ALAMEDA COUNTY WATER DISTRICT

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May 3, 2010

Ms. Christy L. Spector
Environmental Scientist
State of California Department of Water Resources
Division of Integrated Regional Water Management
901 P Street
Post Office Box 942836
Sacramento, California 94236-0001

Subject: Final Report, Inland Saltwater Intrusion Monitoring Wells Project, Job No. 6367, Agreement Number 4600008186

Dear Ms. Spector:

Alameda County Water District (ACWD) is pleased to submit the Final Report for the Inland Saltwater Intrusion Monitoring Wells Project. As outlined in Section 16, Page 5 of the Grant Agreement 46000008186, enclosed are hard and an electronic copies of the report.

If you have any questions regarding this submittal, please contact me at (510) 668-4452.

Sincerely,

Douglas T. Young, P.G.
Hydrogeologist

dty/ps
Enclosure
cc: Steven Inn, Alameda County Water District

Inland Saltwater Intrusion Monitoring Wells Project

Final Report

Mowry Wellfield

ACWD
ALAMEDA COUNTY WATER DISTRICT

INLAND SALTWATER INTRUSION MONITORING WELLS PROJECT

DWR Agreement 4600008186

Prepared for
State of California
Department of Water Resources
Division of Planning and Local Assistance
901 P Street
P.O. Box 942836
Sacramento, California 94236-0001

Prepared by
Alameda County Water District
43885 South Grimmer Boulevard
Fremont, California 94538

April 28, 2010

INLAND SALTWATER INTRUSION MONITORING WELLS PROJECT

DWR Agreement 4600008186

Prepared for and Funded by
State of California
Department of Water Resources
Division of Planning and Local Assistance
901 P Street
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Prepared by:

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April 28, 2010

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INLAND SALTWATER INTRUSION MONITORING WELLS PROJECT

1.0 EXECUTIVE SUMMARY

This report presents the results of the assessment of the geologic and hydrogeologic conditions in the central portion of the Niles Cone Groundwater Basin. Key goals of this project were to: 1) gain a better understanding of the geological process that formed the Niles Cone aquifer system; 2) allow long term monitoring of Centerville and Fremont Aquifers in the central portion of the Niles Cone; 3) evaluate the extent of and the risk of brackish water impacting ACWD's active water supply wells in the Mowry Wellfield; 4) determine the relationship between the Centerville and Fremont Aquifers; and 5) to increase ACWD's understanding of the locations of inferred major depositional channels in the area.

On November 14, 2008, the Alameda County Water District (ACWD) entered into an agreement with the State of California Department of Water Resources (DWR) for the installation of seven monitoring wells at six sites in the central portion of ACWD's service area. Due, in part, to the economic downturn, ACWD received several competitive bids below its estimated costs. Subsequently, on December 9, 2008, ACWD submitted a request for four additional monitoring wells and one additional drilling site. This request was approved by DWR on December 19, 2008. The eleven monitoring wells at the seven proposed drilling sites were all located within the City of Fremont right of ways or properties. The wells were proposed in these areas due to the identification of brackish water near ACWD's wellfields, lack of geologic and hydrogeologic information in this region, and the need for long-term groundwater monitoring points to evaluate groundwater quality trends.

Field activities began on January 12, 2009, and were completed on June 9, 2009. The following summary table describes the original proposed well locations, the approved revised well locations, the actual well installation locations, and explanation of changes:

Original Proposed Location	Revised Well Location	Actual Well Location	Reason for Change
Blacow @ Brophy - F	Blacow @ Brophy - F	Blacow @ Brophy - F	No Change
---	Blacow @ Brophy- C	Blacow @ Brophy- C	Due to lower than expected drilling costs, well added to complete cluster.
Fremont @ Saint Leonards - F	Fremont @ Saint Leonards - F	---	Not installed due to underground utilities.
---	Fremont @ Saint Leonards - C	---	Due to lower than expected drilling costs, well added to complete cluster. Not installed due to underground utilities.
Fremont Library - F	Fremont Library - F	Fremont Library - F	No Change
Fremont Library - C	Fremont Library - C	---	Eliminated due to space limitation and underground utilities.
---	---	Margery @ Blanchard - F	Replacement well for Fremont @ Saint Leonard -F
---	---	Margery @ Blanchard - C	Replacement well for Fremont @ Saint Leonard -C
---	Heritage Village -F	---	Not installed due to access issues.
---	---	Meyer Park - F	Replacement for proposed additional well at Heritage Village -F that could not be installed due to access issues.
__	---	Meyer Park - C	Replacement for proposed well Fremont Library - C that could not be install due to underground utilities.
Noll Park - F	Noll Park - F	Noll Park - F	No Change
Robin @ Ladner - F	Robin @ Ladner - F	Robin @ Ladner - F	No Change
__	Robin @ Ladner - C	Robin @ Ladner - C	Due to lower than expected drilling costs, well added to complete cluster.
Serra Place - C	Serra Place - C	Serra Place - C	No Change
7 Wells	**11 Wells**	**11 Wells**	**4 Additional Wells**

Detailed lithologic characterizations and electric logs were conducted at five of the seven drill sites. The other two drill sites, Serra Place and Noll Park, already had existing logs. The locations of the drill sites were selected based on their proximity to inferred limits of brackish groundwater and available access. Significant amounts of sands and gravels were encountered in the logged borings at depths typical of the Centerville (180 to 230 feet below ground surface (bgs)) and Fremont (290 to 325 feet bgs) Aquifers.

Beneath the study area, the Centerville and Fremont Aquifers consist primarily of coarse grained gravelly sands and sandy gravels. The Centerville Aquifer ranges in thickness from 35 feet (Margery @ Blanchard and Fremont Library) to 50 feet (Serra Place and Noll Park). The Fremont Aquifer ranges in thickness from 15 feet (Noll Park) to 75 feet (Meyer Park). The Centerville and Fremont Aquifers are separated by the Mission Aquitard which consists of silty or sandy clay and ranges in thickness from 25 feet (Blacow @ Brophy and Fremont Library) to 84 feet (Robin @ Ladner).

Seventeen samples of fine grained material (aquitards) between water-bearing zones that are equivalent in elevation to the Newark, Centerville, Fremont, and Deep 1 Aquifer were collected for permeability testing. A summary of the ranges of permeability is documented in the following table:

	Permeability Range (cm/sec)	**Between Aquifers**
Irvington Aquitard	5.36×10^{-4} to 1.33×10^{-8}	Newark and Centerville Aquifers
Mission Aquitard	4.22×10^{-7} to 3.16×10^{-8}	Centerville and Fremont Aquifers
Deep 1 Aquitard	3.05×10^{-8} to 6.40×10^{-9}	Fremont and Deep 1 Aquifers

cm/sec= centimeters/second

The results indicate a low vertical transmission rates in the Mission and Deep 1 Aquitards. In general the Irvington Aquitard also exhibits low vertical transmission rates with the exception of samples collected at the Meyer Park well site where the permeability values are significantly higher (5.36×10^{-4} to 2.08×10^{-5} cm/sec).

Groundwater samples collected from the monitoring wells were analyzed for chloride, hardness, and total dissolved solids. A summary table of the range of analytical results is presented below:

	Centerville Aquifer (5 samples)	**Fremont Aquifer (6 samples)**
Chloride	133.8 to 660.0 ppm	147.5 to 1,331.3 ppm
Hardness	380.0 to 980.0 ppm	220.0 to 1,400.0 ppm
Total Dissolved Solid	674.0 to 1,565.0 ppm	708.0 to 2,460.0 ppm

ppm = parts per million

Aquifer thickness maps of the Centerville and Fremont Aquifers reveal two distinct geologic patterns. When combined, the two geologic patterns generally correspond with the deposition map of the Centerville and Fremont Aquifers presented in DWR Bulletin 118-1. But when separated, the Centerville Aquifer pattern generally follows the

southern branches of the main southern depositional axis and the Fremont Aquifer generally follows the northern branches of the main southern deposition axis.

Differences in water level elevations between the Centerville and Fremont Aquifers (that vary between 0.29 and 0.91 feet) and the relatively low permeability values documented in the Mission Aquitard (between the Centerville and Fremont Aquifers) indicate that a hydraulic separation exists between the two aquifers beneath the study area. Although there are areas within the Niles Cone Groundwater Basin that indicate there are hydraulic connections between the Centerville and Fremont Aquifers, it appears that within the study area of the brackish water plume, the two water bearing zones are distinct. Originally, it was believed that, in general, the Centerville and Fremont Aquifers were two separate aquifers acting as one water bearing unit (since there was only a slight difference in water level elevations), thus the aquifers have been collectively referred to as the Centerville-Fremont Aquifer. The geologic and hydrologic data collected during this project indicates that the aquifers are not acting as one water bearing unit within the study area. It is likely that in order to effectively address the brackish water plume near the Mowry Wellfield, the Centerville and Fremont Aquifers may need to be treated as separate water bearing units.

The data collected during this study made a significant contribution to the understanding of the brackish water bulge located in the vicinity of the Mowry Wellfield. On-going monitoring of the wells will allow ACWD to develop a plan to prevent brackish water intrusion from reaching the Mowry Wellfield and yield a better understanding of chloride movement and groundwater flow direction over time. As a result of DWR's Local Groundwater Management Assistance Grant Program, all of the key goals of the Inland Saltwater Intrusion Monitoring Wells Project were accomplished.

2.0 INTRODUCTION

2.1 Background

The goals of this project were to gain a better understanding of the geological process that formed the Niles Cone aquifer system, allow long term monitoring of Centerville and Fremont Aquifers in the central portion of the Niles Cone, evaluate the extent of and the risk of brackish water impacting ACWD's active water supply wells in the Mowry Wellfield, determine the relationship between the Centerville and Fremont Aquifers, and to increase ACWD's understanding of the locations of inferred major depositional channels in the area. To obtain these goals, ACWD installed 11 groundwater monitoring wells in and around an identified brackish groundwater plume in the vicinity of ACWD's Mowry Wellfield (Figure 1). The locations were selected based on areas where critical data gaps exist, available open space, and long term access.

2.2 Original Proposal

The original proposal called for the installation of seven monitoring wells at six sites (two with existing wells and four new locations). One monitoring well (Fremont Aquifer) was planned at each of three new sites (Blacow @ Brophy, Robin @ Ladner, and Fremont @ St. Leonards). Two monitoring wells (one in the Centerville and one Fremont Aquifer) were proposed at one new site (Fremont Library). A Centerville Aquifer well was proposed next to an existing Fremont Aquifer well (Serra Place), and a Fremont Aquifer well was proposed next to an existing Centerville Aquifer monitoring well (Noll Park). The locations are presented on Figure 2. One pilot boring was to be drilled at each of the four new sites to a total depth of 400 feet below ground surface or to bedrock, whichever came first, to obtain a detailed geologic profile of the alluvial material. The two existing well locations (Serra Place and Noll Park) already had pilot borings drilled in 2007. Each of the pilot borings were planned to be converted into monitoring wells screened within the Fremont Aquifer.

2.3 Revised Proposal

A Notice of Commitment from DWR for a $250,000 grant was received by ACWD on June 26, 2008. On November 14, 2008, ACWD and DWR entered into an agreement (No. 4600008186) for implementation of the Inland Saltwater Intrusion Monitoring Wells Project.

When preparing the original scope of work, ACWD outlined a program that would delineate the brackish water identified in the Centerville and Fremont Aquifers while considering the constraints of available space in a highly urbanized area. Based on historic costs for well installation, this ideal scope of work could not be implemented within DWR's grant allocation. Subsequently, ACWD adjusted the scope of work to maximize coverage, focusing on the Fremont Aquifer, while keeping within the budget.

When the bid costs for implementing the approved scope of work was much lower than expected, ACWD reviewed the project and determined that the addition of four monitoring wells would significantly increase ACWD's understanding of the basin in this area, especially the relationship between the Centerville and Fremont Aquifers. On December 9, 2008, ACWD submitted a memorandum outlining the proposed revised scope of work to DWR for approval. The revised scope of work proposed to add one additional Centerville Aquifer monitoring well to each of the three proposed Fremont Aquifer monitoring well drilling locations, thus creating well clusters at each location. One additional Fremont Aquifer monitoring well was proposed at ACWD's Heritage Village location. This would increase the number of monitoring wells proposed under the project from seven to eleven. The additional scope of work would significantly increase ACWD's understanding of the basin while not changing the amount of the grant. The proposal was verbally approved by DWR (Harley Davis) on December 19, 2008.

2.4 Project Goals and Objectives

The primary goals of this project were to drill and install groundwater monitoring wells in the central portion of ACWD's service area to obtain geologic and hydrogeologic information in this critical area and to evaluate the extent of brackish groundwater identified in the area. The specific objectives of the project as stated in ACWD's proposal and approved change of scope memorandum are summarized below:

- Drill five 400 foot exploratory borings and install monitoring wells completed in the Fremont Aquifer zone.

- Install Centerville Aquifer monitoring wells next to proposed or existing monitoring wells to evaluate water quality and vertical transmissivity.

- Collect undisturbed core samples from the fine grained material between the water-bearing zones for the purposes of conducting vertical permeability analysis.

- Collect aquifer specific groundwater elevation data from the newly installed monitoring wells.

- Collect aquifer specific groundwater quality data from the newly installed monitoring wells.

- Gain a better understanding of the geology and hydrogeology of the central region of the Niles Cone Groundwater Basin.

- Add needed groundwater monitoring points to the groundwater monitoring network that will provide long term aquifer specific groundwater elevation and groundwater quality monitoring.

- Share and discuss groundwater elevation and groundwater quality information obtained from the monitoring sites.

- Share information with other interested parties by including the results in ACWD's annual Groundwater Monitoring Report.

2.5 Project Scope

The above objectives were met by drilling and constructing groundwater monitoring wells to obtain detailed geologic and hydrogeologic data of the area, and to provide long term monitoring points to evaluate groundwater flow and quality. The sites were selected based on the identification of areas where ACWD needed additional information to improve our understanding of the localized geology, groundwater flow, and water quality conditions. The wells were also located in areas that will have long term accessibility, thus providing long term groundwater monitoring points. The original proposed drill sites are presented in Figure 2.

Several modifications were made to the original proposed project scope due to lower than expected contractor costs and previously unidentified utility lines. A summary of the changes to the scope of work are as follows:

- Three additional Centerville Aquifer monitoring wells and one new Fremont Aquifer monitoring well were added to the project.

- During utility clearance operations at the Fremont Library site, a previously unidentified storm drain lateral and parking lot lighting electrical wiring were encountered. The identification of these structures limited the available space for well installation from the planned two monitoring wells to one monitoring well. Upon completion of the pilot boring and electronic log, it was determined that a Centerville Aquifer monitoring well was not necessary at this location.

- A Fremont Aquifer monitoring well was planned to be installed at Heritage Village (new location). Because of property access issues, the monitoring well proposed for Heritage Village was relocated to a planter area on Glenmoor Drive @ Eggers Drive (Meyer Park).

- Given the proximity of the Meyer Park site to the brackish groundwater plume, a Centerville Aquifer monitoring well was also completed. Since a Centerville Aquifer monitoring well was not installed at the Fremont Library site, the addition of a Centerville Aquifer monitoring well at this site did not change the overall scope of work.

- The identification of previously unidentified utility lines at the Fremont @ St Leonards Way site prompted relocation of the drill site to a planter area along Margery Drive @ Blanchard Street.

The changes in location of the drilling sites were approved by DWR (Harley Davis and Christy Spector) and satisfy the objectives of the project in that it is within the vicinity of the identified brackish groundwater plume where there is a lack of geologic and

hydrogeologic data. As a result, the final project scope was expanded to include the installation of 11 wells at seven sites. The locations for the final well sites and well identifications are presented in Figure 3 and the drilling activities at each site are described below.

Monitoring Well Drill Site: Fremont Library

A single boring was drilled to 400 feet below ground surface (bgs). The boring was sampled and geophysically logged for the purpose of creating a detailed geologic record for the site. The log is being used to further understand the geology and hydrogeology of the Niles Cone aquifer system. Upon completion of drilling and logging of the exploratory boring, a monitoring well, 4S/1W-28R003 (Fremont Library-F), was installed to a depth of 295 feet bgs. This depth generally corresponds to the Fremont Aquifer identified regionally throughout much of the Niles Cone Groundwater Basin.

Monitoring Well Drill Site: Robin @ Ladner

A single boring was drilled to 400 feet bgs. The boring was sampled and geophysically logged. Upon completion of drilling and logging of the exploratory boring, a monitoring well, 5S/1W-4H005 (Robin-F), was installed to a depth of 365 feet bgs. An additional monitoring well, 5S/1W-4H004 (Robin-C), was completed to a depth of 255 bgs. These depths generally correspond to the Fremont and Centerville Aquifers.

Monitoring Well Drill Site: Blacow @ Brophy

A single boring was drilled to 400 feet bgs. The boring was sampled and geophysically logged. Upon completion of drilling and logging of the exploratory boring, a monitoring well, 4S/1W-32N002 (Blacow-F), was installed to a depth of 350 feet bgs. An additional monitoring well, 4S/1W-32N001 (Blacow-C), was completed to a depth of 250 feet bgs. These depths generally correspond to the Fremont and Centerville Aquifers.

Monitoring Well Drill Site: Meyer Park

A single boring was drilled to 400 feet bgs. The boring was sampled and geophysically logged. Upon completion of drilling and logging of the exploratory boring, a monitoring well, 4S/1W-32E012 (Meyer Park-F), was installed to a depth of 340 feet bgs. An additional monitoring well, 4S/1W-32E011 (Meyer Park-C), was completed to a depth of 240 bgs. These depths generally correspond to the Fremont and Centerville Aquifers.

Monitoring Well Drill Site: Margery @ Blanchard

A single boring was drilled to 400 feet bgs. The boring was sampled and geophysically logged. Upon completion of drilling and logging of the exploratory boring, a monitoring well, 4S/1W-33R008 (Margery-F), was installed to a depth of 350 feet bgs. An additional monitoring well, 4S/1W-33R007 (Margery-C), was completed to a depth of 250 bgs. These depths generally correspond to the Fremont and Centerville Aquifers.

Monitoring Well Drill Site: Serra Place

In March 2007 a single boring was drilled to 400 feet bgs. The boring was sampled and geophysically logged. Upon completion of drilling and logging of the exploratory boring, a monitoring well, 4S/1W-32K011 (Serra Place-F), was installed to a depth of 360 bgs. Based on the log generated for this boring, an additional monitoring well, 4S/1W-32K014 (Serra Place-C), was completed during this drilling project. Monitoring well Serra Place-C was installed to a depth of 250 feet. The completion depth of Serra Place-C and Serra Place-F generally corresponds to the Centerville and Fremont Aquifers. The installation of monitoring well Serra Place-C completes the well cluster at this location.

Monitoring Well Drill Site: Noll Park

In February 2007, a single boring was drilled to 400 feet bgs. The boring was sampled and geophysically logged. Upon completion of drilling and logging of the exploratory boring, a monitoring well, 4S/1W-33N002 (Noll Park-C), was installed to a depth of 270 bgs. Based on the log generated for this boring, an additional monitoring well, 4S/1W-33N003 (Noll Park-F), was completed during this drilling project. Monitoring well Noll Park-F was installed to a depth of 350 feet. The completion depth of Noll Park-C and Noll Park-F generally corresponds to the Centerville and Fremont Aquifers. The installation of monitoring well Noll Park-F completes the well cluster at this location.

The installation of the well clusters allows long term monitoring of the Centerville and Fremont Aquifers and determination of trends in vertical flow and water quality between the two aquifers over time.

2.6 Geology and Hydrogeology

The Niles Cone Groundwater Basin is an alluvial aquifer system consisting of unconsolidated gravel, sand, silt, and clay. The gravel and sand deposits have the highest permeability and thus comprise the aquifers; conversely, silt and clay layers have low permeability and form the aquitards. An aquifer is a water-bearing geologic formation which will yield an appreciable or economically beneficial supply of water. In 1968, DWR used the term aquiclude, a saturated geologic unit that is incapable of transmitting significant quantities of water under ordinary hydraulic gradients, for the low

permeability beds that confine the aquifers. In 1973, DWR reclassified these confining beds as aquitards, which are relatively low permeability geologic beds in a stratigraphic sequence that store water, but will not transmit it rapidly enough to supply wells or springs. These beds may be permeable enough to transmit water in quantities that are significant for the study area, even though water movement per acre is insignificant.

The Niles Cone Groundwater Basin is divided by the Hayward Fault. The Hayward Fault is an active fault with low permeability that impedes the lateral flow of groundwater. Large differences in water levels on either side of the fault demonstrate the relatively impermeable nature of the fault. ACWD manages both the Above Hayward Fault and the Below Hayward Fault sub-basins. The AHF sub-basin on the east side of the Hayward Fault is composed of highly permeable sediments referred to as the AHF Aquifer. The BHF sub-basin is composed of a series of relatively flat lying aquifers separated by extensive clay aquitards (Figure 4).

Over time, the alluvial/fluvial depositional environment produced thick coarse grain sediments along present day Alameda Creek and also along historic stream channels (now buried). With distance westward, both the thickness and grain size of the aquifers decreases while the intervening clay aquitards become thicker. The aquitards appear to be absent just west of the Hayward Fault in the hydrogeologic region called the forebay area.

The shallowest regional aquifer in the BHF sub-basin, the Newark Aquifer, is an extensive permeable gravel and sand layer between 40 and 140 feet below ground surface (bgs), except in the forebay area where it begins at the surface. The thickness of the Newark Aquifer ranges from less than 20 feet at the western edge of the basin to more than 140 feet at the Hayward Fault. The Newark Aquifer is overlain in most of the sub-basin by a thick layer of silt and clay called the Newark Aquiclude. The Newark Aquiclude is absent in the forebay area, allowing direct recharge to the Newark Aquifer from Alameda Creek and the recharge ponds. Within the Newark Aquiclude, layers of sand and silt comprise a non-regional hydrogeologic unit known commonly as the shallow water-bearing zone.

An extensive thick clay aquitard separates the Newark Aquifer from the Centerville Aquifer. The Centerville Aquifer, the top of which lies at an average depth of 180 to 230 feet bgs, overlies a thick clay aquitard, which in turn overlies the Fremont Aquifer which exists in the interval of 290 to 390 feet bgs. Although the Centerville and Fremont Aquifers are separate aquifers, they have been considered as one water bearing unit (Centerville-Fremont Aquifer), based on historical water level data that indicated that they are in good hydrogeologic connection (Figure 4). However, water level and water chemistry results from this program indicate that in the study area of the brackish water bulge, these two aquifers are isolated from each other. Lithologic analysis also confirms their separation in this portion of the basin. This isolation is best seen at some of the well clusters with wells screened in each aquifer.

Saltwater from San Francisco Bay and the adjacent salt ponds intruded into the Newark Aquifer as a result of over pumping of groundwater and was first noted in the 1920's. The Newark Aquifer became unsuitable for irrigation. Deeper wells were drilled and also over pumped. Brackish water appeared in the deeper aquifers in the 1940's. Intrusion occurred as far inland as the Hayward Fault.

Starting in 1962, ACWD began to supplement local recharge with water purchased from the State Water Project to raise groundwater levels. By 1972, the groundwater head in the Newark Aquifer had been restored to above sea level and the natural bayward flow direction was re-established. In 1974, ACWD implemented the Aquifer Reclamation Program to expedite the removal of brackish water from the Newark, Centerville, and Deep Aquifers. The brackish water from the Aquifer Reclamation Program pumping was originally discharged to flood control channels that flowed into San Francisco Bay. In 2003, ACWD began operating a desalination facility to treat the brackish water pumped from the Aquifer Reclamation Program wells (Figure 4) prior to its addition to the distribution system. This has been a highly successful program which has resulted in substantial improvement in water quality in both the Newark and Centerville Aquifers as well as creating a beneficial use for the brackish groundwater. However, brackish water still remains in all the aquifers.

3.0 METHODOLOGY

This section presents the field methodology that was implemented to obtain the data necessary to meet the project objectives. Information presented in this section includes a description of pre-field activities such as permitting and underground utility clearance, as well as soil boring and groundwater well installation procedures, and soil and groundwater sampling methodologies.

3.1 Pre-Field Mobilization Activities

3.1.1 Drilling Permits

ACWD obtained 11 drilling permits from the Alameda County Water District. Copies of the permits are presented in Appendix A.

3.1.2 Access Agreements

ACWD obtained 7 encroachment permits and one access agreement from the City of Fremont for the installation of monitoring wells. Nine of the monitoring wells were installed within the City of Fremont right-of-ways and two monitoring wells were installed on City of Fremont property. Copies of the permits and access agreement are presented in Appendix B.

3.1.3 Underground Utility Surveys

Prior to drilling activities, ACWD personnel visited the drill sites to mark the proposed locations for the wells and met with the facility contacts to discuss the location of underground utilities. Underground Service Alert (USA) was contacted, after the field locations were marked, at least 72 hours prior to field mobilization.

3.2 Soil Boring and Well Installation Procedures

3.2.1 Subsurface Drilling

Drilling of the borings and installation of the monitoring wells were performed by Precision Sampling, Inc. (Precision) of Stockton, California. The borings were drilled with a Delta Base 540 mud rotary drilling rig with an 8.75-inch diameter drill bit. At each new drilling location, pilot holes were drilled to a maximum depth of 400 feet bgs. The pilot holes were drilled for the purposes of creating a lithologic log of the boreholes, running geophysical logs, and designing the monitoring wells. Samples of geologic material were collected at five foot intervals, examined, and documented on a field log data sheet. Undisturbed soil samples were collected of the fine grained material between aquifers for permeability testing. The undisturbed soil samples were collected by advancing the boring to a point immediately above the desired sampling depth and then

pushing a Modified California Split Spoon Sampler lined with three brass tubes, into the undisturbed soil. The sampler was then extracted from the borehole, the ends of the bottom tube were covered with plastic end caps, the vertical orientation of the sample was noted (which end was up), and labeled with a unique identification number. Samples not retained for analytical testing were used for lithologic evaluation.

3.2.2 Well Installation

Eleven new monitoring wells were installed as part of this project. Nine of the wells (4S/1W-32K014 (Serra Place-C), 4S/1W-32N002 (Blacow-F), 4S/1W-32N001 (Blacow-C), 4S/1W-32E012 (Meyer Park-F), 4S/1W-32E011 (Meyer Park-C), 5S/1W-04H005 (Robin-F), 5S/1W-04H004 (Robin-C), 4S/1W-33R008 (Margery-F), and 4S/1W-33R007 (Margery-C)) were installed within the City of Fremont right-of-ways. Two new monitoring wells, (4S/1W-33N003 (Noll Park-F) and 4S/1W-28R003 (Fremont Library-F)) were installed on City of Fremont property. Well construction details are discussed below and summarized in Table 1. Unless otherwise stated, well installations were conducted using the following general specifications:

- Installation of monitoring wells within the pilot borings (4S/1W-32N002 (Blacow-F), 4S/1W-32E012 (Meyer Park-F), 5S/1W-04H005 (Robin-F), 4S/1W-33R008 (Margery-F), and 4S/1W-28R003 (Fremont Library-F)) were done upon completion of geophysical logging (resistivity, spontaneous potential, conductivity, gamma, and temperature) of the wells by Welenco of Bakersfield California. Neat cement was tremied from the bottom of the boring to within 10 feet of the designed bottom of the well. The neat cement was allowed to cure a minimum of 24-hours prior to reaming out the borehole with an 8.75-inch diameter drill bit to the designed well depth. Upon completion of reaming, installation of the monitoring well casing and material was performed.

- Casing and screen for all the monitoring wells were constructed of 2-inch diameter Schedule 80 polyvinyl chloride (PVC) plastic with factory slotted well screen (slot size 0.020-inch).

- All sand packs were constructed using coarse aquarium (4x12) sand. Due to the density of the drilling fluid and sealing depths, it was not practical to place the fine separator sand as proposed. Instead, additional coarse aquarium sand was placed between 15 to 20 feet above the top of the designed screened portion of the monitoring well. The additional thickness of coarse aquarium sand sufficiently retarded the intrusion of the sand-cement slurry, keeping it out of the screened portion of the well.

- All the wells were grouted from the top of the sand pack to the surface using a sand-cement slurry.

- Drilling mud displaced by the well installation activities was placed in a trailer mounted storage tank and transported to ACWD's storage site.

- For wells installed within the City of Fremont right-of-way, a traffic-rated well cover was installed flush to the existing grade with a concrete pad surrounding the well cover that extended from sidewalk to curb.

- For wells installed on City of Fremont property, a traffic-rated well cover was installed flush to the existing grade with a concrete pad surrounding the well cover.

3.2.3 Well Development

The sand-cement slurry was allowed to cure 72-hours prior to well development. The goals of development were to remove fine sediment from the well casing and screen, to stabilize the filter pack, and to maximize water flow between the well and the aquifer. Well development was performed using the drop pipe and air lift method. The drop pipe was moved up and down the well to agitate sediment in the well and to set up a surging action within the well screen. The well was then purged using compressed air to lift both water and sediment out of the well. Field parameters (temperature, pH, electrical conductivity, and turbidity) were measured at approximately 500 to 1,000 gallon intervals. Development continued until turbidity was reduced to 5 nephelometric turbidity units (NTU) or removal of 2,000 gallons, whichever came first. Development water containing drilling mud was placed in a truck mounted storage tank and transported to ACWD's property for storage.

3.3 Monitoring Well Survey Procedures

The monitoring wells were surveyed by ACWD using a Trimble R8 GPS (Global Positioning System). The monitoring wells were located, within limitations of the equipment, to approximate vertical and horizontal accuracies of $\pm$ 0.2 and $\pm$ 0.1 of a foot, respectively. The survey data is presented in Table 2.

3.4 Storm Water Protection and Emergency Response Plans

ACWD required Precision to prepare a Storm Water Protection and an Emergency Response Plan for the project. The plans were prepared and in place prior to implementing field activities. ACWD required the preparation of plans to minimize the effects of sediment runoff and potential unauthorized spills to the environment. Copies of the plans are presented in Appendix C.

3.5 Sampling and Analysis Procedures

3.5.1 Soil Permeability Testing

Selected soil samples were collected using a 24-inch long Modified California Split Spoon Sampler with 2.5-inch brass liners. The sampler was pushed 24 inches into the underlying sediment using a hydraulic slide hammer on the drilling rig. The sampler was

then removed and the sample liners removed. The sample retained for testing was capped with plastic end caps, labeled, packaged, and delivered to a soils laboratory certified by the American Association of State Highway and Transportation Officials (AASHTO) for soil permeability testing. No preservation procedures were required. The testing laboratory used was SIGNET Laboratories of Hayward, California. The soil cores were analyzed by Falling-Head Flexible Wall Permeability Testing by ASTM Method D-5084. Soil samples were collected in fine grained material for the purposes of evaluating the vertical permeability between identified aquifers.

3.5.2 Groundwater Testing

General groundwater quality samples were collected and analyzed for physical characteristics, chlorides (EPA Method 300), total dissolved solids (Standard Methods 2540C), and hardness (Standard Methods 2340B). The wells were purged by air lifting with a minimum of three casing volumes removed prior to sampling. Upon completion of purging, the samples were collected in unpreserved 250 milliliter glass Teflon-capped laboratory-supplied bottles and delivered under chain of custody record to ACWD's water quality laboratory. ACWD's laboratory is a state certified laboratory and is part of the Environmental Laboratory Accreditation Program.

3.6 Soil Disposal Procedures

Soil and drilling mud generated during field operations were removed from the well locations and transported to ACWD's storage site located on Mission Boulevard next to Alameda Creek in Fremont, California.

4.0 RESULTS

4.1 Geology

The geological data collected from this project is consistent with an alluvial channel deposition. The general lithology consists of inter-bedded clays, sands, and gravels with intermingled silts. The lithologic data is fairly consistent with the general first encountered depth below ground surface of the Newark (40 to 50 feet bgs), Centerville (180 to 230 feet bgs), and the Fremont (290 to 325 feet bgs) Aquifer zones. Aquifer zones in the vicinity of the Fremont Library appear to be shallower in depth than encountered at the other drill sites. This may be, in part, due to the close proximity of the Fremont Library drilling location to the source area of the Niles Canyon Alluvial Fan. In general, the alluvial depositional bedding becomes shallower in depth as it nears the source area since the source area is at a higher elevation than the surrounding topography. Geologic well logs presenting the lithologic log, geophysical log, and well completion are presented in Appendix D.

4.2 Groundwater Elevations

Water level measurements were collected in the monitoring wells within a 10 day window from August 31, 2009 to September 9, 2009. Groundwater elevations within the Centerville Aquifer ranged from -3.3 feet Mean Sea Level (MSL) to -6.0 feet MSL in monitoring wells Robin-C (5S/1W-04H004) and Blacow-C (4S/1W-32N001), respectively. Groundwater elevations within the Fremont Aquifer ranged from –3.6 feet MSL to -6.5 feet MSL in monitoring wells Robin-F (5S/1W-04H005) and Blacow -F (4S/1W-32N002), respectively (Table 3). Water level elevations collected at each of the cluster well sites that have Centerville and Fremont Aquifer monitoring wells consistently documented lower groundwater elevations in the Fremont Aquifer well. The elevation difference ranged from 0.23 foot to 0.91 foot difference in the Meyer Park and Noll Park clusters, respectively. A summary table is presented below:

Well Cluster	Difference in Water Level Elevation between Centerville and Fremont Aquifers (feet)
Blacow @ Brophy	0.46
Margery @ Blanchard	0.47
Meyer Park	0.23
Noll Park	0.91
Robin @ Ladner	0.29
Serra Place	0.79

4.3 Groundwater Analytical Testing

Upon completion of well construction, the wells were developed to remove sediment that had accumulated in the well as a result of well construction activities. All the wells were

developed to the goal of 5 NTUs or 2,000 gallons removed, whichever came first. Appendix E contains the development records for the monitoring wells.

Upon completion of development and purging, samples were collected and delivered to the analytical laboratory under chain-of-custody record for testing. The table below matches each well to the aquifer monitored:

Well Name	State Identification Number	Aquifer Monitored
Blacow-C	4S/1W-32N001	Centerville Aquifer
Margery–C	4S/1W-33R007	Centerville Aquifer
Meyer Park-C	4S/1W-32E011	Centerville Aquifer
Robin-C	5S/1W-04H004	Centerville Aquifer
Serra Place-C	4S/1W-32K014	Centerville Aquifer
Blacow-F	4S/1W-32N002	Fremont Aquifer
Fremont Library-F	4S/1W-28R003	Fremont Aquifer
Margery-F	4S/1W-33R008	Fremont Aquifer
Meyer Park-F	4S/1W-32E012	Fremont Aquifer
Noll Park-F	4S/1W-33N003	Fremont Aquifer
Robin-F	5S/1W-04H005	Fremont Aquifer

Laboratory results for water samples collected from the monitoring wells installed during this program are presented in Table 3. Data from two monitoring wells (Serra Place–F and Noll Park–C) were used in the analysis of the brackish water plume but were not installed under this project. ACWD's standard semiannual sampling does not encompass the analysis for hardness, thus the hardness analysis for Serra Place-F and Noll Park-C are not included in Table 3. The table below summarizes the ranges of analytical results for the Centerville and Fremont Aquifers:

	Centerville Aquifer (5 samples)	Fremont Aquifer (6 samples)
Chloride	133.8 to 660.0 ppm	147.5 to 1,331.3 ppm
Hardness	380.0 to 980.0 ppm	220.0 to 1,400.0 ppm
Total Dissolved Solids	674.0 to 1,565.0 ppm	708.0 to 2,460.0 ppm

ppm=part per million

The Laboratory Analytical Report is presented in Appendix F.

4.4 Soil Permeability Testing

A total of 17 soil samples were collected and tested for evaluation of vertical permeability (Table 4). The samples were collected from the aquitards between the Newark and Centerville Aquifers (Irvington Aquitard), Centerville and Fremont Aquifers (Mission Aquitard), and Fremont and Deep 1 Aquifers (Deep 1 Aquitard). Below is a summary table presenting the results of the permeability testing:

	Permeability Range	Between Aquifers
Irvington Aquitard	5.36×10^{-4} to 1.33×10^{-8} cm/sec.	Newark and Centerville Aquifers
Mission Aquitard	4.22×10^{-7} to 3.16×10^{-8} cm/sec.	Centerville and Fremont Aquifers
Deep 1 Aquitard	3.05×10^{-8} to 6.40×10^{-9} cm/sec.	Fremont and Deep 1 Aquifers

cm/sec= centimeters/second

The results indicate low vertical transmission rates in the Mission and Deep 1 Aquitards. In general the Irvington Aquitard also exhibits low vertical transmission rates with the exception of samples collected at the Meyer Park well site where the permeability values are significantly higher (5.36×10^{-4} to 2.08×10^{-5} cm/sec). The shallower sample (fine sand), collected at131 feet bgs, appears to have been collected in the lower portion of the Newark Aquifer and not the Irvington Aquitard. The lower sample (silty clay), collected from 161 feet bgs, and appears to be more characteristic of the Irvington Aquitard. Laboratory Reports are presented in Appendix G.

5.0 CONCLUSIONS

The drilling locations were selected based on work previously conducted by DWR (documented in DWR Bulletin No. 118-1, Evaluation of Ground Water Resources South Bay, Appendix A: Geology, August 1967), analytical data collected during ACWD's semiannual groundwater monitoring program, and available drilling locations in the vicinity of the brackish water plume. The locations were selected to further define the boundaries of the brackish water plume and to evaluate water quality. Although two of the drill sites were relocated (Fremont @ St Leonards to Margery @ Blanchard and Heritage Village to Meyer Park), the new locations still satisfied these goals.

Overall, the geological data collected during the drilling of the soil borings is consistent with the alluvial channel depositional environment in the Niles Cone Groundwater Basin. Significant amounts of sands and gravels were encountered in the logged borings at depths comparable to the Centerville and Fremont Aquifers. In the monitoring wells installed during this project, the Centerville and Fremont Aquifers ranged in thickness from 35 to 50 feet and 15 to 75 feet, respectively. A graphical presentation of the relationship and makeup of the Centerville and Fremont Aquifers beneath the study area are presented in two hydrologic formation cross-sections (Figure 5). The cross-sections, A-A' and B-B', are presented in Figures 6 and 7, respectively. These cross-sections present the generalized zones which characterize the hydrogeologic formations above 400 feet bgs. Within each of the aquifers zones, there are relatively thicker areas that contain a higher percentage of gravels. These zones appear to generally correspond to the depositional axis within the Centerville and Fremont Aquifers as identified in DWR Bulletin No 118-1.

One of the goals of the project was to evaluate and refine the predominate direction and axis of major aquifer deposition in the Centerville and Fremont Aquifer systems, as identified in DWR Bulletin No 118-1, that may be influencing the brackish water plume. Aquifer thickness calculations were made of both the Centerville and Fremont Aquifers from the new and existing wells in the vicinity of the brackish water plume (Table 5). These calculations were then combined into contour maps of lines of equal thickness for the Centerville Aquifer (Figure 8) and Fremont Aquifer (Figure 9). These maps appear to represent two distinct hydrogeologic formation patterns. Figure 8 (Centerville Aquifer) shows two predominant depositional axes that generally correlate to the two southern axes of the major southern leg as presented in DWR Bulletin No 118-1, Plate 13 (Figure 10). Figure 9 (Fremont Aquifer) also shows two predominant depositional axes, but they generally correlate to the two northern axes of the major southern leg as presented in DWR Bulletin No 118-1, Plate 13 (Figure 10).

In addition to evaluating the effect of the geology on the brackish water plume, water samples were collected from the newly installed wells to determine water quality in the Centerville and Fremont Aquifers during ACWD's fall monitoring program. The purpose of the fall monitoring program is to evaluate water quality parameters in wells

located throughout the basin and within the individual aquifer zones when water levels tend to be at their lowest levels. The primary constituent of concern tested for during the program is chloride. Analytical testing of groundwater samples collected from the monitoring wells installed during Inland Saltwater Intrusion Monitoring Wells Project documented the presence of chloride concentrations above the secondary maximum contaminant level (MCL) for drinking water (250 ppm) in several of the wells. To better understand the distribution of chloride in and around the brackish water plume, chloride data collected from both the newly installed monitoring wells and existing wells (Figure 11) that were sampled during the fall monitoring program, within the Centerville and Fremont Aquifers, have been presented in Figures 12 and 13, respectively. The chloride concentrations in the Centerville Aquifer appear to be concentrated along two axes following a south-southwest trend. The chloride concentration map for the Fremont Aquifer appears to be concentrated along a single axis trending to the west-southwest.

Permeability results from soil samples collected during the project documented low permeability values in Aquitards separating water-bearing zones that are equivalent in elevation to the Newark, Centerville, Fremont, and Deep Aquifers within the study area. The permeability values for the samples collected in the Mission (between the Centerville and Fremont Aquifers) and Deep 1 (between the Fremont and Deep 1 Aquifers) Aquitards revealed similar results, ranging from 4.22×10^{-7} cm/sec to 6.40×10^{-9} cm/sec. For comparison, the requirement for a liner beneath a Class 1 Hazardous Waste Landfill is 1.0×10^{-7} cm/sec. This information suggests considerable natural resistance to vertical flow between these aquifers. The samples collected from the Irvington Aquitard (between the Newark and Centerville Aquifers) also documents considerable natural resistance to vertical flow, except in samples collected from the Meyers Park site. The upper sample, collected from 131 feet bgs, is more characteristic of the overlying Newark Aquifer (fine sand). The lower sample, collected at 161 feet bgs, is more characteristic of the Irvington Aquitard (silty clay). It appears the Irvington Aqutard in the vicinity of the Meyers Park site is more vertically transmissive than in other locations within the study area.

The geologic, chloride, hydrologic, and permeability data seem to generally correlate well. Basically, the aquifer thickness maps for the Centerville and Fremont Aquifers compare closely to their respective chloride concentration maps. One variance of note is a slight shift to the west of the western chloride concentration axis with the corresponding aquifer thickness axis in the Centerville Aquifer. This apparent shift may be due to the decades of Aquifer Reclamation Program pumping that has occurred in the Centerville Aquifer in this area. Hydraulically, differences in water level elevations vary between 0.29 and 0.91 feet between the Centerville and Fremont Aquifers. Combining this information with the relatively low permeability values documented in the Mission Aquitard (between the Centerville and Fremont Aquifers), support (in concert with the geologic and chloride data) the inference that a hydraulic separation exists between the two aquifers beneath the study area. The data also indicates that close to the Niles Cone source area, the Centerville and Fremont Aquifers appear to converge (Figure 7). This convergence of aquifer zones is characteristic of the forebay area of the Niles Cone alluvial fan.

Although there are areas within the Niles Cone Groundwater Basin that indicate hydraulic connection between the Centerville and Fremont Aquifers, it appears that within the study area of the brackish water plume, the two water bearing zones are distinct. Due to the limited data that existed when DWR Bulletin No. 118-1 was published, it was originally believed that although the Centerville and Fremont Aquifers were individual aquifers, the groundwater elevation levels did not have sufficient change in elevation to warrant being treated as separate water bearing units, thus were combined and treated as one water-bearing zone. As documented by the data collected during this project, this may not be the case in the area of the brackish water plume. It is likely that in order to effectively address the issue of the brackish water plume near the Mowry Wellfield, the Centerville and Fremont Aquifers may need to be treated as separate water bearing units.

The installation of monitoring wells during this project has already provided valuable information to ACWD. Limited information existed on the geology and hydrogeology in the vicinity of the brackish water plume. The only available source of information from this area was from two nested well clusters within the plume (installed in 1997 and 2000) and four widely scattered monitoring wells around the cluster wells (installed in 2007). The installation of the wells associated with this project has greatly increased our understanding of the brackish water plume and yielded valuable data to assist ACWD in its management of the Niles Cone Groundwater Basin. ACWD has incorporated these wells into its spring and fall monitoring programs so that water level and water quality information can be collected on a regular basis. At the end of each year, this information will be used to construct water level and water quality contour figures that are included in the annual Groundwater Monitoring Report. This report will allow ACWD to assess the effectiveness of groundwater basin management activities related to saltwater intrusion. A copy of the annual groundwater monitoring report is submitted to DWR as part of ACWD's groundwater management plan annual update.

The Inland Saltwater Intrusion Monitoring Wells Project final report will be posted on ACWD's website for all interested parties, stakeholders, agencies and the general public to access.

6.0 RECOMMENDATIONS

Data collected during the project, significantly increased ACWD's understanding of the geologic depositional history of the area in the vicinity of the brackish water plume. Analytical data collected for groundwater quality and soil permeability evaluation have identified areas of high chloride concentrations and significantly refined the boundaries of the brackish water plume in the Centerville and Fremont Aquifers near the Mowry Wellfield. Unfortunately, monitoring wells installed in the west/southwest portion of the study area (Blacow @ Brophy) documented elevated concentrations of chlorides. To assist in evaluating whether the brackish water plumes in the Centerville and Fremont Aquifers are limited in extent or are aerially extensive along the interpreted axes of deposition, additional Centerville and Fremont Aquifer monitoring wells will need to be installed west, southwest, and south in the Centerville Aquifer and west and southwest in the Fremont Aquifer. Presently, only two sets of monitoring wells, 5S/2W-14E007 (DE1–C (Centerville Aquifer)) and 5S/2W-14E006 (DE1-F (Fremont Aquifer)), and 5S/1W-16M006 (Automall-C (Centerville Aquifer)) and 5S/1W-16M007 (Automall-F (Fremont Aquifer)), exist to the southwest and south, respectively, of the brackish water plume. These two monitoring well clusters (Figure 11) assist in bracketing the brackish water plume in both the Centerville and Fremont Aquifers but large data gaps still exist. Both of these monitoring well sets were installed during the 2004-2005 DWR grant project.

Additionally, aquifer hydraulic characteristics for the Fremont Aquifer have not been determined. The Fremont Aquifer chloride contour map (Figure 13) indicates that the leading edge of the brackish water plume (250 ppm contour) is relatively close to the Mowry Wellfield. To design a plan to mitigate the risk the Fremont Aquifer brackish water plume poses to the Mowry Wellfield, a test well will need to be installed in the Fremont Aquifer and an aquifer pump test performed. The collection of this data will yield information on optimal pumping rates, zone of influence, and system design characteristics.

Finally, continued monitoring of the existing well network is imperative to document the movement of the brackish water plume over time. The evaluation of the data will determine if the mitigation plan resulting from the work conducted under this project is sufficient or if additional corrective action will need to be implemented.

7.0 SCHEDULE INFORMATION

The original implementation schedule for the project was 24 months with approximately seven months of field operations scheduled to begin in November 2008 (Figure 14). Due to delays in approval of the agreement between ACWD and DWR (November 2008), an expansion of the original scope of work, and obtaining access approval for the additional monitoring wells from the City of Fremont and property owners, field operations did not begin until January 12, 2009. A revised schedule was submitted and approved by DWR on January 12, 2009 (Figure 15). Even with the delayed start of the project, additional wells (included in the revised scope of work), and equipment downtime, field operations were completed by July 9, 2009, approximately two weeks ahead of the revised scheduled completion date.

The original and revised scheduled completion date for the project (submittal of the final report) is May 10, 2010. Submittal of this report constitutes a completion of the project approximately two weeks ahead of schedule. The actual implementation schedule is presented in Figure 16.

8.0 BUDGET INFORMATION

The original total proposed budget amount was $383,700.00 with DWR grant funding covering $250,000.00 of these costs and with ACWD responsible for the remaining costs of $133,700.00. The highly competitive environment, attributed to the economic downturn, manifested itself in the bid costs submitted by the drilling contractors. The winning bid was both significantly lower than expected and lower than previous drilling contracts. Consequently, due to the lower costs for well drilling and installation, ACWD reviewed the scope of work and determined that four additional monitoring wells would significantly increase ACWD's understanding of the basin while keeping the costs covered by the DWR grant the same. A memorandum outlining the additional scope of work was submitted to DWR for approval on December 18, 2008, and was verbally approved by DWR (Harley Davis) on December 19, 2008. This addition to the scope of work increased the total modified budget amount to $414,205.00 with DWR grant funding remaining the same at $250,000.00.

Additional ACWD labor time associated with the installation of the four additional wells (permits, communications with the City of Fremont, public notification, additional geologic data collection and well installation time, additional time for data evaluation, GPS surveying of the additional wells, and additional report preparation time) increased the overall project budget to $491,914.36. As stated in ACWD's original proposal, DWR grant funding was used only for contractor expenses and not for ACWD labor costs. As presented in Table 6, contractor costs (drilling contractor and outside laboratory costs) and ACWD labor costs were $253,881.00 and $238,033.36, respectively. ACWD is responsible for all remaining costs above the $250,000 grant amount.

Tables

Table 1
Well Completion and Well Identification Summary Sheet

ACWD* ID Number	Well Completion Date	ACWD * Elevation Equivalent Aquifer	Borehole Depth (feet)	Well Completion Depth (feet)	Screen Interval (feet)	State ID Number
Serra Place - C	1/6/2009	Centerville	250	250	210 - 250	4S/1W-32K014
Blacow - F	2/11/2009	Fremont	400	350	310 - 350	4S/1W-32N002
Blacow - C	2/25/2009	Centerville	250	250	200 - 240	4S/1W-32N001
Meyer Park - F	3/9/2009	Fremont	400	340	290 - 330	4S/1W-32E012
Meyer Park - C	3/12/2009	Centerville	240	240	190 - 230	4S/1W-32E011
Robin - F	3/26/2009	Fremont	400	365	330 -360	5S/1W-04H005
Robin - C	4/1/2009	Centerville	260	255	230 - 255	5S/1W-04H004
Margery - F	4/15/2009	Fremont	400	350	310 - 340	4S/1W-33R008
Margery - C	4/23/2009	Centerville	250	250	200 - 240	4S/1W-33R007
Noll Park - F	5/5/2009	Fremont	350	350	320 - 340	4S/1W-33N003
Fremont Library - F	5/19/2009	Fremont	400	295	260 - 290	4S/1W-28R003

** = Alameda County Water District

Table 2
Survey Data

State ID Number	ACWD* ID Number	Well Completion Date	ACWD* Elevation Equivalent Aquifer	Reference Elevation (feet msl)	Northing	Easting
4S/1W-32K014	Serra Place - C	1/6/2009	Centerville	43.281	2022222.279	6128573.970
4S/1W-32N002	Blacow - F	2/11/2009	Fremont	37.591	2021890.098	6126130.441
4S/1W-32N001	Blacow - C	2/25/2009	Centerville	37.649	2021886.979	6126135.090
4S/1W-32E012	Meyer Park - F	3/9/2009	Fremont	43.886	2024399.608	6126010.653
4S/1W-32E011	Meyer Park - C	3/12/2009	Centerville	43.683	2024405.155	6126002.265
5S/1W-04H005	Robin - F	3/26/2009	Fremont	44.917	2018920.527	6134992.811
5S/1W-04H004	Robin - C	4/1/2009	Centerville	45.106	2018926.828	6134987.422
4S/1W-33R008	Margery - F	4/15/2009	Fremont	53.181	2021783.973	6135470.421
4S/1W-33R007	Margery - C	4/23/2009	Centerville	53.252	2021776.000	6135465.884
4S/1W-33N003	Noll Park - F	5/5/2009	Fremont	46.641	2020816.608	6131650.002
4S/1W-28R003	Fremont Library - F	5/19/2009	Fremont	59.704	2025882.346	6134997.992

* = Alameda County Water District

Table 3
Summary of Groundwater Sampling Results

Well Numbers	ACWD* Well I.D.	ACWD* Elevation Equivalent Aquifer	Date of Water Level	Depth to Water (feet)	Reference Elevation (feet msl)	Water Elevation (feet msl)	Water Sample Date	Chloride Result (ppm)	TDS (ppm)	Hardness (ppm)
4S/1W-32K011	*Serra Place - F*	*Fremont*	*9/9/2009*	*49.7*	*43.39*	*-6.31*	*8/25/2009*	*795*	**1,655.00**	
4S/1W-32K014	Serra Place - C	Centerville	9/9/2009	48.8	43.281	-5.519	8/25/2009	**660.00**	**1,565.00**	980.00
4S/1W-32N002	Blacow - F	Fremont	9/8/2009	44.1	37.591	-6.509	8/20/2009	**1,331.30**	**2,460.00**	1,400.00
4S/1W-32N001	Blacow - C	Centerville	9/8/2009	43.7	37.649	-6.051	8/20/2009	152.50	674.00	380.00
4S/1W-32E012	Meyer Park - F	Fremont	9/9/2009	50.0	43.886	-6.114	9/9/2009	**445.00**	**1,145.00**	614.00
4S/1W-32E011	Meyer Park - C	Centerville	9/9/2009	49.5	43.683	-5.817	9/9/2009	**375.00**	910.00	502.00
5S/1W-04H005	Robin - F	Fremont	8/31/2009	48.6	44.917	-3.683	8/27/2009	232.50	708.00	220.00
5S/1W-04H004	Robin - C	Centerville	8/31/2009	48.5	45.106	-3.394	8/27/2009	**350.00**	992.00	670.00
4S/1W-33R008	Margery - F	Fremont	9/3/2009	57.3	53.181	-4.119	8/17/2009	192.50	804.00	500.00
4S/1W-33R007	Margery - C	Centerville	9/3/2009	56.9	53.252	-3.648	8/17/2009	133.80	826.00	510.00
4S/1W-33N003	Noll Park - F	Fremont	9/8/2009	49.0	43.641	-5.359	8/26/2009	**290.00**	820.00	580.00
4S/1W-33N002	*Noll Park - C*	*Centerville*	*9/8/2009*	*48.2*	*43.75*	*-4.45*	*8/26/2009*	***1,137.50***	***2,540.00***	
4S/1W-28R003	Fremont Library - F	Fremont	9/1/2009	64.2	59.704	-4.496	8/17/2009	147.50	842.00	540.00
Secondary MCL								250.00	1,000.00	

* = Alameda County Water District
MCL = Maximum Contaminant Levels
2,460 = value in bold above Secondary Maximum Contaminant Levels
Noll Park - C = Well not installed as part of this program

Table 4
Inland Saltwater Intrusion Monitoring Wells Project
Permeability Data Summary Spreadsheet

Sample Date	ACWD* Sample ID	Aquitards Between the Following Aquifers	Date of Delivery to Lab (per COC**)	Received by (at lab)	Date of Lab Report	Sample Results (cm/sec)
Signet Testing Laboratories						
1/30/2009	Blacow-F-121.5	Newark - Centerville	2/2/2009	Signet Testing Labs	2/27/2009	1.33E-08
2/4/2009	Blacow-F-261.5	Centerville - Fremont	2/11/2009	Signet Testing Labs	3/3/2009	4.22E-07
2/6/2009	Blacow-F-391.0	Fremont - Deep 1	2/11/2009	Signet Testing Labs	3/3/2009	1.92E-08
2/27/2009	Meyer Park-F-131.0	Newark - Centerville	3/5/2009	Signet Testing Labs	4/14/2009	5.36E-04
2/27/2009	Meyer Park-F-161.0	Newark - Centerville	3/5/2009	Signet Testing Labs	4/14/2009	2.08E-05
3/2/2009	Meyer Park-F-271.0	Centerville - Fremont	3/5/2009	Signet Testing Labs	4/14/2009	2.73E-08
3/4/2009	Meyer Park-F-381.0	Fremont - Deep 1	3/5/2009	Signet Testing Labs	4/14/2009	3.05E-08
3/18/2009	Robin-F-141.0	Newark - Centerville	3/24/2009	Signet Testing Labs	4/20/2009	3.51E-07
3/19/2009	Robin-F-281.0	Centerville - Fremont	3/24/2009	Signet Testing Labs	4/20/2009	4.01E-08
3/20/2009	Robin-F-400.0	Fremont - Deep 1	3/24/2009	Signet Testing Labs	4/20/2009	2.21E-08
4/8/2009	Margery-F-110.0	Newark - Centerville	4/14/2009	Signet Testing Labs	5/22/2009	8.20E-08
4/9/2009	Margery-F-250.0	Centerville - Fremont	4/14/2009	Signet Testing Labs	5/22/2009	2.52E-08
4/10/2009	Margery-F-350.0	Fremont - Deep 1	4/14/2009	Signet Testing Labs	5/22/2009	1.17E-08
5/11/2009	FL-F-161.0	Newark - Centerville	5/18/2009	Signet Testing Labs	6/11/2009	3.14E-08
5/12/2009	FL-F-241.0	Centerville - Fremont	5/18/2009	Signet Testing Labs	6/11/2009	7.11E-08
5/12/2009	FL-F-300.0	Centerville - Fremont	5/18/2009	Signet Testing Labs	6/11/2009	3.16E-08
5/13/2009	FL-F-370.0	Fremont - Deep 1	5/18/2009	Signet Testing Labs	6/11/2009	6.40E-09

* = Alameda County Water District

** = Chain of Custody

Table 5
Aquifer and Aquitard Thickness Measurements

Well Numbers	ACWD* Well I.D.	Total Borehole Depth (feet)	Well Depth (feet)	Centerville Aquifer (feet)	Mission Aquitard (feet)	Fremont Aquifer (feet)
4S/1W-19N004	Westridge Park - F (Well I)	325	310		20	80
4S/1W-19N005	Westridge Park - C (Well J)	240	230	50		
4S/1W-28P004	Beacon - C	473	295	60		
4S/1W-28P007	Beacon - F (Well F)	385	380		36	65
4S/1W-28R003	Fremont Library - F**	400	290	35	35	45
4S/1W-31B011	Willowood #2 - CF	335	320	35	68	19
4S/1W-31N001	Cedar #1 - C	268	248	25		
4S/1W-32K011	Serra Place - F**	400	340		60	25
4S/1W-32K014	Serra Place - C	250	250	50		
4S/1W-32N002	Blacow - F**	400	350		25	95
4S/1W-32N001	Blacow - C**	250	250	45		
4S/1W-32E012	Meyer Park - F**	400	340		47	75
4S/1W-32E011	Meyer Park - C**	240	240	40		
4S/1W-33R008	Margery - F**	400	350		76	28
4S/1W-33R007	Margery - C**	250	240	35		
4S/1W-33N003	Noll Park - F**	350	350		56	15
4S/1W-33N002	Noll Park - C	250	250	50		
4S/2W-13P006	Roland - F (Well H-1)	365	360		30	80
4S/2W-13P007	Roland - C (Well I-1)	290	280	100		
4S/2W36A007	Darvon #2 - CF	344	329	29		26
4S/2W-36N010	Montclam - F (Well-T)	425	310		65	40
4S/2W-36N011	Montclam - C (Well-U)	230	220	20		
5S/1W-04H005	Robin - F**	400	365		84	25
5S/1W-04H004	Robin - C**	260	255	40		
5S/1W-05C001	Farwell Arp - C	265	253	30		
5S/1W-05H004	Farwell - F	350	340		65	20
5S/1W-05H005	Farwell - C	265	260	40		
5S/1W-06H004	Bellflower - C	295	279	61		
5S/1W-07B036	Silliman Center - C	505	245	85	75	75
5S/1W-07J005	Site A-MW - F	752	360	20	50	50
5S/1W-16M006	Automall - C***	270	265	35		
5S/1W-16M007	Automall - F***	340	330		70	20
5S/2W-01R014	Desal Plant - MW - C	255	240	20		
5S/2W-02F003	Bridgepointe - C (Well W)	200	165	25		
5S/2W-14E006	DE1 - F***	310	300		50	50
5S/2W-14E007	DE1 - C***	220	210	25		

* = Alameda County Water District
** = Well Installed Under Present DWR Agreement
***= Well Installed Under Past DWR Agreement

Table 6
DWR Cost Summary Sheet

Task No.	Description from Approved Budget	Budget Amount by Task	Contractor Costs Accrued	ACWD Labor Costs Accrued	Amount Over Budget
1.1	Finalize well locations	$9,363.00	$0.00	$12,882.43	($3,519.43)
1.2	Drilling contract selection	$12,284.00	$500.00	$13,133.09	($1,349.09)
1.3	Permitting process	$13,068.00	$0.00	$16,684.96	($3,616.96)
1.4	Public notification	$4,075.00	$0.00	$4,432.38	($357.38)
2.1	Drill and collect lithologic data for 5 boreholes to 400 feet	$88,356.00	$59,500.00	$34,829.55	($5,973.55)
2.2	Geophysical logs	$22,251.00	$15,000.00	$3,867.48	$3,383.52
2.3	Install four 2-inch monitoring wells to 350 feet	$34,836.00	$28,644.00	$16,604.66	($10,412.66)
2.4	Install one 2-inch monitoring well	$6,771.00	$12,880.00	$10,484.94	($16,593.94)
2.5	Drill 5 boreholes and install one 2-inch monitoring well to 250 feet	$56,697.00	$36,800.00	$16,747.36	$3,149.64
2.6	Drill 1 borehole and install one 2-inch monitoring well to 250 feet	$19,132.00	$9,200.00	$11,621.08	($1,689.08)
2.7	Collect and classify samples	$11,119.00	$0.00	$19,159.07	($8,040.07)
2.8	Review logs and finalize well design	$1,205.00	$0.00	$6,604.14	($5,399.14)
2.9	Grout boreholes	$24,819.00	$9,000.00	$5,478.60	$10,340.40
2.10	Develop wells	$29,819.00	$27,500.00	$14,130.50	($11,811.50)
2.11	Dispose of drilling fluids and cuttings	$11,902.00	$9,429.00	$5,618.89	($3,145.89)
2.12	Install security fencing	$13,608.00	$9,743.00	$3,542.97	$322.03
2.13	Install surface completion well boxes	$6,569.00	$3,850.00	$4,519.36	($1,800.36)
2.14	GPS new well locations	$1,576.00	$0.00	$2,146.40	($570.40)
2.15	Mobilization, bonding, and construction schedules	$27,685.00	$26,735.00	$481.85	$468.15
3.1	Collection and permeability testing of sample cores	$6,573.00	$5,100.00	$6,628.00	($5,155.00)
3.2	Collect and analyze groundwater samples upon well completion	$1,087.00	$0.00	$2,658.07	($1,571.07)
4.1	Submit quarterly progress reports to DWR	$2,964.00	$0.00	$1,279.13	$1,684.87
4.2	Submit final project summary to DWR	$6,446.00	$0.00	$22,498.45	($16,052.45)
4.3	Distribute report to stakeholders	$2,000.00	$0.00	$2,000.00	$0.00
	SUBTOTALS		$253,881.00	$238,033.36	
	TOTALS	$414,205.00	$491,914.36		($77,709.36)

Figures

N
W E
S

ACWD Boundary and Study Area

FIGURE 1

0 0.5 1
Miles

FIGURE 2: ORIGINAL PROPOSED WELL LOCATIONS

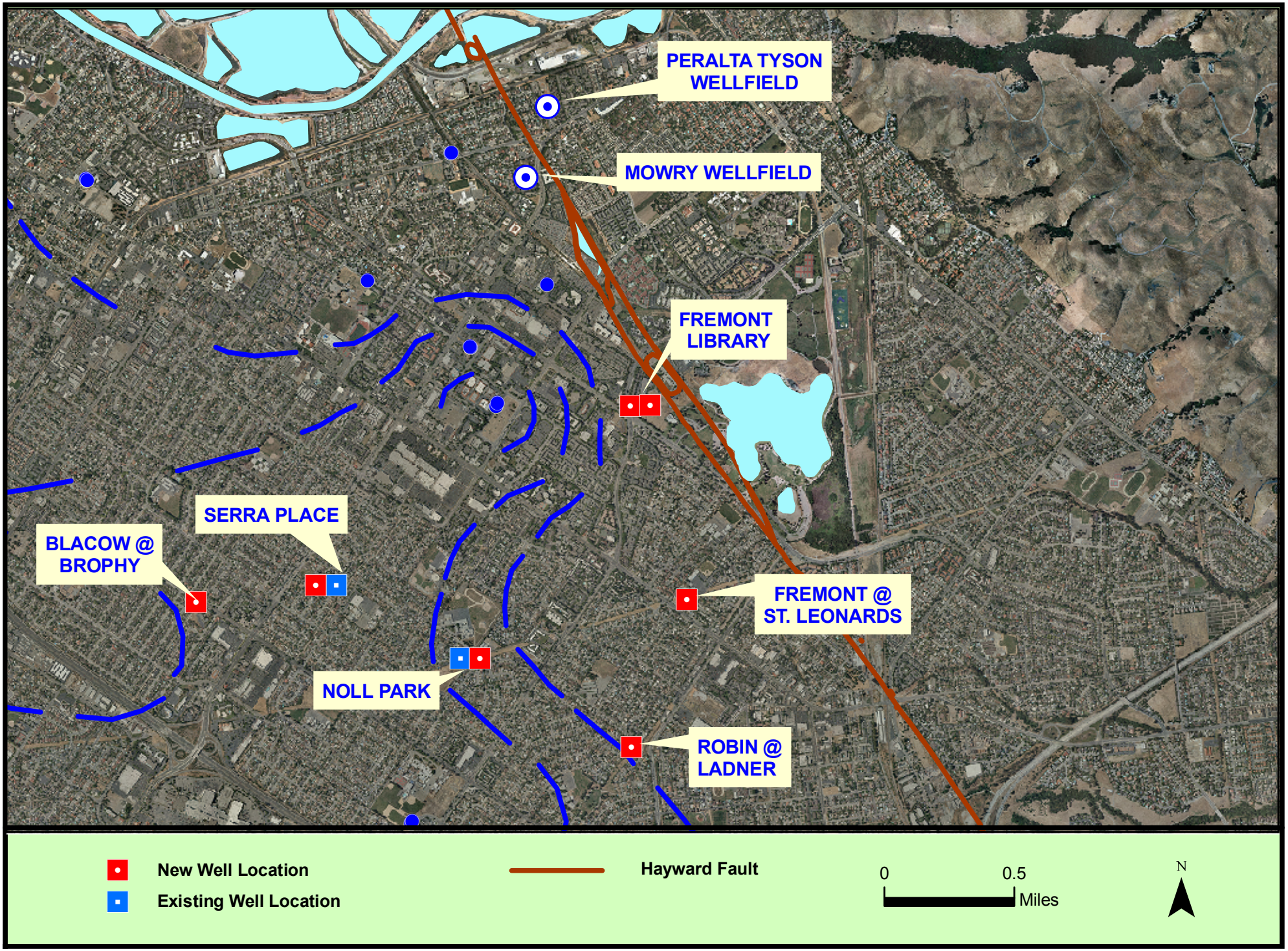
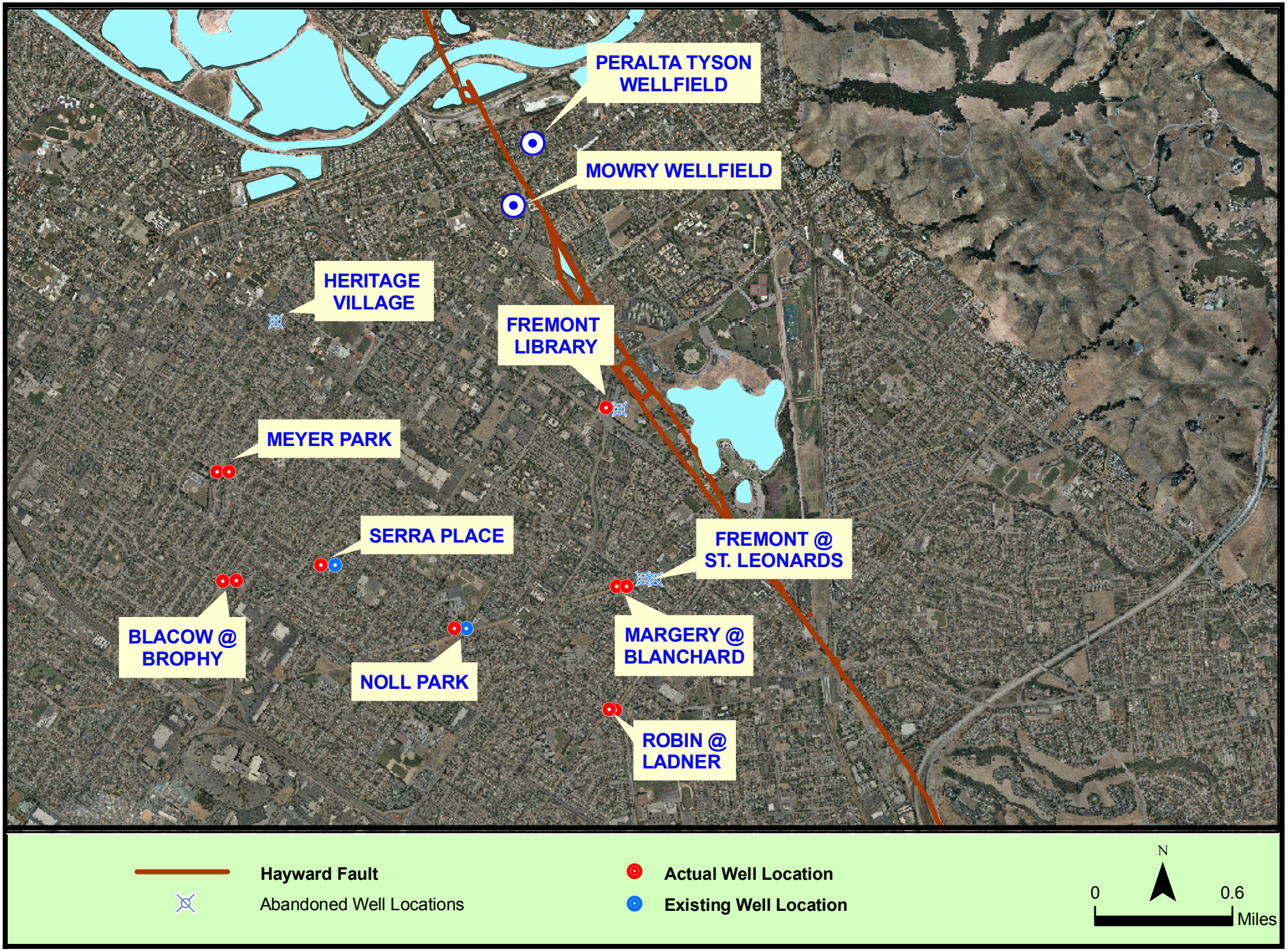
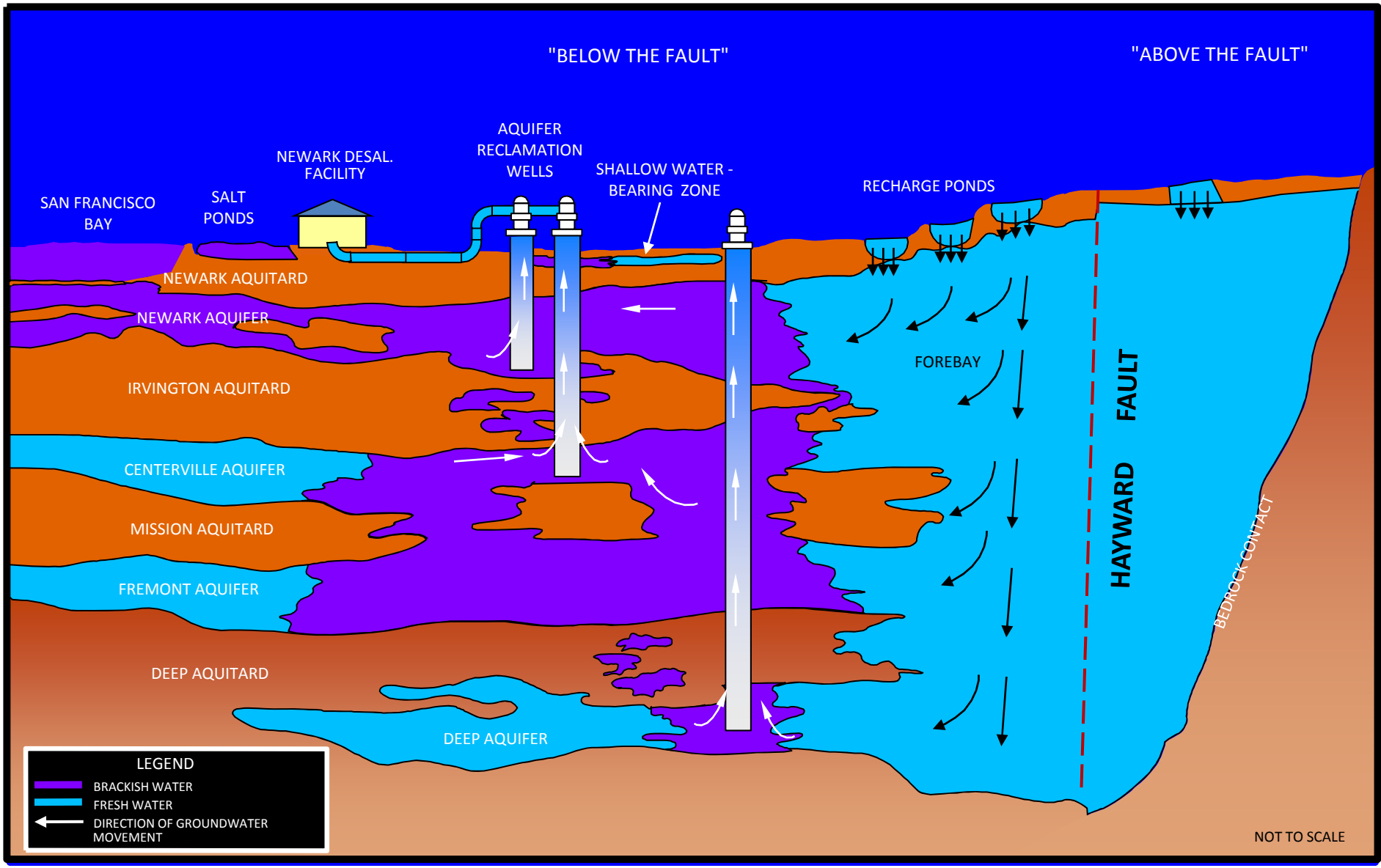


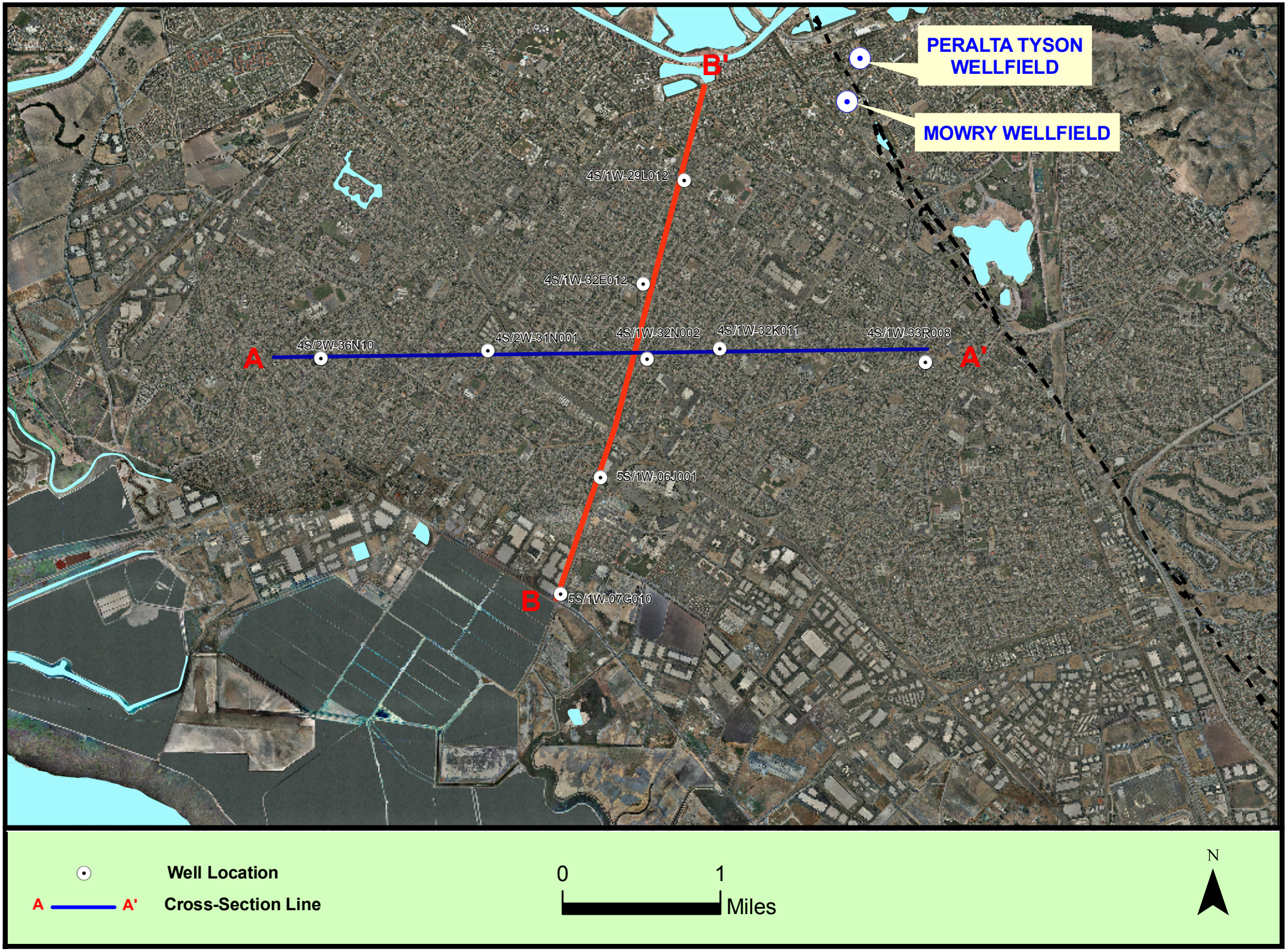
FIGURE 3: PROPOSED AND ACTUAL WELL LOCATIONS





CONCEPTUAL MODEL OF THE NILES CONE ALLUVIAL FAN
FIGURE 4

FIGURE 5: HYDROLOGICAL FORMATION CROSS SECTION LOCATIONS



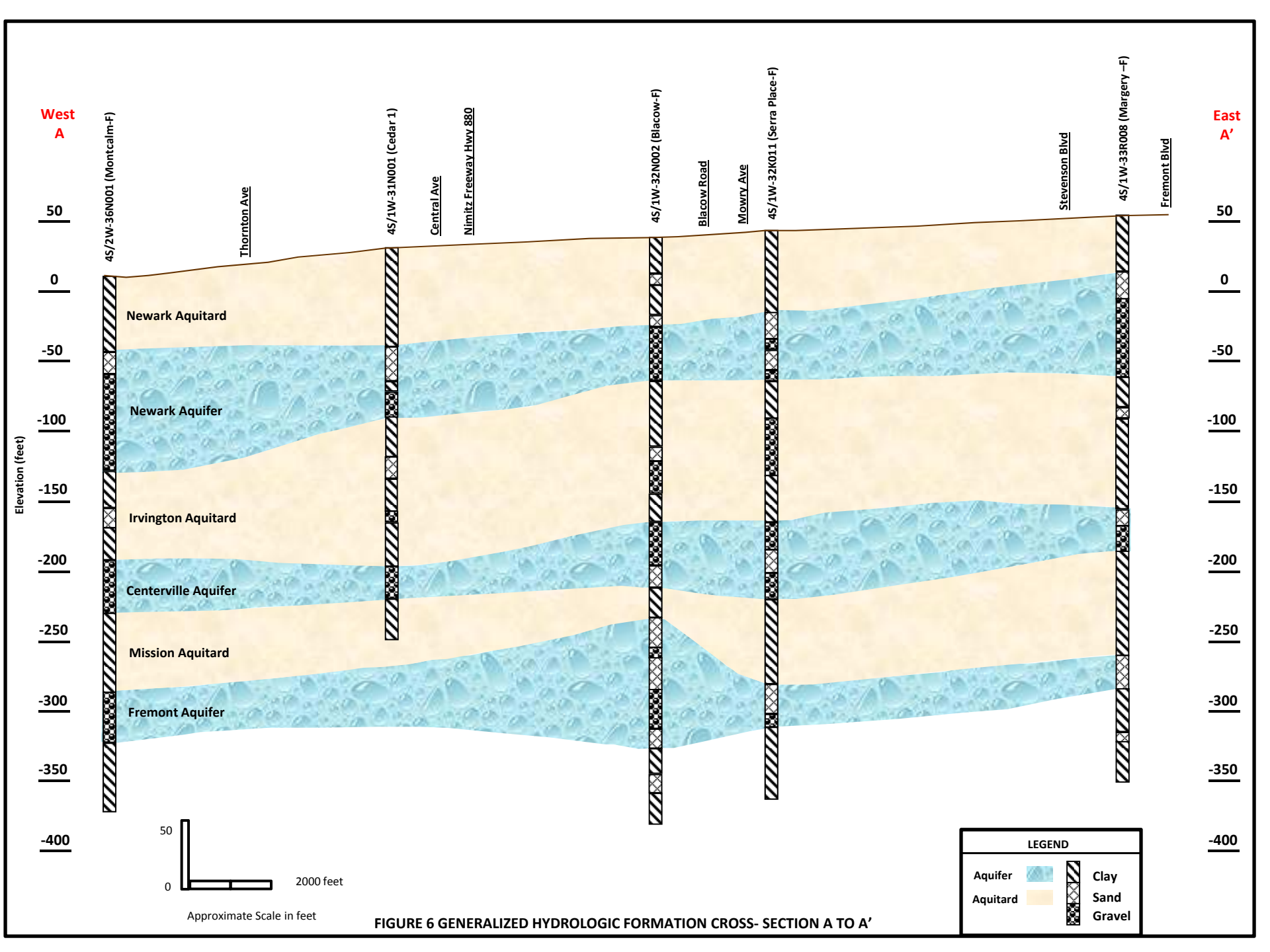


FIGURE 6 GENERALIZED HYDROLOGIC FORMATION CROSS- SECTION A TO A'

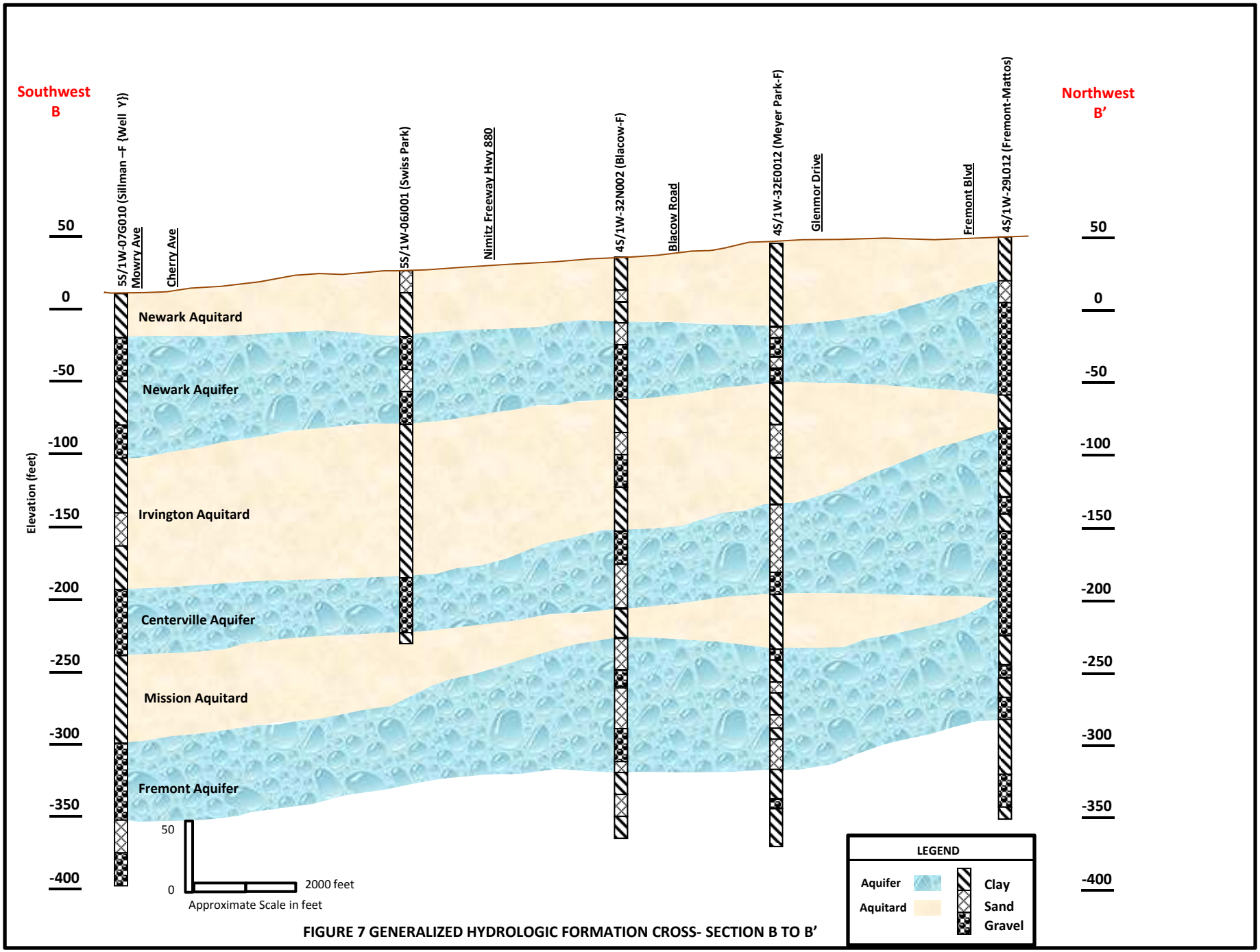


FIGURE 7 GENERALIZED HYDROLOGIC FORMATION CROSS- SECTION B TO B'

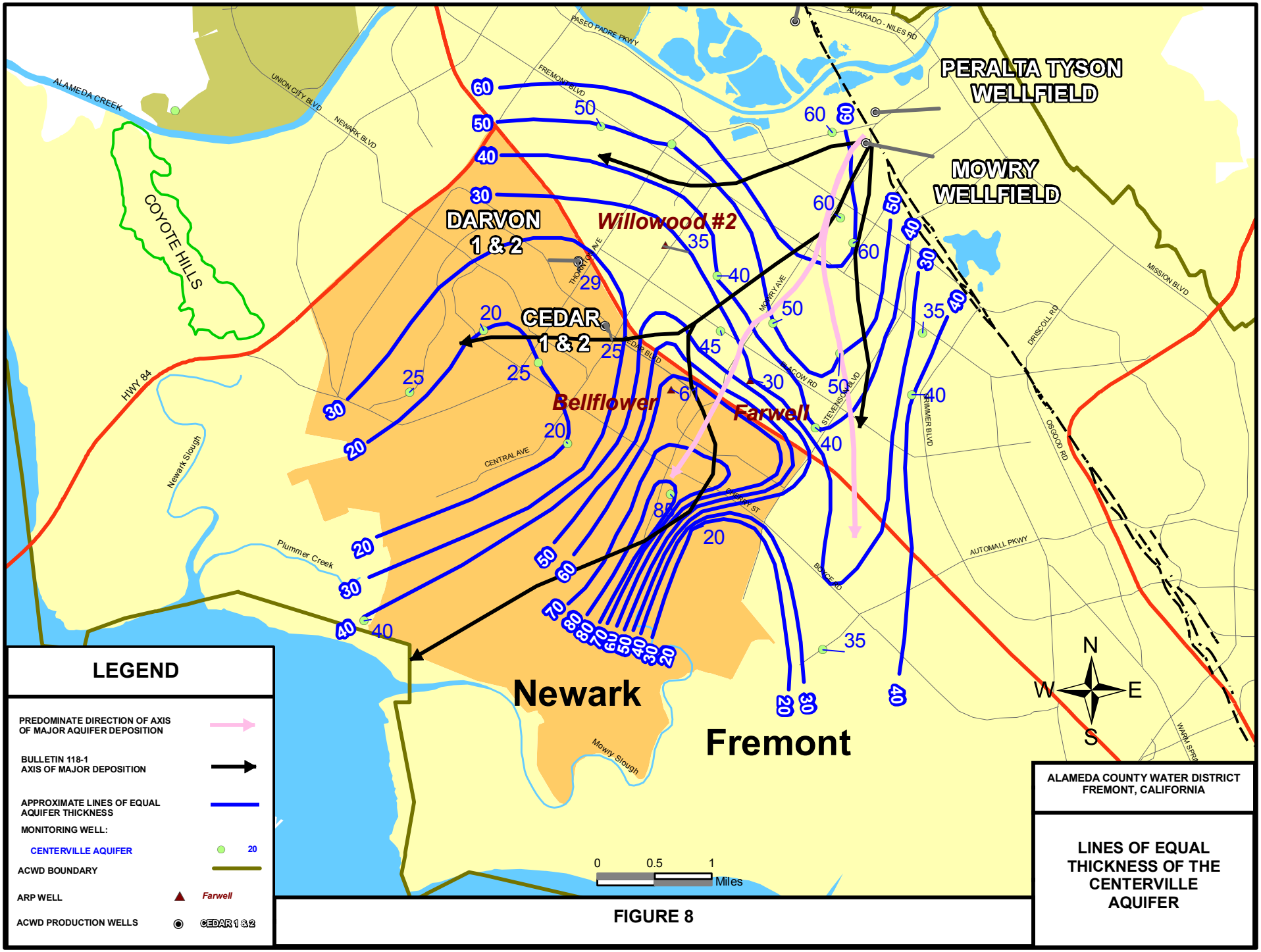
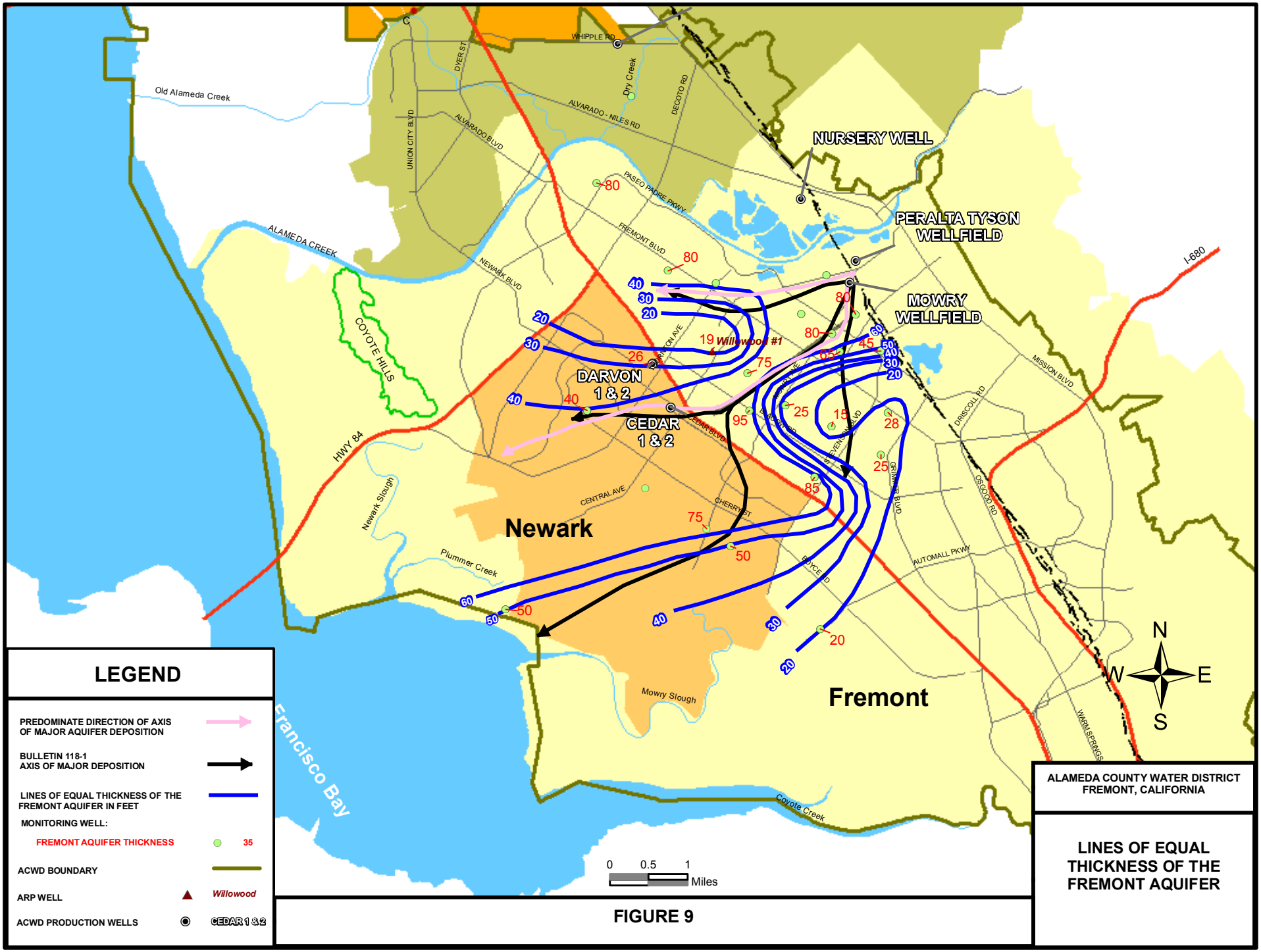

PERALTA TYSON WELLFIELD
MOWRY WELLFIELD
DARVON 1 & 2
CEDAR 1 & 2
Willowood #2
Bellflower
Farwell
COYOTE HILLS
ALAMEDA CREEK
HWY 84
Newark Slough
Plummer Creek
Mowry Slough
Newark
Fremont
PASEO PADRE PKWY
ALVARADO - NILES RD
UNION CITY BLVD
NEWARK BLVD
FREMONT BLVD
THORNTON AVE
MOWRY AVE
CEDAR BLVD
CENTRAL AVE
DIAGONAL RD
STEVENSON BLVD
CEDAR ST
BOYCE RD
AUTOMALL PKWY
MISSION BLVD
DRISCOLL RD
OSGOOD RD
GRIMMER BLVD
WARM SPRINGS
LEGEND
PREDOMINATE DIRECTION OF AXIS OF MAJOR AQUIFER DEPOSITION
BULLETIN 118-1 AXIS OF MAJOR DEPOSITION
APPROXIMATE LINES OF EQUAL AQUIFER THICKNESS
MONITORING WELL:
CENTERVILLE AQUIFER
ACWD BOUNDARY
ARP WELL
Farwell
ACWD PRODUCTION WELLS
CEDAR 1 &2
0 0.5 1 Miles
N
W E
S
ALAMEDA COUNTY WATER DISTRICT
FREMONT, CALIFORNIA
LINES OF EQUAL THICKNESS OF THE CENTERVILLE AQUIFER

FIGURE 8


NURSERY WELL
PERALTA TYSON WELLFIELD
MOWRY WELLFIELD
DARVON 1 & 2
CEDAR 1 & 2
Willowood #1
Newark
Fremont
Old Alameda Creek
ALAMEDA CREEK
Dry Creek
Newark Slough
Plummer Creek
Mowry Slough
Coyote Creek
San Francisco Bay
COYOTE HILLS
HWY 84
I-680
WHIPPLE RD
ALVARADO - NILES RD
ALVARADO BLVD
PASEO PADRE PKWY
FREMONT BLVD
NEWARK BLVD
CENTRAL AVE
CHERRY ST
CEDAR BLVD
MISSION BLVD
DRISCOLL RD
OSGOOD RD
AUTOMALL PKWY
WARM SPRINGS
LEGEND
PREDOMINATE DIRECTION OF AXIS OF MAJOR AQUIFER DEPOSITION
BULLETIN 118-1 AXIS OF MAJOR DEPOSITION
LINES OF EQUAL THICKNESS OF THE FREMONT AQUIFER IN FEET
MONITORING WELL:
FREMONT AQUIFER THICKNESS
35
ACWD BOUNDARY
ARP WELL
Willowood
ACWD PRODUCTION WELLS
CEDAR 1 & 2
0 0.5 1
Miles
N
W
E
S
ALAMEDA COUNTY WATER DISTRICT
FREMONT, CALIFORNIA
LINES OF EQUAL THICKNESS OF THE FREMONT AQUIFER
FIGURE 9

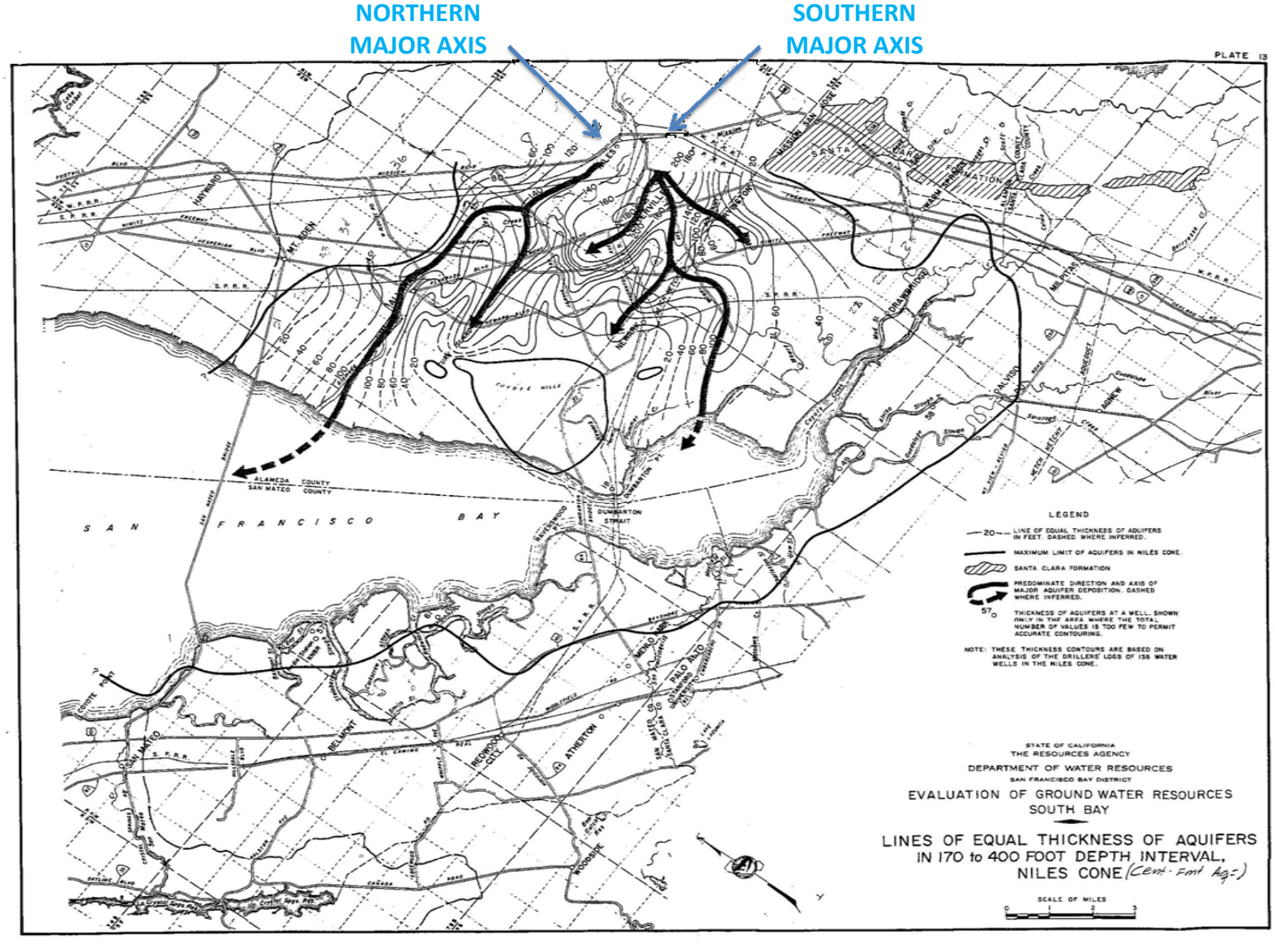


FIGURE 10 DWR BULLETIN 118-1 PLATE 13

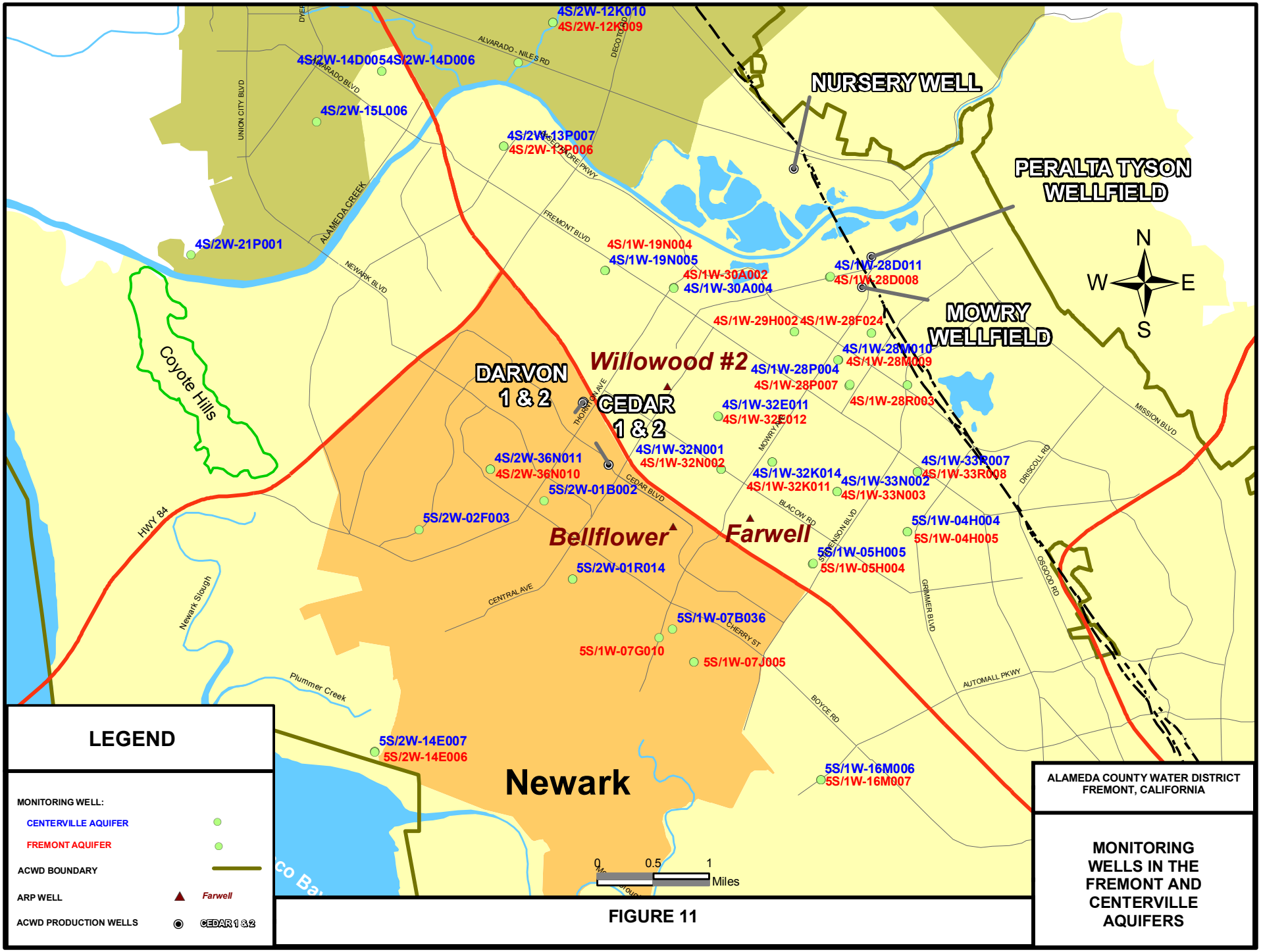

4S/2W-12K010
4S/2W-12K009
4S/2W-14D0054S/2W-14D006
4S/2W-15L006
4S/2W-13P007
4S/2W-13P006
4S/2W-21P001
NURSERY WELL
PERALTA TYSON WELLFIELD
MOWRY WELLFIELD
4S/1W-19N004
4S/1W-19N005
4S/1W-30A002
4S/1W-30A004
4S/1W-28D011
4S/1W-28D008
4S/1W-29H002
4S/1W-28F024
4S/1W-28M010
4S/1W-28M009
4S/1W-28P004
4S/1W-28P007
4S/1W-28R003
4S/1W-32E011
4S/1W-32E012
DARVON 1 & 2
CEDAR 1 & 2
Willowood #2
4S/1W-32N001
4S/1W-32N002
4S/2W-36N011
4S/2W-36N010
5S/2W-01B002
4S/1W-32K014
4S/1W-32K011
4S/1W-33N002
4S/1W-33N003
4S/1W-33R007
4S/1W-33R008
5S/2W-02F003
Bellflower
Farwell
5S/1W-04H004
5S/1W-04H005
5S/1W-05H005
5S/1W-05H004
5S/2W-01R014
5S/1W-07B036
5S/1W-07G010
5S/1W-07J005
5S/2W-14E007
5S/2W-14E006
Newark
5S/1W-16M006
5S/1W-16M007
Coyote Hills
ALAMEDA CREEK
Newark Slough
Plummer Creek
HWY 84
UNION CITY BLVD
ALVARADO BLVD
ALVARADO - NILES RD
DECOTO RD
DYER ST
WHIPPLE RD
DUSTIN RD
FREMONT BLVD
NEWARK BLVD
THORNTON AVE
MOWRY AVE
CEDAR BLVD
CENTRAL AVE
CHERRY ST
STEVENSON BLVD
BLACOW RD
GRIMMER BLVD
OSGOOD RD
DRISCOLL RD
MISSION BLVD
AUTOMALL PKWY
BOYCE RD
N
W
E
S
0
0.5
1
Miles
LEGEND
MONITORING WELL:
CENTERVILLE AQUIFER
FREMONT AQUIFER
ACWD BOUNDARY
ARP WELL
Farwell
ACWD PRODUCTION WELLS
CEDAR 1&2
ALAMEDA COUNTY WATER DISTRICT
FREMONT, CALIFORNIA
MONITORING WELLS IN THE FREMONT AND CENTERVILLE AQUIFERS

FIGURE 11

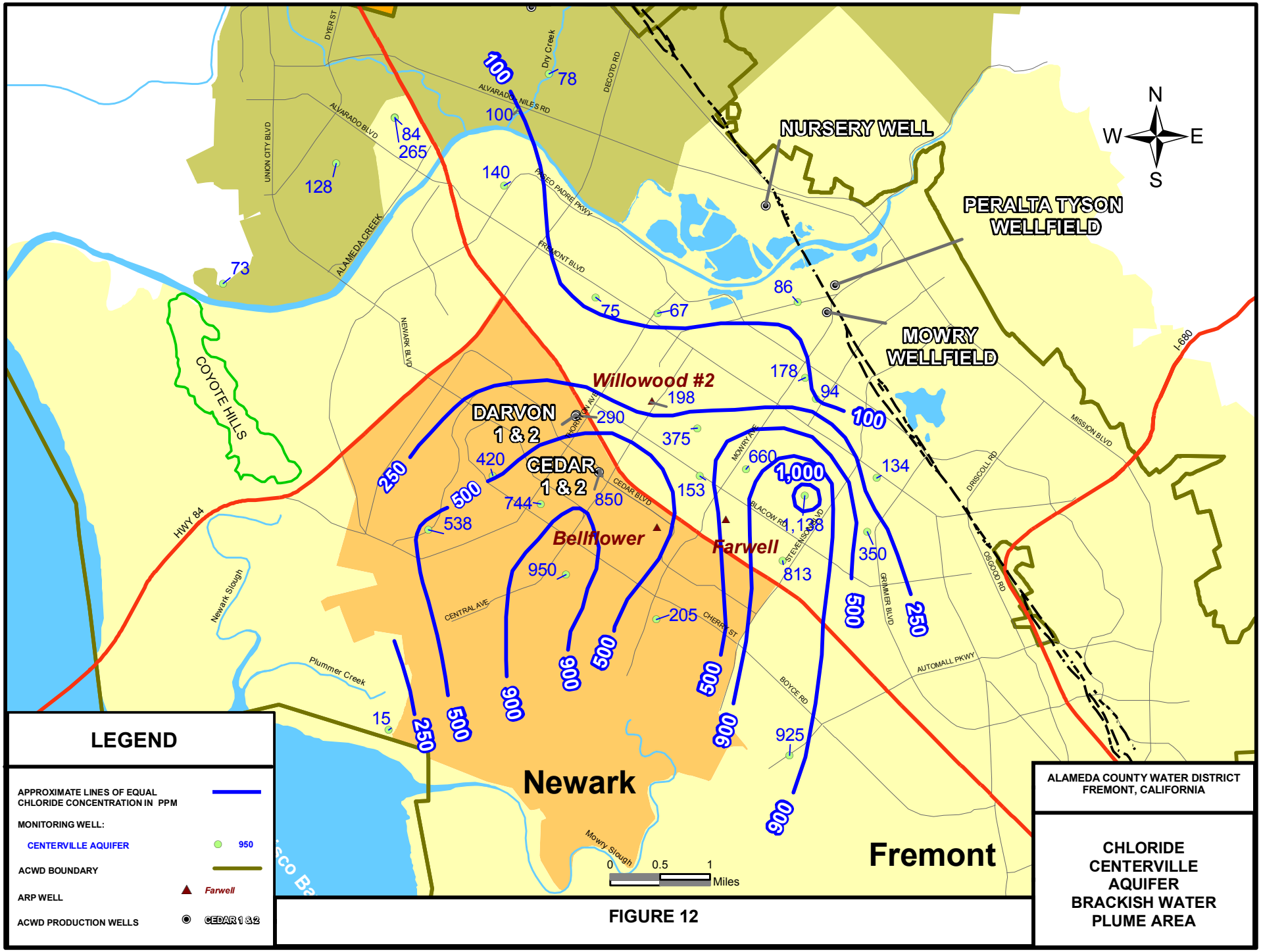

NURSERY WELL
PERALTA TYSON WELLFIELD
MOWRY WELLFIELD
DARVON 1 & 2
CEDAR 1 & 2
Willowood #2
Bellflower
Farwell
Newark
Fremont
COYOTE HILLS
ALAMEDA CREEK
Dry Creek
Newark Slough
Plummer Creek
Mowry Slough
HWY 84
I-680
N
W
E
S
0 0.5 1 Miles
LEGEND
APPROXIMATE LINES OF EQUAL CHLORIDE CONCENTRATION IN PPM
MONITORING WELL:
CENTERVILLE AQUIFER
950
ACWD BOUNDARY
ARP WELL
Farwell
ACWD PRODUCTION WELLS
CEDAR 1 & 2
ALAMEDA COUNTY WATER DISTRICT
FREMONT, CALIFORNIA
CHLORIDE CENTERVILLE AQUIFER BRACKISH WATER PLUME AREA

FIGURE 12

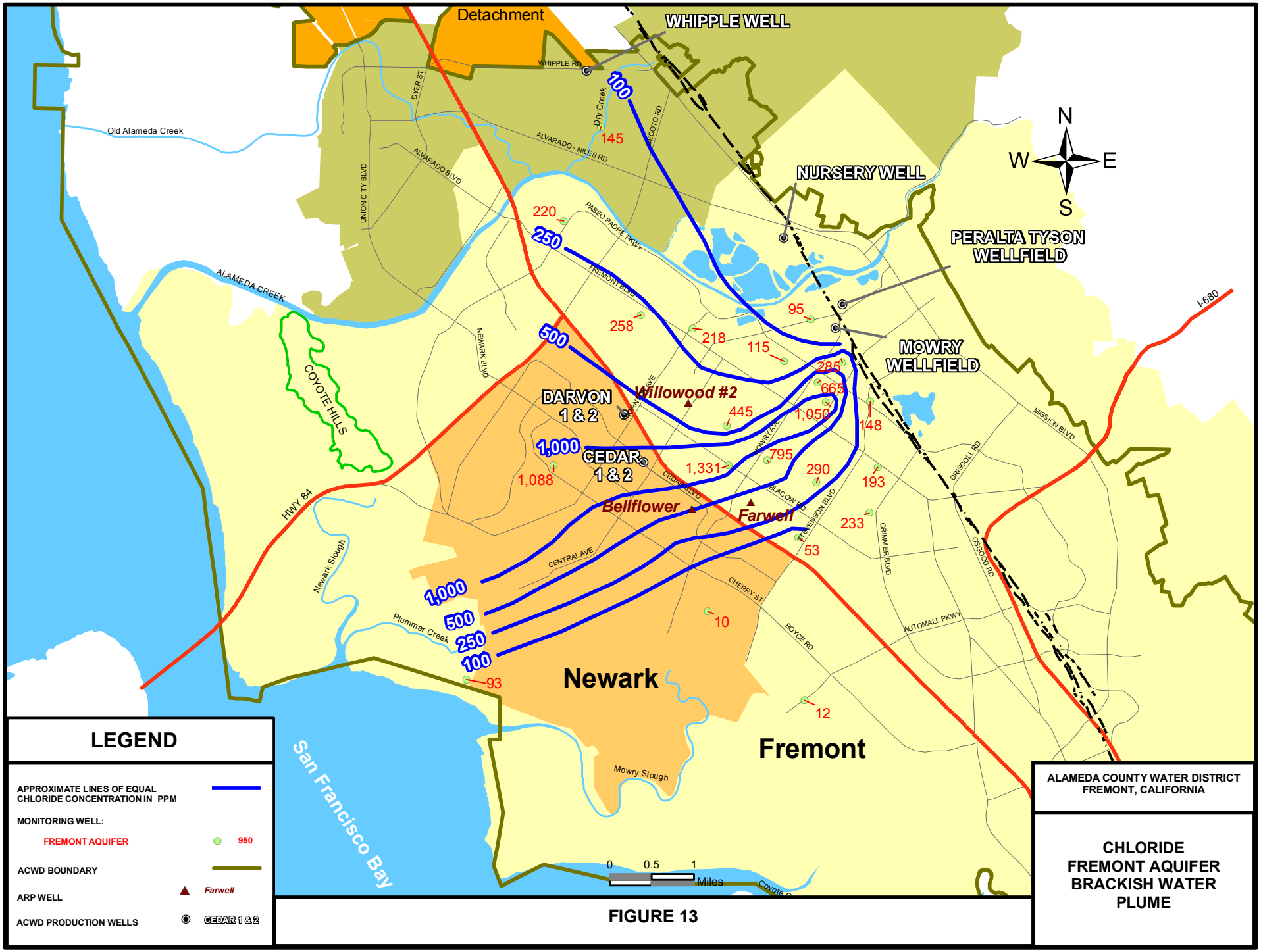

Detachment
WHIPPLE WELL
WHIPPLE RD
Old Alameda Creek
DYER ST
Dry Creek
DESOTO RD
ALVARADO - NILES RD
ALVARADO BLVD
UNION CITY BLVD
NURSERY WELL
PERALTA TYSON WELLFIELD
PASEO PADRE PKWY
FREMONT BLVD
ALAMEDA CREEK
NEWARK BLVD
COYOTE HILLS
MOWRY WELLFIELD
I-680
DARVON 1 & 2
Willowood #2
MOWRY AVE
MISSION BLVD
CEDAR 1 & 2
CEDAR BLVD
DRISCOLL RD
BLACOW RD
Bellflower
Farwell
STEVENSON BLVD
GRIMMER BLVD
OSGOOD RD
HWY 84
Newark Slough
CENTRAL AVE
CHERRY ST
AUTOMALL PKWY
BOYCE RD
Plummer Creek
Newark
Fremont
Mowry Slough
San Francisco Bay
Coyote C
N
W
E
S
100
250
500
1,000
145
220
258
218
115
95
285
665
1,050
148
445
795
1,331
1,088
290
193
233
53
10
93
12
0
0.5
1
Miles
LEGEND
APPROXIMATE LINES OF EQUAL CHLORIDE CONCENTRATION IN PPM
MONITORING WELL:
FREMONT AQUIFER
950
ACWD BOUNDARY
ARP WELL
Farwell
ACWD PRODUCTION WELLS
CEDAR 1 & 2
ALAMEDA COUNTY WATER DISTRICT
FREMONT, CALIFORNIA
CHLORIDE
FREMONT AQUIFER
BRACKISH WATER
PLUME

FIGURE 13

Original Schedule - Inland Saltwater Intrusion Monitoring Wells Project

ID	Task Name	Duration	Start
1	*Authorization to Proceed*	0 days	Mon 6/2/08
2	**Task 1-Pre-Construction Activities**	**103 days**	**Fri 6/6/08**
3	Task 1.1- Finalize well locations	8 days	Fri 6/6/08
4	Task 1.2 Drilling contractor selection	79 days	Wed 6/18/08
5	Task 1.3-Permitting process	97 days	Mon 6/16/08
6	Task 1.4-Public notification	97 days	Mon 6/16/08
7	*Completion of pre-field activities*	0 days	Wed 10/29/08
8	**Task 2-Drilling, Well Construction, and Development**	**127 days**	**Fri 11/14/08**
9	Task 2.1-Drill and collect lithologic data for 4 boreholes to 400 feet	127 days	Fri 11/14/08
10	Task 2.1.1-Boring 1 to 400 feet	12 days	Mon 11/17/08
11	Task 2.1.2-Boring 2 to 400 feet	16 days	Thu 12/25/08
12	Task 2.1.3-Boring 3 to 400 feet	12 days	Mon 1/26/09
13	Task 2.1.4-Boring 4 to 400 feet	12 days	Thu 2/19/09
14	Task 2.2- Conduct geophysical logs	69 days	Wed 12/3/08
15	Task 2.2.1-Boring 1	1 day	Wed 12/3/08
16	Task 2.2.2-Boring 2	1 day	Fri 1/16/09
17	Task 2.2.3-Boring 3	1 day	Wed 2/11/09
18	Task 2.2.4-Boring 4	1 day	Mon 3/9/09
19	Task 2.3-Install 4 2-inch monitoring wells to 350 feet	72 days	Thu 12/4/08
20	Task 2.3.1-Boring 1	5 days	Thu 12/4/08
21	Task 2.3.2-Boring 2	6 days	Mon 1/19/09
22	Task 2.3.3-Boring 3	4 days	Thu 2/12/09
23	Task 2.3.4-Boring 4	4 days	Tue 3/10/09
24	Task 2.4-Drill 2 boreholes and install 2 2-inch monitoring wells to 250 feet	6 days	Mon 3/30/09
25	Task 2.4.1-Site 1	6 days	Thu 12/11/08
26	Task 2.4.2-Serra Place	4 days	Wed 4/1/09
27	Task 2.5-Drill 1 borehole and install 1 2-inch monitoring well to 350 feet	10 days	Mon 3/16/09
28	Task 2.5.1-Noll Park	10 days	Mon 3/16/09
29	Task 2.6-Collect and classify samples	80 days	Mon 11/17/08
30	Task 2.7- Review of logs and finalize well designs	68 days	Wed 12/3/08
31	Task 2.8-Grout boreholes	80 days	Mon 11/17/08
32	Task 2.9-Develop wells	90 days	Mon 12/15/08
33	Task 2.10-Dispose of drilling fluids and cuttings	115 days	Mon 11/17/08
34	Task 2.11-Install security fencing	5 days	Mon 4/27/09
35	Task 2.12-Install surface completion well box	5 days	Tue 5/5/09
36	Task 2.13-GPS new well locations	2 days	Mon 5/11/09
37	*Completion of Field Activities*	0 days	Tue 5/12/09
38	**Task 3-Analytical Testing and Evaluation**	**212 days**	**Fri 11/7/08**
39	Task 3.1-Collect and test permeability of sample cores	90 days	Fri 11/7/08
40	Task 3.3-Collect and analyze groundwater samples upon well completion	5 days	Tue 8/25/09
41	**Task 4- Reporting**	**409 days**	**Wed 10/15/08**
42	Task 4.1-Submit quarterly progress reports to DWR	392 days	Wed 10/15/08
43	Task 4.1.1-Third Qt 2008 progress report	0 days	Wed 10/15/08
44	Task 4.1.2-Fourth Qt 2008 progress report	0 days	Thu 1/15/09
45	Task 4.1.3-First Qt 2009 progress report	0 days	Wed 4/15/09
46	Task 4.1.4-Second Qt 2009 progress report	0 days	Wed 7/15/09
47	Task 4.1.5-Third Qt 2009 progress report	0 days	Thu 10/15/09
48	Task 4.1.6-Fourth Qt 2009 progress report	0 days	Fri 1/15/10
49	Task 4.1.7-First Qt 2010 progress report	0 days	Thu 4/15/10
50	Task 4.2-Submit final project summary to DWR	261 days	Mon 5/11/09
51	*Well Installation Project Completed*	0 days	Mon 5/10/10
52	Task 4.3 Distribute report to stakeholders	0 days	Tue 5/11/10

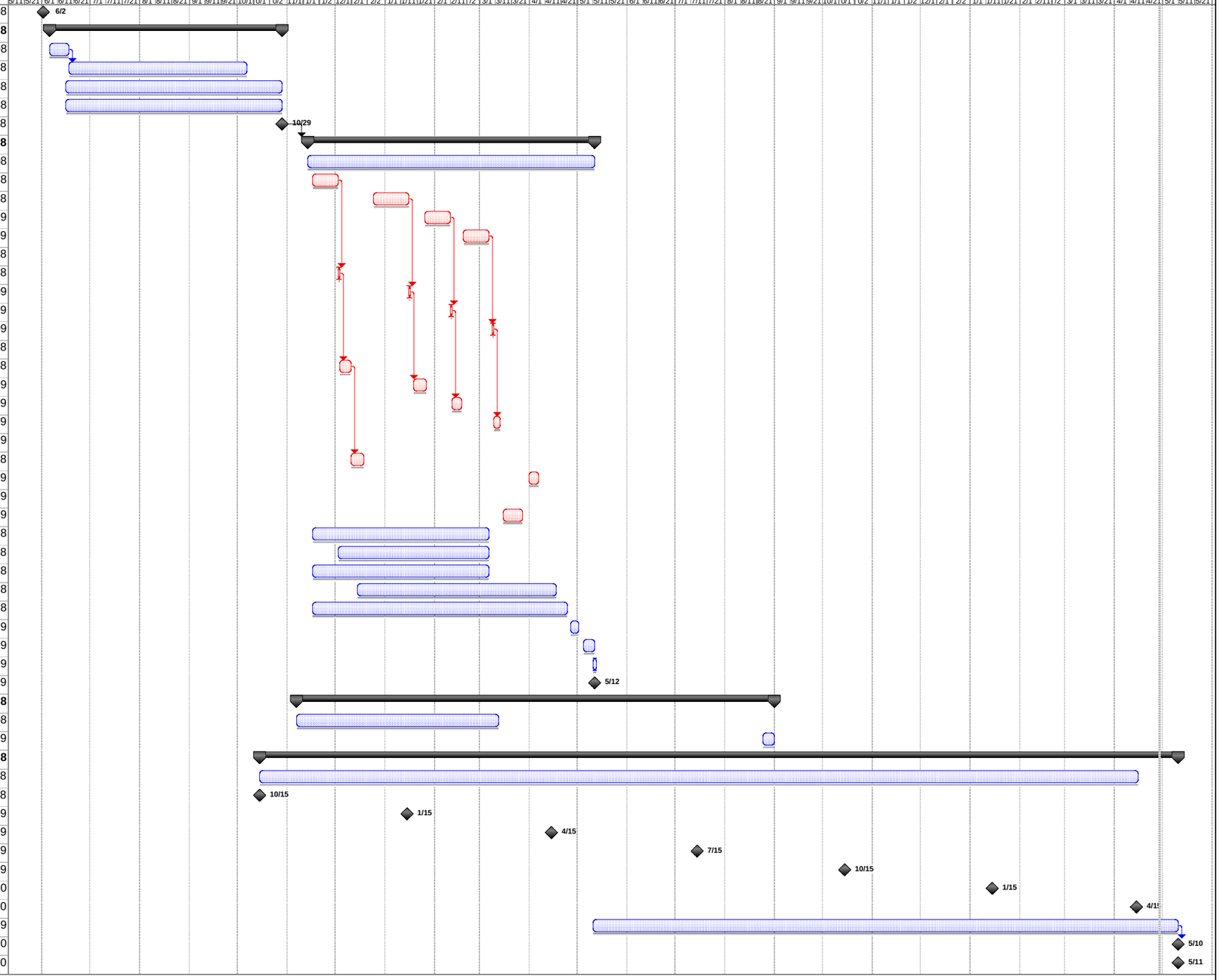


Figure 14
Project: Inland Saltwater Intrusion Monitoring Wells Project (Original Sch
Date: December 10, 2007

Task — Progress — Summary — External Tasks — Split
Split — Milestone — Project Summary — External MileTask

Revised - Inland Saltwater Intrusion Monitoring Wells Project

ID	Task Name	Duration	Start	Finish
1	*Authorization to Proceed*	0 days	Mon 8/4/08	Mon 8/4/08
2	DWR Contract Review and Finalization	28 days	Mon 8/25/08	Wed 10/1/08
3	**Task 1-Pre-Construction Activities**	**104 days**	**Wed 8/6/08**	**Mon 12/29/08**
4	Task 1.1- Finalize well locations	8 days	Wed 8/6/08	Fri 8/15/08
5	Task 1.2 Drilling contractor selection	79 days	Mon 8/18/08	Thu 12/4/08
6	*Opening of Bids*	0 days	Thu 10/16/08	Thu 10/16/08
7	Task 1.3-Permitting process	52 days	Mon 8/18/08	Tue 10/28/08
8	Task 1.4-Public notification	96 days	Mon 8/18/08	Mon 12/29/08
9	*Completion of pre-field activities*	0 days	Mon 12/29/08	Mon 12/29/08
10	**Task 2-Drilling, Well Construction, and Development**	**150 days**	**Mon 12/29/08**	**Fri 7/24/09**
11	Task 2.1-Drill and collect lithologic data for 4 boreholes to 400 feet	84 days	Mon 12/29/08	Thu 4/23/09
12	Task 2.1.1-Boring 1 to 400 feet	12 days	Mon 1/19/09	Tue 2/3/09
13	Task 2.1.2-Boring 2 to 400 feet	12 days	Wed 2/25/09	Thu 3/12/09
14	Task 2.1.3-Boring 3 to 400 feet	12 days	Thu 4/2/09	Fri 4/17/09
15	Task 2.1.4-Boring 4 to 400 feet	12 days	Tue 5/5/09	Wed 5/20/09
16	Task 2.1.5-Boring 5 to 400 feet	12 days	Fri 6/5/09	Mon 6/22/09
17	Task 2.2- Conduct geophysical logs	69 days	Tue 2/3/09	Fri 5/8/09
18	Task 2.2.1-Boring 1	1 day	Wed 2/4/09	Wed 2/4/09
19	Task 2.2.2-Boring 2	1 day	Mon 3/16/09	Mon 3/16/09
20	Task 2.2.3-Boring 3	1 day	Mon 4/20/09	Mon 4/20/09
21	Task 2.2.4-Boring 4	1 day	Thu 5/21/09	Thu 5/21/09
22	Task 2.2.5-Boring 5	1 day	Tue 6/23/09	Tue 6/23/09
23	Task 2.3-Install 4 2-inch monitoring wells	72 days	Wed 2/4/09	Thu 5/14/09
24	Task 2.3.1-Boring 1 to 350 feet	4 days	Thu 2/5/09	Tue 2/10/09
25	Task 2.3.2-Boring 2 to 350 feet	4 days	Thu 3/19/09	Tue 3/24/09
26	Task 2.3.3-Boring 3 to 350 feet	4 days	Tue 4/21/09	Fri 4/24/09
27	Task 2.3.4-Boring 4 to 350 feet	4 days	Fri 5/22/09	Wed 5/27/09
28	Task 2.4-Install 1 2-inch monitoring well to 250 feet	4 days	Wed 6/24/09	Mon 6/29/09
29	Task 2.5-Drill 2 boreholes and install 2 2-inch monitoring wells to 250 feet	6 days	Mon 6/1/09	Mon 6/8/09
30	Task 2.5.1-Fremont Library - C (Site 1)	6 days	Wed 2/11/09	Wed 2/18/09
31	Task 2.5.2-Fremont @ St. Leonards - C (Site 2)	6 days	Wed 3/25/09	Wed 4/1/09
32	Task 2.5.3-Ladner @ Robin - C (Site 3)	6 days	Mon 4/27/09	Mon 5/4/09
33	Task 2.5.4-Blacow @ Brophy - C (Site 4)	6 days	Thu 5/28/09	Thu 6/4/09
34	Task 2.5.5-Serra Place - C	6 days	Tue 6/30/09	Tue 7/7/09
35	Task 2.6-Drill 1 borehole and install 1 2-inch monitoring well to 350 feet	10 days	Mon 5/18/09	Fri 5/29/09
36	Task 2.6.1-Noll Park - F	10 days	Wed 7/8/09	Tue 7/21/09
37	Task 2.7-Collect and classify samples	132 days	Mon 1/19/09	Tue 7/21/09
38	Task 2.8- Review of logs and finalize well designs	120 days	Wed 2/4/09	Tue 7/21/09
39	Task 2.9-Grout boreholes	132 days	Mon 1/19/09	Tue 7/21/09
40	Task 2.10-Develop wells	112 days	Mon 2/16/09	Tue 7/21/09
41	Task 2.11-Dispose of drilling fluids and cuttings	132 days	Mon 1/19/09	Tue 7/21/09
42	Task 2.12-Install security fencing	138 days	Mon 1/12/09	Wed 7/22/09
43	Task 2.13-Install surface completion well box	117 days	Tue 2/10/09	Wed 7/22/09
44	Task 2.14-GPS new well locations	2 days	Thu 7/23/09	Fri 7/24/09
45	*Completion of Field Activities*	1 day	Fri 7/24/09	Fri 7/24/09
46	**Task 3-Analytical Testing and Evaluation**	**169 days**	**Wed 1/7/09**	**Mon 8/31/09**
47	Task 3.1-Collect and test permeability of sample cores	143 days	Wed 1/7/09	Fri 7/24/09
48	Task 3.2-Collect and analyze groundwater samples upon well completion	5 days	Tue 8/25/09	Mon 8/31/09
49	**Task 4- Reporting**	**343 days**	**Thu 1/15/09**	**Mon 5/10/10**
50	Task 4.1-Submit quarterly progress reports to DWR	326 days	Thu 1/15/09	Thu 4/15/10
51	Task 4.1.1-Fourth Qt 2008 progress report	0 days	Thu 1/15/09	Thu 1/15/09
52	Task 4.1.2-First Qt 2009 progress report	0 days	Wed 4/15/09	Wed 4/15/09
53	Task 4.1.3-Second Qt 2009 progress report	0 days	Wed 7/15/09	Wed 7/15/09
54	Task 4.1.4-Third Qt 2009 progress report	0 days	Thu 10/15/09	Thu 10/15/09
55	Task 4.1.5-Fourth Qt 2009 progress report	0 days	Fri 1/15/10	Fri 1/15/10
56	Task 4.1.6-First Qt 2010 progress report	0 days	Thu 4/15/10	Thu 4/15/10
57	Task 4.2-Submit final project summary to DWR	216 days	Mon 7/13/09	Mon 5/10/10
58	*Draft Final Report to DWR*	0 days	Fri 4/2/10	Fri 4/2/10
59	*Well Installation Project Completed*	0 days	Mon 5/10/10	Mon 5/10/10
60	Task 4.3 Distribute report to stakeholders	0 days	Tue 5/11/10	Tue 5/11/10

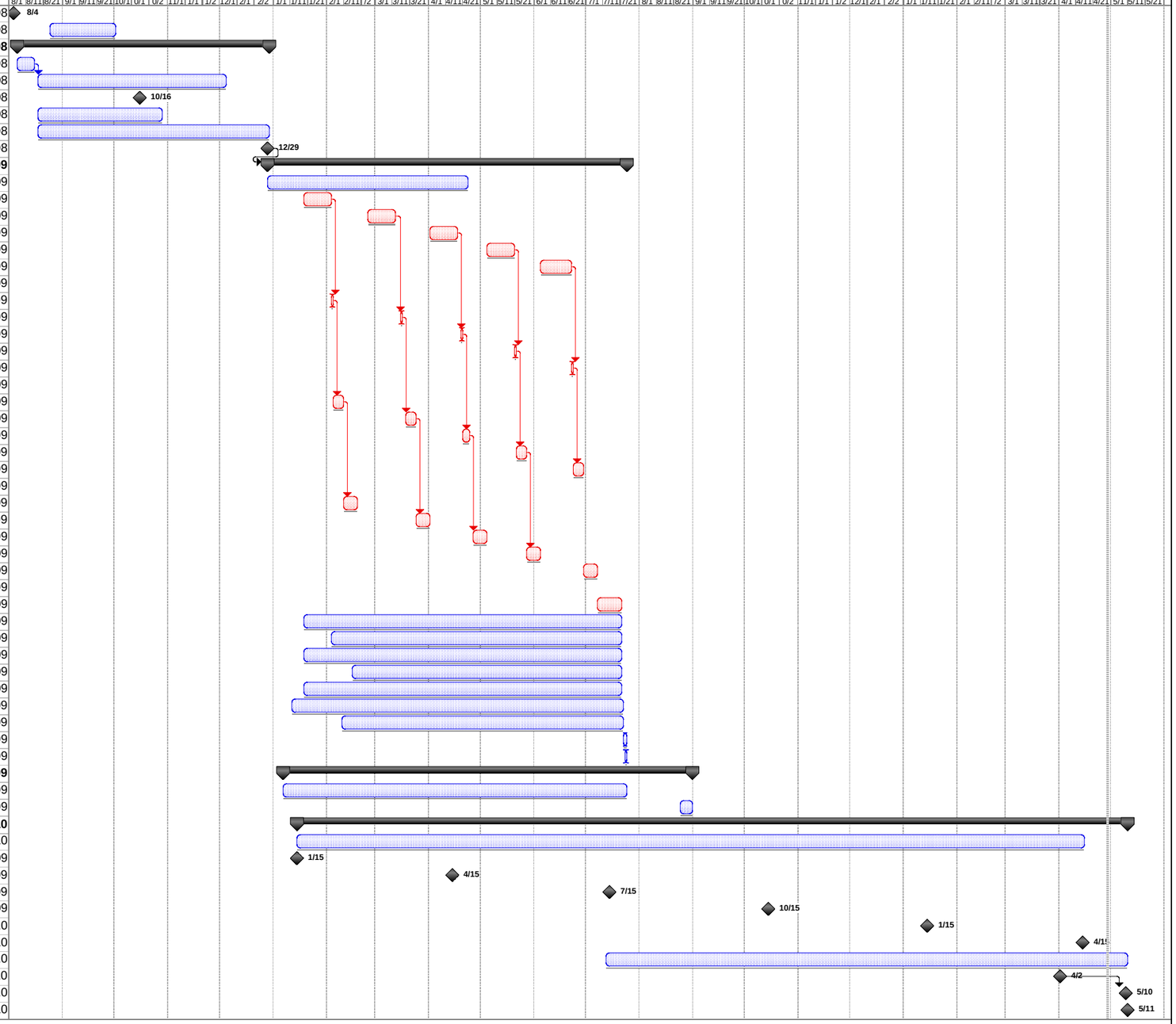


Figure 15
Project: Inland Saltwater Intrusion Monitoring Wells Project (Revised)
Date: December 18, 2008

Task | Progress | Summary | External Tasks | Split
Split | Milestone | Project Summary | External MileTask

Actual Completion Schedule Inland Saltwater Intrusion Monitoring Wells Project

ID	Task Name	Duration	Start	Finish
1	*Authorization to Proceed*	0 days	Mon 8/4/08	Mon 8/4/08
2	DWR Contract Review and Finalization	28 days	Mon 8/25/08	Wed 10/1/08
3	**Task 1-Pre-Construction Activities**	**104 days**	**Wed 8/6/08**	**Mon 12/29/08**
4	Task 1.1- Finalize well locations	8 days	Wed 8/6/08	Fri 8/15/08
5	Task 1.2 Drilling contractor selection	79 days	Mon 8/18/08	Thu 12/4/08
6	*Opening of Bids*	0 days	Thu 10/16/08	Thu 10/16/08
7	Task 1.3-Permitting process	52 days	Mon 8/18/08	Tue 10/28/08
8	Task 1.4-Public notification	96 days	Mon 8/18/08	Mon 12/29/08
9	*Completion of pre-field activities*	0 days	Mon 12/29/08	Mon 12/29/08
10	**Task 2-Drilling, Well Construction, and Development**	**129 days**	**Mon 1/12/09**	**Thu 7/9/09**
11	Task 2.1-Drill and collect lithologic data for 4 boreholes to 400 feet	84 days	Fri 1/23/09	Wed 5/20/09
12	Task 2.1.1-Blacow - F	12 days	Wed 2/11/09	Thu 2/26/09
13	Task 2.1.2-Meyers Park - F	12 days	Mon 3/9/09	Tue 3/24/09
14	Task 2.1.3-Robin - F	12 days	Wed 3/25/09	Thu 4/9/09
15	Task 2.1.4-Margery - F	12 days	Wed 4/15/09	Thu 4/30/09
16	Task 2.1.5-Fremont Library - F	12 days	Tue 5/19/09	Wed 6/3/09
17	Task 2.2- Conduct geophysical logs	69 days	Tue 2/3/09	Fri 5/8/09
18	Task 2.2.1-Blacow - F	1 day	Fri 2/27/09	Fri 2/27/09
19	Task 2.2.2-Meyers Park - F	1 day	Wed 3/25/09	Wed 3/25/09
20	Task 2.2.3-Robin - F	1 day	Mon 4/13/09	Mon 4/13/09
21	Task 2.2.4-Margery - F	1 day	Mon 5/11/09	Mon 5/11/09
22	Task 2.2.5-Fremont Library - F	1 day	Thu 6/4/09	Thu 6/4/09
23	Task 2.3-Install 4 2-inch monitoring wells	72 days	Wed 2/4/09	Thu 5/14/09
24	Task 2.3.1-Blacow - F	4 days	Mon 3/2/09	Thu 3/5/09
25	Task 2.3.2-Meyers Park - F	4 days	Thu 3/26/09	Tue 3/31/09
26	Task 2.3.3-Robin - F	4 days	Tue 4/14/09	Fri 4/17/09
27	Task 2.3.4-Margery - F	4 days	Tue 5/12/09	Fri 5/15/09
28	Task 2.3.4-Fremont Library - F	4 days	Fri 6/5/09	Wed 6/10/09
29	Task 2.4-Install Heritage Village (well not installed)	0 days	Tue 5/12/09	Tue 5/12/09
30	Task 2.5-Drill boreholes and install 2 2-inch monitoring wells to 250 feet	6 days	Mon 6/1/09	Mon 6/8/09
31	Task 2.5.1-Blacow - C	6 days	Fri 3/6/09	Fri 3/13/09
32	Task 2.5.2Meyers Park - C	6 days	Wed 4/1/09	Wed 4/8/09
33	Task 2.5.3- Robin - C	6 days	Mon 4/20/09	Mon 4/27/09
34	Task 2.5.4-Margery - C	6 days	Mon 5/18/09	Mon 5/25/09
35	Task 2.5.5-Serra Place - C	6 days	Fri 1/23/09	Fri 1/30/09
36	Task 2.6-Drill 1 borehole and install 1 2-inch monitoring well to 350 feet	10 days	Mon 5/18/09	Fri 5/29/09
37	Task 2.6.1-Noll Park - F	10 days	Fri 5/1/09	Thu 5/14/09
38	Task 2.7-Collect and classify samples	100 days	Thu 1/22/09	Wed 6/10/09
39	Task 2.8- Review of logs and finalize well designs	100 days	Mon 1/19/09	Fri 6/5/09
40	Task 2.9-Grout boreholes	104 days	Mon 1/19/09	Thu 6/11/09
41	Task 2.10-Develop wells	95 days	Mon 2/16/09	Fri 6/26/09
42	Task 2.11-Dispose of drilling fluids and cuttings	115 days	Mon 1/19/09	Fri 6/26/09
43	Task 2.12-Install security fencing	121 days	Mon 1/12/09	Mon 6/29/09
44	Task 2.13-Install surface completion well box	97 days	Tue 2/10/09	Wed 6/24/09
45	Task 2.14-GPS new well locations	2 days	Wed 7/8/09	Thu 7/9/09
46	*Completion of Field Activities*	1 day	Thu 7/9/09	Thu 7/9/09
47	**Task 3-Analytical Testing and Evaluation**	**169 days**	**Wed 1/7/09**	**Mon 8/31/09**
48	Task 3.1-Collect and test permeability of sample cores	143 days	Wed 1/7/09	Fri 7/24/09
49	Task 3.2-Collect and analyze groundwater samples upon well completion	5 days	Tue 8/25/09	Mon 8/31/09
50	**Task 4- Reporting**	**331 days**	**Thu 1/15/09**	**Fri 4/23/10**
51	Task 4.1-Submit quarterly progress reports to DWR	272 days	Thu 1/15/09	Fri 1/29/10
52	Task 4.1.1-Fourth Qt 2008 progress report	0 days	Thu 1/15/09	Thu 1/15/09
53	Task 4.1.2-First Qt 2009 progress report	0 days	Wed 4/15/09	Wed 4/15/09
54	Task 4.1.3-Second Qt 2009 progress report	0 days	Wed 7/15/09	Wed 7/15/09
55	Task 4.1.4-Third Qt 2009 progress report	0 days	Thu 10/15/09	Thu 10/15/09
56	Task 4.1.5-Fourth Qt 2009 progress report	0 days	Fri 1/15/10	Fri 1/15/10
57	Task 4.2-Submit final project summary to DWR	3 days	Wed 4/14/10	Fri 4/16/10
58	*Draft Final Report to DWR*	0 days	Fri 4/16/10	Fri 4/16/10
59	*Well Installation Project Completed*	0 days	Fri 4/23/10	Fri 4/23/10
60	Task 4.3 Distribute report to stakeholders	0 days	Fri 4/30/10	Fri 4/30/10

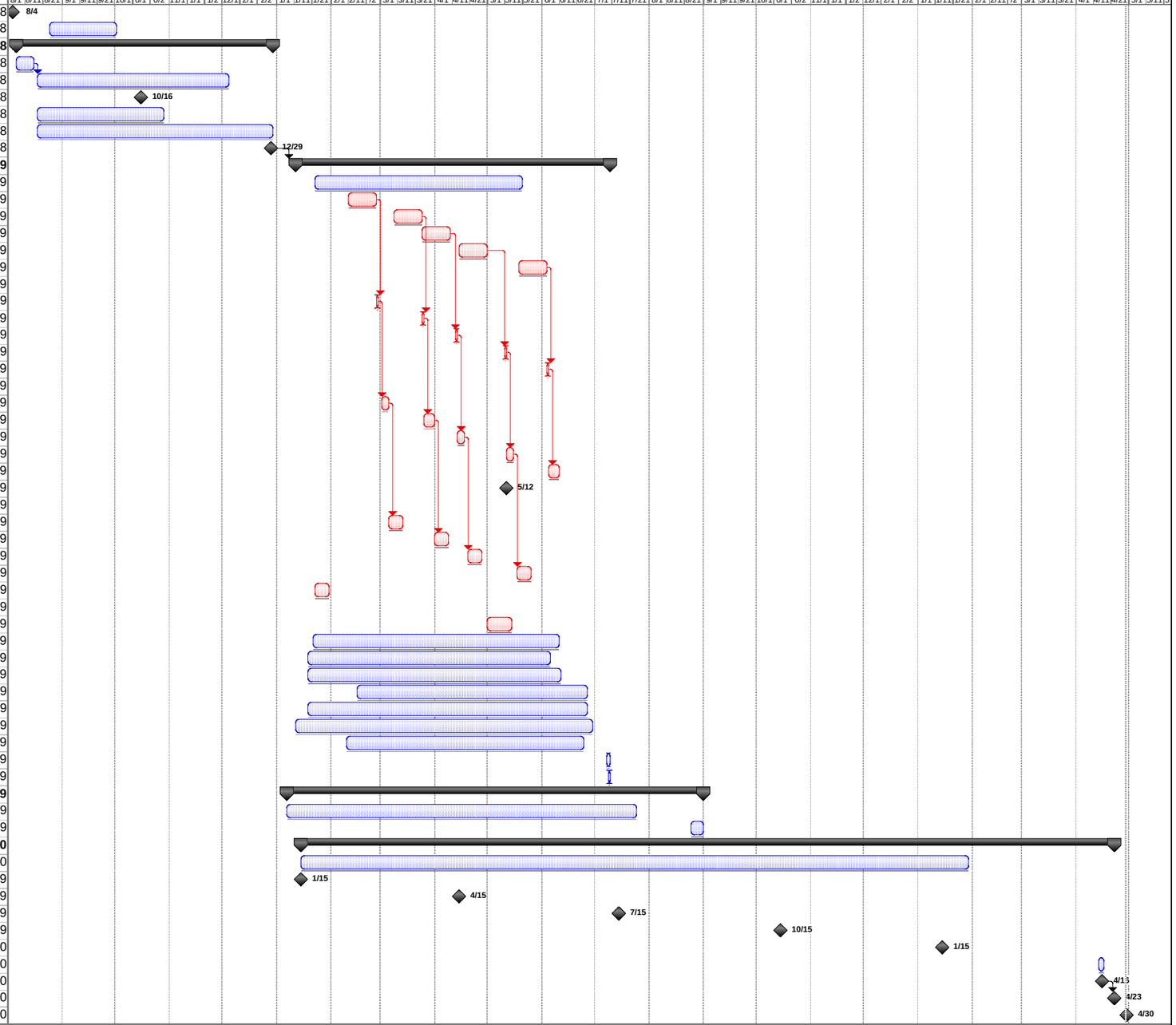


Figure 16
Project: Inland Saltwater Intrusion Monitoring Wells Project
Date: March 10, 2010

Task — Progress — Summary — External Tasks — Split
Split — Milestone — Project Summary — External MileTask

Appendix A
Permits

COMPUTER POSTED

APPLICATION FOR DRILLING PERMIT

ALAMEDA COUNTY WATER DISTRICT
43885 South Grimmer Blvd. • P.O. Box 5110
Fremont, CA 94537-5110
Engineering Department (510) 668-4460

WELL ORDINANCE
- ☑ City of Fremont No. 963
- ☐ City of Newark No. 136
- ☐ City of Union City No. 109-73

Application Received Date: 12/17/08 By: M.M | Permit Issued Date: 12/18/08 | Permit Expiration Date: 4/18/09 | Job No. 0307 | Permit No. 2008-388 | Well No. 4S/1W-32N001 (Blacow Rd. - C)

JOB ADDRESS:
Approximately 45 feet southeast of Cannel and Blacow Rd. intersection, in grassy area along sidewalk. (Blacow C)

When properly signed

THIS APPLICATION IS A VALID PERMIT

to perform only work described below at the given job address, in accordance with the City Ordinance checked above and all other applicable laws and regulations. Discontinuation of work may result in revocation of permit by Inspecting Officer. ***Permittee must schedule the work in advance with ACWD.*** *ACWD's approval of drawings, designs, specifications, reports and incidental work or materials shall not in any way relieve the applicant of responsibility for the technical adequacy of the work. Except for special circumstances, all work to be inspected must be performed within ACWD work hours – 7:00 a.m. to 4:30 p.m., Monday through Friday.*

PROPERTY OWNER
NAME: City of Fremont
ADDRESS: 3300 Capitol Avenue, Fremont, California 94537
TELEPHONE: 510-284-4000

CONSULTING ENGINEER
NAME: Alamdeda County Water District - Douglas Young
ADDRESS: 43885 South Grimmer Boulevard, Fremont, California 94538
TELEPHONE: 510-668-4452 RG/CEG/RCE NO. 5859

WELL DRILLING CONTRACTOR
NAME: Precision Sampling
ADDRESS: 2365 Wigwam Drive, Stockton, California 95205
TELEPHONE: 209-465-8712 STATE LIC. NO. C57 636387

PLEASE CHECK TYPE OF PROPOSED WORK AND INDICATE NUMBER OF BOREHOLES

WATER (Pumping) WELL
- Construction ☐
- Repair or Reconstruction ☐
- Destruction ☐
- Dewatering ☐

GEOTECHNICAL INVESTIGATION AND OTHER CATEGORIES
- Exploratory Holes ☐
  No. of Exploratory Holes ____
- Monitoring Wells, Construction ☒
- Monitoring Wells, Destruction ☐
- Cathodic Protection Well ☐
- Elevator Shafts ☐
- Piers or Pilings ☐

CHEMICAL INVESTIGATION
- Exploratory Holes ☐
  No. of Exploratory Holes ____
- Monitoring Well Construction ☐
- Monitoring Well Destruction ☐
- Injection Well ☐
- Vapor Extraction Well ☒

DESCRIPTION OF PROPOSED WORK:
Installation of one 2-inch diameter monitoring well to approx. 250 feet below ground surface. (Blacow Rd. - C)

TOTAL ESTIMATED COST $____

PERMIT CONDITIONS:
Monitoring Well Construction to comply with current ACWD Groundwater Monitoring Guidelines

FEES: Private ☐ Public (Governmental) Agency ☐

ESTIMATE		ACTUAL	
Permit Issuance Fee	$ 0	Permit Issuance Fee	$ 0
Field Investigation and Inspection Fee	$ 0	Field Investigation and Inspection Fee	$ 0
ESTIMATE TOTAL	$ 0	ACTUAL TOTAL	$ 0

DEPOSIT: Date Received ____ Cash ____ Check No. ____ P.O. No. ____
Estimated Amount $ 0
Actual Amount $ 0
Difference $ 0

GUARANTEE OF PERFORMANCE
Cash Deposit ____ Bond ____
Amount $____ Date ____
(NOT TO EXCEED TOTAL ESTIMATED COST)

Refund $ ____
Refund Date ____
Billed for $ ____
Billed for Date ____

ACWD SITE NO. ____
APPROVED FOR SCHEDULING BY: [signature] DATE: 12/18/08
INSPECTING OFFICER APPROVAL: [signature] DATE: 12/18/08

I hereby agree to comply with all conditions of this permit in accordance with the City Well Ordinance checked above, and to furnish the Alameda County Water District a completed copy of D.W.R. water well Drillers Report (form 188) or acceptable facsimile as well as any chemical testing results within fifteen (15) days after completion.

Title: Hydrogeologist Signature: [signature] Date: 12/18/08

Representing: Alameda County Water District Name (printed): Douglas Young

ACWD #458 12-08

ALAMEDA COUNTY WATER DISTRICT
43885 South Grimmer Blvd. • P.O. Box 5110
Fremont, CA 94537-5110
Engineering Department (510) 668-4460

APPLICATION FOR DRILLING PERMIT

WELL ORDINANCE
- ☑ City of Fremont No. 963
- ☐ City of Newark No. 136
- ☐ City of Union City No. 109-73

Application Received Date: 12/17/08 By: MM | Permit Issued Date: 12/18/08 | Permit Expiration Date: 12/18/09 | Job No. 0367 | Permit No. 2008-389 | Well No. 4S/1W-32N002

JOB ADDRESS:
Approximately 45 feet southeast of Cannel and Blacow Rd. intersection, in grassy area along sidewalk. (Blacow F)

When properly signed (Blacow Rd. F)

THIS APPLICATION IS A VALID PERMIT

to perform only work described below at the given job address, in accordance with the City Ordinance checked above and all other applicable laws and regulations. Discontinuation of work may result in revocation of permit by Inspecting Officer. ***Permittee must schedule the work in advance with ACWD.*** *ACWD's approval of drawings, designs, specifications, reports and incidental work or materials shall not in any way relieve the applicant of responsibility for the technical adequacy of the work. Except for special circumstances, all work to be inspected must be performed within ACWD work hours – 7:00 a.m. to 4:30 p.m., Monday through Friday.*

PROPERTY OWNER
NAME: City of Fremont
ADDRESS: 3300 Capitol Avenue
Fremont, California 94537
TELEPHONE: 510-284-4000

CONSULTING ENGINEER
NAME: Alamdeda County Water District - Douglas Young
ADDRESS: 43885 South Grimmer Boulevard
Fremont, California 94538
TELEPHONE: 510-668-4452 RG/CEG/RCE NO. 5859

WELL DRILLING CONTRACTOR
NAME: Precision Sampling
ADDRESS: 2365 Wigwam Drive
Stockton, California 95205
TELEPHONE: 209-465-8712 STATE LIC. NO. C57 636387

PLEASE CHECK TYPE OF PROPOSED WORK AND INDICATE NUMBER OF BOREHOLES

WATER (Pumping) WELL		GEOTECHNICAL INVESTIGATION AND OTHER CATEGORIES		CHEMICAL INVESTIGATION	
Construction	☐	Exploratory Holes	☐	Exploratory Holes	☐
Repair or Reconstruction	☐	No. of Exploratory Holes ____		No. of Exploratory Holes ____	
Destruction	☐	Monitoring Wells, Construction	☑	Monitoring Well Construction	☐
Dewatering	☐	Monitoring Wells, Destruction	☐	Monitoring Well Destruction	☐
		Cathodic Protection Well	☐	Injection Well	☐
		Elevator Shafts	☐	Vapor Extraction Well	☐
		Piers or Pilings	☐		

DESCRIPTION OF PROPOSED WORK:
Installation of one 2-inch diameter monitoring well to approx. ~~250~~ 850 feet below ground surface. (Blacow Rd. - F)

TOTAL ESTIMATED COST
$ ____

PERMIT CONDITIONS:
Monitoring Well Construction to comply with current ACWD Groundwater Monitoring Guidelines.

FEES: Private ☐ Public (Governmental) Agency ☐

ESTIMATE
Permit Issuance Fee $ ____
Field Investigation and Inspection Fee $ ____
ESTIMATE TOTAL $ ____

ACTUAL
Permit Issuance Fee $ ____
Field Investigation and Inspection Fee $ ____
ACTUAL TOTAL $ ____

DEPOSIT: Date Received ____ Cash ____ Check No. ____ P.O. No. ____
Estimated Amount $ ____
Actual Amount $ ____
Difference $ ____

GUARANTEE OF PERFORMANCE
Cash Deposit ____ Bond ____
Amount $ ____ Date ____
(NOT TO EXCEED TOTAL ESTIMATED COST)

Refund $ ____
Refund Date ____
Billed for $ ____
Billed for Date ____

ACWD SITE NO. ____
APPROVED FOR SCHEDULING BY: [signature] DATE: 12/18/08
INSPECTING OFFICER APPROVAL [signature] DATE: 12/18/08

I hereby agree to comply with all conditions of this permit in accordance with the City Well Ordinance checked above, and to furnish the Alameda County Water District a completed copy of D.W.R. water well Drillers Report (form 188) or acceptable facsimile as well as any chemical testing results within fifteen (15) days after completion.

Title: Hydrogeologist Signature: [signature] Date: 12/18/08

Representing: Alameda County Water District Name (printed): Douglas Young

ACWD #458 12-08

ALAMEDA COUNTY WATER DISTRICT
43885 South Grimmer Blvd. • P.O. Box 5110
Fremont, CA 94537-5110
Engineering Department (510) 668-4460

APPLICATION FOR DRILLING PERMIT

WELL ORDINANCE
- ☑ City of Fremont No. 963
- ☐ City of Newark No. 136
- ☐ City of Union City No. 109-73

Application Received Date: 12/17/08 By: M.M.
Permit Issued Date: ~~12/18/2008~~ 12/18/2008
Permit Expiration Date: ~~4/5/09~~ 4/5/09
Job No. 10367
Permit No. 2008-396
Well No. 4S/1W-28R003

JOB ADDRESS: Southwestern most corner of Fremont Library parking lot, approximately 50 feet east of Stevenson Boulevard. (~~Library~~ F) Fremont Library - F

(Fremont Library - F)
When properly signed

THIS APPLICATION IS A VALID PERMIT

to perform only work described below at the given job address, in accordance with the City Ordinance checked above and all other applicable laws and regulations. Discontinuation of work may result in revocation of permit by Inspecting Officer. ***Permittee must schedule the work in advance with ACWD.*** *ACWD's approval of drawings, designs, specifications, reports and incidental work or materials shall not in any way relieve the applicant of responsibility for the technical adequacy of the work. Except for special circumstances, all work to be inspected must be performed within ACWD work hours – 7:00 a.m. to 4:30 p.m., Monday through Friday.*

PROPERTY OWNER
NAME: City of Fremont
ADDRESS: 3300 Capitol Avenue, Fremont, California 94537
TELEPHONE: 510-284-4000

CONSULTING ENGINEER
NAME: Alamdeda County Water District - Douglas Young
ADDRESS: 43885 South Grimmer Boulevard, Fremont, California 94538
TELEPHONE: 510-668-4452 RG/CEG/RCE NO. 5859

WELL DRILLING CONTRACTOR
NAME: Precision Sampling
ADDRESS: 2365 Wigwam Drive, Stockton, California 95205
TELEPHONE: 209-465-8712 STATE LIC. NO. C57 636387

PLEASE CHECK TYPE OF PROPOSED WORK AND INDICATE NUMBER OF BOREHOLES

WATER (Pumping) WELL
- Construction ☐
- Repair or Reconstruction ☐
- Destruction ☐
- Dewatering ☐

GEOTECHNICAL INVESTIGATION AND OTHER CATEGORIES
- Exploratory Holes ☐
  No. of Exploratory Holes ____
- Monitoring Wells, Construction ☑
- Monitoring Wells, Destruction ☐
- Cathodic Protection Well ☐
- Elevator Shafts ☐
- Piers or Pilings ☐

CHEMICAL INVESTIGATION
- Exploratory Holes ☐
  No. of Exploratory Holes ____
- Monitoring Well Construction ☐
- Monitoring Well Destruction ☐
- Injection Well ☐
- Vapor Extraction Well ☐

DESCRIPTION OF PROPOSED WORK: Installation of one 2-inch diameter monitoring well to approx. ~~250~~ 350 feet below ground surface.

TOTAL ESTIMATED COST $____

PERMIT CONDITIONS:
Monitoring Well Construction to comply with current ACWD Groundwater Monitoring Guidelines.

FEES: Private ☐ Public (Governmental) Agency ☑

ESTIMATE		ACTUAL	
Permit Issuance Fee	$ -0-	Permit Issuance Fee	$ -0-
Field Investigation and Inspection Fee	$ -0-	Field Investigation and Inspection Fee	$ -0-
ESTIMATE TOTAL	$ -0-	ACTUAL TOTAL	$ -0-

DEPOSIT: Date Received ____ Cash ____ Check No. ____ P.O. No. ____
Estimated Amount $ -0-
Actual Amount $ -0-
Difference $ -0-

GUARANTEE OF PERFORMANCE
Cash Deposit ____ Bond ____
Amount $ ____ Date ____
(NOT TO EXCEED TOTAL ESTIMATED COST)

Refund $ ____
Refund Date ____
Billed for $ ____
Billed for Date ____

ACWD SITE NO. ____
APPROVED FOR SCHEDULING BY: [signature] DATE: 12/18/08
INSPECTING OFFICER APPROVAL: [signature] DATE: 12/18/08

I hereby agree to comply with all conditions of this permit in accordance with the City Well Ordinance checked above, and to furnish the Alameda County Water District a completed copy of D.W.R. water well Drillers Report (form 188) or acceptable facsimile as well as any chemical testing results within fifteen (15) days after completion.

Title: Hydrogeologist Signature: [signature] Date: 12/18/08

Representing: Alameda County Water District Name (printed): Douglas Young

ACWD #458 12-08

ALAMEDA COUNTY WATER DISTRICT
43885 South Grimmer Blvd. • P.O. Box 5110
remont, California 94537-5110
Engineering Department 1 (510) 668-4460

APPLICATION FOR DRILLING PERMIT

(APPLICATION TO BE TYPED)

X WELL ORDINANCE
___ City of Fremont No. 963
___ City of Newark No. 136
___ City of Union City No. 109-73

Application Received Date: 3/30/09 By: M.M. | Permit Issued Date: 3/31/09 | Permit Expiration Date: 5/31/09 | Job No: 6367 | Permit No. 2009-048 Well No. 4S/1W-33R007

JOB ADDRESS NW Corner of Margery Dr and Blanchard St. Fremont CA.

PROPERTY OWNER
NAME: City of Fremont
ADDRESS: 39550 Liberty ST
Fremont CA 94537
TELEPHONE: 510-494-4700

CONSULTING ENGINEER
NAME: Alameda County Water District - Douglas Young
ADDRESS: 43885 South Grimmer Blvd
Fremont CA 94538
TELEPHONE: 510-668-4452 RG/CFG/RCE NO. 5959

WELL DRILLING CONTRACTOR
NAME: Precision Sampling
ADDRESS: 2365 Wigwam Dr.
Stockton CA 95205
TELEPHONE: 209-465-8712 STATE LIC. NO. C57 636287

When properly signed (Margery - C)

THIS APPLICATION IS A VALID PERMIT

to perform only work described below at the given job address, in accordance with the City Ordinance checked above and all other applicable laws and regulations. Discontinuation of work may result in revocation of permit by Inspecting Officer. ***Permittee must schedule the work in advance with the Inspecting Officer,*** *ACWD's approval of drawings, designs, specifications, reports and incidental work or materials shall not in any way relieve the applicant of responsibility for the technical adequacy of the work. Except for special circumstances, all work to be inspected must be performed within ACWD work hours - 7:00 a.m. to 4:30 p.m., Monday through Friday.*

PLEASE CHECK TYPE OF PROPOSED WORK

WATER (Pumping) WELL		GEOTECHNICAL INVESTIGATION		CHEMICAL INVESTIGATION			
Construction	___	Exploratory Holes	___	Exploratory Holes	___	Monitoring Well Const. (Chemical Leak)	___
Repair or Reconstruction	___	Monitoring Wells, Construction	X	Vapor Sampling Investigation	___	Monitoring Well Const. (Compliance Wells)	___
Destruction	___	Monitoring Wells, Destruction	___	Monitoring Well Destruction	___	Monitoring Well Const. (Baseline Study)	___
Cathodic Protection Hole	___			Air Sparging Well	___	Vapor Extraction Well	___
Dewatering	___						

Description of Proposed Work: Installation of one 2-inch Monitoring Well to approximately 250 feet below ground surface (Margery - C)

TOTAL ESTIMATED COST $ ___

PERMIT CONDITIONS: Monitoring Well Construction to comply with current ACWD Groundwater Monitoring Guidelines.

FEES:

ESTIMATE
- Private ___
- Public (Governmental) Agency ___
- Public Utility ✓
- Permit Issuance Fee $ 0
- Field Investigation and Inspection Fee $ ___
- ESTIMATE TOTAL $ 0

ACTUAL
- Permit Issuance Fee $ 0
- Field Investigation and Inspection Fee $ ___
- TOTAL $ 0

DEPOSIT:
Date Received ___
P.O. NO. ___ Cash ___ Check No. ___
Estimated Amount $ 0
Actual Amount $ 0
Difference $ 0
Refund $ ___ Date ___
Billed 4 ___ Date ___

GUARANTEE OF PERFORMANCE
Cash Deposit ___ Bond ___
Amount $ ___ Date ___
(NOT TO EXCEEDED TOTAL ESTIMATED COST)
Return Amount $ ___ Date ___

ACWD SITE NO. ___
APPROVED FOR SCHEDULING BY: [signature] DATE: 3/31/09
INSPECTING OFFICER APPROVAL [signature] DATE: 3/31/09

I hereby agree to comply with all conditions of this permit in accordance with the City Well Ordinance checked above, and to furnish the Alameda County Water District a completed copy of D.W.R. water well Drillers Report (form 188) or acceptable facsimile as well as any chemical testing results within fifteen (15) days after completion.

Title: Hydrogeologist Signature: [signature] Date: 3-30-09
Representing: ACWD Name (printed): Douglas Young

ACWD #458 8-03

ALAMEDA COUNTY WATER DISTRICT
43885 South Grimmer Blvd. • P.O. Box 5110
Fremont, California 94537-5110
Engineering Department 1 (510) 668-4460

APPLICATION FOR DRILLING PERMIT

(APPLICATION TO BE TYPED)

WELL ORDINANCE
X City of Fremont No. 963
____ City of Newark No. 136
____ City of Union City No. 109-73

Application Received Date: 3/30/09 By: MM | Permit Issued Date: 3/31/09 | Permit Expiration Date: 5/31/09 | Job No. 6367 | Permit No. 2009-649 Well No. 4S/1W-33R008 (Margery - F)

JOB ADDRESS NW Corner of Margery Drive and Blanchard Street, Fremont CA

PROPERTY OWNER
NAME: City of Fremont
ADDRESS: 39550 Liberty ST.
Fremont CA 94537
TELEPHONE: 510-494-4700

CONSULTING ENGINEER
NAME: Douglas Young - Alameda Co Water Dist.
ADDRESS: 43885 South Grimmer Blvd.
Fremont CA 94538
TELEPHONE: 510-668-4452 (RG/CFG/RCE NO. 5859

WELL DRILLING CONTRACTOR
NAME: Precision Sampling
ADDRESS: 2365 Wigwam Dr.
Stockton CA 95205
TELEPHONE: 209-465-8712 STATE LIC. NO. C57 636387

When properly signed

THIS APPLICATION IS A VALID PERMIT

to perform only work described below at the given job address, in accordance with the City Ordinance checked above and all other applicable laws and regulations. Discontinuation of work may result in revocation of permit by Inspecting Officer. ***Permittee must schedule the work in advance with the Inspecting Officer,*** *ACWD's approval of drawings, designs, specifications, reports and incidental work or materials shall not in any way relieve the applicant of responsibility for the technical adequacy of the work. Except for special circumstances, all work to be inspected must be performed within ACWD work hours - 7:00 a.m. to 4:30 p.m., Monday through Friday.*

PLEASE CHECK TYPE OF PROPOSED WORK

WATER (Pumping) WELL		GEOTECHNICAL INVESTIGATION		CHEMICAL INVESTIGATION			
Construction	____	Exploratory Holes		Exploratory Holes	____	Monitoring Well Const. (Chemical Leak)	____
Repair or Reconstruction	____	Monitoring Wells, Construction	X	Vapor Sampling Investigation	____	Monitoring Well Const. (Compliance Wells)	____
Destruction	____	Monitoring Wells, Destruction	____	Monitoring Well Destruction	____	Monitoring Well Const. (Baseline Study)	____
Cathodic Protection Hole	____			Air Sparging Well	____	Vapor Extraction Well	____
Dewatering	____						

Description of Proposed Work: Installation of one 2-inch diameter Monitoring Well to approximately 350 feet below ground surface

(Margery - F)

TOTAL ESTIMATED COST $ ____

PERMIT CONDITIONS: Monitoring Well Construction to comply with current ACWD Groundwater Monitoring Guidelines.

FEES:

ESTIMATE
- Private ____
- Public (Governmental) Agency ✓
- Public Utility ____
- Permit Issuance Fee $ 0
- Field Investigation and Inspection Fee $ ____
- ESTIMATE TOTAL $ 0

ACTUAL
- Permit Issuance Fee $ 0
- Field Investigation and Inspection Fee $ ____
- TOTAL $ 0

DEPOSIT:
Date Received ____
P.O. NO. ____ Cash ____ Check No. ____
Estimated Amount $ 0
Actual Amount $ 0
Difference $ 0
Refund $ ____ Date ____
Billed $ ____ Date ____

GUARANTEE OF PERFORMANCE
Cash Deposit ____ Bond ____
Amount $ ____ Date ____
(NOT TO EXCEEDED TOTAL ESTIMATED COST)
Return Amount $ ____ Date ____

ACWD SITE NO. ____
APPROVED FOR SCHEDULING BY: [signature] DATE: 3/31/09
INSPECTING OFFICER APPROVAL [signature] DATE: 3/31/09

I hereby agree to comply with all conditions of this permit in accordance with the City Well Ordinance checked above, and to furnish the Alameda County Water District a completed copy of D.W.R. water well Drillers Report (form 188) or acceptable facsimile as well as any chemical testing results within fifteen (15) days after completion.

Title: Hydrogeologist Signature: [signature] Date: 3-30-09
Representing: ACWD Name (printed): Douglas Young

ACWD #458 8-03

APPLICATION FOR DRILLING PERMIT

(APPLICATION TO BE TYPED)

ALAMEDA COUNTY WATER DISTRICT
43885 South Grimmer Blvd. • P.O. Box 5110
Fremont, California 94537-5110
Engineering Department 1 (510) 668-4460

WELL ORDINANCE
X City of Fremont No. 963
____ City of Newark No. 136
____ City of Union City No. 109-73

Application Received Date: 2/23/09 By: MM | Permit Issued Date: 2/23/09 | Permit Expiration Date: 4/23/09 | Job No. 6367 | Permit No. 2009-032 | Well No. 4S/1W-32E011 (MEYER PARK-C)

JOB ADDRESS Corner of Glenmoor Drive and Eggers Drive, Fremont near Meyer Park

PROPERTY OWNER
NAME: City of Fremont
ADDRESS: 39550 Liberty ST.
Fremont CA. 94537-5006
TELEPHONE: 510-494-4700

CONSULTING ENGINEER
NAME: ACWD Douglas Young
ADDRESS: 43885 South Grimmer Blvd.
Fremont CA 94538
TELEPHONE: 510-668-4452 RG/CFG/RCE NO. 5859

WELL DRILLING CONTRACTOR
NAME: Precision Sampling
ADDRESS: 2365 Wigwam Dr.
Stockton CA 95205
TELEPHONE: 209-465-8712 STATE LIC. NO. C57 636387

When properly signed

THIS APPLICATION IS A VALID PERMIT

to perform only work described below at the given job address, in accordance with the City Ordinance checked above and all other applicable laws and regulations. Discontinuation of work may result in revocation of permit by Inspecting Officer. ***Permittee must schedule the work in advance with the Inspecting Officer,*** *ACWD's approval of drawings, designs, specifications, reports and incidental work or materials shall not in any way relieve the applicant of responsibility for the technical adequacy of the work. Except for special circumstances, all work to be inspected must be performed within ACWD work hours - 7:00 a.m. to 4:30 p.m., Monday through Friday.*

PLEASE CHECK TYPE OF PROPOSED WORK

WATER (Pumping) WELL		GEOTECHNICAL INVESTIGATION		CHEMICAL INVESTIGATION Meyer Park - C	
Construction		Exploratory Holes		Exploratory Holes		Monitoring Well Const. (Chemical Leak)	
Repair or Reconstruction		Monitoring Wells, Construction		Vapor Sampling Investigation		Monitoring Well Const. (Compliance Wells)	
Destruction		Monitoring Wells, Destruction		Monitoring Well Destruction		Monitoring Well Const. (Baseline Study)	X
Cathodic Protection Hole				Air Sparging Well		Vapor Extraction Well	
Dewatering							

Description of Proposed Work: Installation of ~~2~~ 2" monitoring wells ± 250 [redacted]' below ground surface within the planter strip at the corner of Glenwood Drive at Eggers Drive in Fremont

TOTAL ESTIMATED COST $

PERMIT CONDITIONS: Monitoring Well Construction to comply with current ACWD Groundwater Monitoring Guidelines.

FEES:

ESTIMATE
- Private
- Public (Governmental) Agency ✓
- Public Utility
- Permit Issuance Fee $ 0
- Field Investigation and Inspection Fee $
- ESTIMATE TOTAL $ 0

ACTUAL
- Permit Issuance Fee $ 0
- Field Investigation and Inspection Fee $
- TOTAL $ 0

DEPOSIT:
Date Received
P.O. NO. Cash Check No.
Estimated Amount $ 0
Actual Amount $ 0
Difference $ 0
Refund $ Date
Billed 4 Date

GUARANTEE OF PERFORMANCE
Cash Deposit Bond
Amount $ Date
(NOT TO EXCEEDED TOTAL ESTIMATED COST)
Return Amount $ Date

ACWD SITE NO. N/A
APPROVED FOR SCHEDULING BY: MM DATE: 2/24/09 INSPECTING OFFICER APPROVAL Michelle Myers DATE: 2/24/09

I hereby agree to comply with all conditions of this permit in accordance with the City Well Ordinance checked above, and to furnish the Alameda County Water District a completed copy of D.W.R. water well Drillers Report (form 188) or acceptable facsimile as well as any chemical testing results within fifteen (15) days after completion.

Title: Hydrogeologist Signature: Date: 2/23/09
Representing: ACWD Name (printed): Douglas Young

ACWD #458 8-03

ALAMEDA COUNTY WATER DISTRICT
43885 South Grimmer Blvd. • P.O. Box 5110
Fremont, California 94537-5110
Engineering Department 1 (510) 668-4460

APPLICATION FOR DRILLING PERMIT

(APPLICATION TO BE TYPED)

X WELL ORDINANCE
___ City of Fremont No. 963
___ City of Newark No. 136
___ City of Union City No. 109-73

Application Received Date: 2/23/09 By: M.M | Permit Issued Date: 2/23/09 | Permit Expiration Date: 4/23/09 | Job No. 6367 | Permit No. 2009-033 | Well No. 4S/1W-32E012 (MEYER PARK-F)

JOB ADDRESS Corner of Glen moor Drive and Eggers Drive Fremont near Meyer Park

PROPERTY OWNER
NAME: City of Fremont
ADDRESS: 39550 Liberty ST.
Fremont CA 94537-5006
TELEPHONE: (510) 494-4700

CONSULTING ENGINEER
NAME: ACWD Douglas Young
ADDRESS: 43885 South Grimmer Blvd
Fremont CA 94538
TELEPHONE: 510-668-4452 RG/CEG/RCE NO.

WELL DRILLING CONTRACTOR
NAME: Precision Sampling
ADDRESS: 2365 Waynoma Dr.
Stockton CA [redacted] 95205
TELEPHONE: 209-465-8712 STATE LIC. NO. C57 636387

When properly signed

THIS APPLICATION IS A VALID PERMIT

to perform only work described below at the given job address, in accordance with the City Ordinance checked above and all other applicable laws and regulations. Discontinuation of work may result in revocation of permit by Inspecting Officer. ***Permittee must schedule the work in advance with the Inspecting Officer,*** *ACWD's approval of drawings, designs, specifications, reports and incidental work or materials shall not in any way relieve the applicant of responsibility for the technical adequacy of the work. Except for special circumstances, all work to be inspected must be performed within ACWD work hours - 7:00 a.m. to 4:30 p.m., Monday through Friday.*

PLEASE CHECK TYPE OF PROPOSED WORK

WATER (Pumping) WELL		GEOTECHNICAL INVESTIGATION		CHEMICAL INVESTIGATION Meyer Park - F	
Construction	___				
Repair or Reconstruction	___	Exploratory Holes	___	Exploratory Holes	___
Destruction	___	Monitoring Wells, Construction	___	Vapor Sampling Investigation	___
Cathodic Protection Hole	___	Monitoring Wells, Destruction	___	Monitoring Well Destruction	___
Dewatering	___			Air Sparging Well	___
				Monitoring Well Const. (Chemical Leak)	___
				Monitoring Well Const. (Compliance Wells)	___
				Monitoring Well Const. (Baseline Study)	X
				Vapor Extraction Well	___

Description of Proposed Work Installation of 2" monitoring well to ± 350'. well will be in Planter strip at the corner of Glenwood Dr. and Eggers Dr. at Meyer Park

TOTAL ESTIMATED COST $ ___

PERMIT CONDITIONS Monitoring Well Construction to comply with current ACWD Groundwater Monitoring Guidelines.

FEES:

ESTIMATE
- Private ___
- Public (Governmental) Agency ___
- Public Utility ✓
- Permit Issuance Fee $ 0
- Field Investigation and Inspection Fee $ ___
- ESTIMATE TOTAL $ 0

ACTUAL
- Permit Issuance Fee $ 0
- Field Investigation and Inspection Fee $ ___
- TOTAL $ 0

DEPOSIT:
Date Received ___
P.O. NO. ___ Cash ___ Check No. ___
Estimated Amount $ 0
Actual Amount $ 0
Difference $ 0
Refund $ ___ Date ___
Billed $ ___ Date ___

GUARANTEE OF PERFORMANCE
Cash Deposit ___ Bond ___
Amount $ ___ Date ___
(NOT TO EXCEEDED TOTAL ESTIMATED COST)
Return Amount $ ___ Date ___

ACWD SITE NO. N/A
APPROVED FOR SCHEDULING BY: [signature] DATE: 2/24/09
INSPECTING OFFICER APPROVAL [signature] DATE: 2/24/09

I hereby agree to comply with all conditions of this permit in accordance with the City Well Ordinance checked above, and to furnish the Alameda County Water District a completed copy of D.W.R. water well Drillers Report (form 188) or acceptable facsimile as well as any chemical testing results within fifteen (15) days after completion.

Title: Hydrogeologist Signature: [signature] Date: 2/23/09
Representing: ACWD Name (printed) Douglas Young

ACWD #458 8-03

ALAMEDA COUNTY WATER DISTRICT
43885 South Grimmer Blvd. • P.O. Box 5110
Fremont, CA 94537-5110
Engineering Department (510) 668-4460

APPLICATION FOR DRILLING PERMIT

WELL ORDINANCE
- ☑ City of Fremont No. 963
- ☐ City of Newark No. 136
- ☐ City of Union City No. 109-73

Application Received Date: 12/17/08 By: MM | Permit Issued Date: 12/18/08 | Permit Expiration Date: 4/18/09 | Job No. 1307 | Permit No. 2008-386 | Well No. 4S/1W-33N003 (Knoll Park - F)

JOB ADDRESS:
In the northeasterly corner of Knoll Park. Approximately 30 feet northwest from the intersection of Logan Drive and Gamble Court.
(Knoll - F)

PROPERTY OWNER
NAME: City of Fremont
ADDRESS: 3300 Capitol Avenue
Fremont, California 94537
TELEPHONE: 510-284-4000

CONSULTING ENGINEER
NAME: Alamdeda County Water District - Douglas Young
ADDRESS: 43885 South Grimmer Boulevard
Fremont, California 94538
TELEPHONE: 510-668-4452 RG/CEG/RCE NO. 5859

WELL DRILLING CONTRACTOR
NAME: Precision Sampling
ADDRESS: 2365 Wigwam Drive
Stockton, California 95205
TELEPHONE: 209-465-8712 STATE LIC. NO. C57 636387

When properly signed

THIS APPLICATION IS A VALID PERMIT

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PLEASE CHECK TYPE OF PROPOSED WORK AND INDICATE NUMBER OF BOREHOLES

WATER (Pumping) WELL
- Construction ☐
- Repair or Reconstruction ☐
- Destruction ☐
- Dewatering ☐

GEOTECHNICAL INVESTIGATION AND OTHER CATEGORIES
- Exploratory Holes ☐
  No. of Exploratory Holes ____
- Monitoring Wells, Construction ☒
- Monitoring Wells, Destruction ☐
- Cathodic Protection Well ☐
- Elevator Shafts ☐
- Piers or Pilings ☐

CHEMICAL INVESTIGATION
- Exploratory Holes ☐
  No. of Exploratory Holes ____
- Monitoring Well Construction ☐
- Monitoring Well Destruction ☐
- Injection Well ☐
- Vapor Extraction Well ☐

DESCRIPTION OF PROPOSED WORK:
Installation of one 2-inch diameter monitoring well to approx. ~~250~~ 350 feet below ground surface.
Monitoring Well Construction to comply with current ACWD Groundwater Monitoring Guidelines.
(KNOLL PARK - F)

TOTAL ESTIMATED COST $

PERMIT CONDITIONS:
Monitoring Well Construction to comply with current ACWD Groundwater Monitoring Guidelines.

FEES: Private ☐ Public (Governmental) Agency ☐

ESTIMATE		ACTUAL	
Permit Issuance Fee	$ 0	Permit Issuance Fee	$ 0
Field Investigation and Inspection Fee	$ 0	Field Investigation and Inspection Fee	$ 0
ESTIMATE TOTAL	$ 0	ACTUAL TOTAL	$ 0

DEPOSIT: Date Received ____ Cash ____ Check No. ____ P.O. No. ____
Estimated Amount $ 0
Actual Amount $ 0
Difference $ 0

GUARANTEE OF PERFORMANCE
Cash Deposit ____ Bond ____
Amount $ ____ Date ____
(NOT TO EXCEED TOTAL ESTIMATED COST)

Refund $ ____
Refund Date ____
Billed for $ ____
Billed for Date ____

ACWD SITE NO. ____
APPROVED FOR SCHEDULING BY: [signature] DATE: 12/18/08
INSPECTING OFFICER APPROVAL: [signature] DATE: 12/18/08

I hereby agree to comply with all conditions of this permit in accordance with the City Well Ordinance checked above, and to furnish the Alameda County Water District a completed copy of D.W.R. water well Drillers Report (form 188) or acceptable facsimile as well as any chemical testing results within fifteen (15) days after completion.

Title: Hydrogeologist Signature: [signature] Date: 12/17/08

Representing: Alameda County Water District Name (printed): Douglas Young

ACWD #458 12-08

ALAMEDA COUNTY WATER DISTRICT
43885 South Grimmer Blvd. • P.O. Box 5110
Fremont, CA 94537-5110
Engineering Department (510) 668-4460

APPLICATION FOR DRILLING PERMIT

WELL ORDINANCE
- ☑ City of Fremont No. 963
- ☐ City of Newark No. 136
- ☐ City of Union City No. 109-73

Application Received Date: 12/17/08 By: [illegible]
Permit Issued Date: ~~4/6/2009~~
Permit Expiration Date: 4/5/09
Job No. 1367
Permit No. 2008-393
Well No. 5S/1W-04H004

JOB ADDRESS: 12/18/08
Approximately 50 feet southeast of Lander St. and Robin St. intersection. Located behind sidewalk along Robin St. (Robin C)

When properly signed (Robin-C)

THIS APPLICATION IS A VALID PERMIT

to perform only work described below at the given job address, in accordance with the City Ordinance checked above and all other applicable laws and regulations. Discontinuation of work may result in revocation of permit by Inspecting Officer. ***Permittee must schedule the work in advance with ACWD.*** *ACWD's approval of drawings, designs, specifications, reports and incidental work or materials shall not in any way relieve the applicant of responsibility for the technical adequacy of the work. Except for special circumstances, all work to be inspected must be performed within ACWD work hours – 7:00 a.m. to 4:30 p.m., Monday through Friday.*

PROPERTY OWNER
NAME: City of Fremont / ACWD
ADDRESS: 3300 Capitol Avenue
Fremont, California 94537
TELEPHONE: 510-284-4000

CONSULTING ENGINEER
NAME: Alamdeda County Water District - Douglas Young
ADDRESS: 43885 South Grimmer Boulevard
Fremont, California 94538
TELEPHONE: 510-668-4452 RG/CEG/RCE NO. 5859

WELL DRILLING CONTRACTOR
NAME: Precision Sampling
ADDRESS: 2365 Wigwam Drive
Stockton, California 95205
TELEPHONE: 209-465-8712 STATE LIC. NO. C57 636387

PLEASE CHECK TYPE OF PROPOSED WORK AND INDICATE NUMBER OF BOREHOLES

WATER (Pumping) WELL		GEOTECHNICAL INVESTIGATION AND OTHER CATEGORIES		CHEMICAL INVESTIGATION	
Construction	☐	Exploratory Holes	☐	Exploratory Holes	☐
Repair or Reconstruction	☐	No. of Exploratory Holes ____		No. of Exploratory Holes ____	
Destruction	☐	Monitoring Wells, Construction	☑	Monitoring Well Construction	☐
Dewatering	☐	Monitoring Wells, Destruction	☐	Monitoring Well Destruction	☐
		Cathodic Protection Well	☐	Injection Well	☐
		Elevator Shafts	☐	Vapor Extraction Well	☐
		Piers or Pilings	☐		

DESCRIPTION OF PROPOSED WORK:
Installation of one 2-inch diameter monitoring well to approx. 250 feet below ground surface.

TOTAL ESTIMATED COST
$ ____

PERMIT CONDITIONS:
Monitoring Well Construction to comply with current ACWD Groundwater Monitoring Guidelines.

FEES: Private ☐ Public (Governmental) Agency ☑

ESTIMATE		ACTUAL	
Permit Issuance Fee	$ -0-	Permit Issuance Fee	$ -0-
Field Investigation and Inspection Fee	$ -0-	Field Investigation and Inspection Fee	$ -0-
ESTIMATE TOTAL	$ -0-	ACTUAL TOTAL	$ -0-

DEPOSIT: Date Received ____ Cash ____ Check No. ____ P.O. No. ____
Estimated Amount $ -0-
Actual Amount $ -0-
Difference $ -0-

GUARANTEE OF PERFORMANCE
Cash Deposit ____ Bond ____
Amount $ ____ Date ____
(NOT TO EXCEED TOTAL ESTIMATED COST)

Refund $ ____
Refund Date ____
Billed for $ ____
Billed for Date ____

ACWD SITE NO. ____
APPROVED FOR SCHEDULING BY: [signature] DATE: 12/18/08
INSPECTING OFFICER APPROVAL: [signature] DATE: 12/18/08

I hereby agree to comply with all conditions of this permit in accordance with the City Well Ordinance checked above, and to furnish the Alameda County Water District a completed copy of D.W.R. water well Drillers Report (form 188) or acceptable facsimile as well as any chemical testing results within fifteen (15) days after completion.

Title: Hydrogeologist Signature: [signature] Date: 12/17/08

Representing: Alameda County Water District Name (printed): Douglas Young

WD #458 12-08

ALAMEDA COUNTY WATER DISTRICT
43885 South Grimmer Blvd. • P.O. Box 5110
Fremont, CA 94537-5110
Engineering Department (510) 668-4460

APPLICATION FOR DRILLING PERMIT

WELL ORDINANCE
- ☑ City of Fremont No. 963
- ☐ City of Newark No. 136
- ☐ City of Union City No. 109-73

Application Received Date: 12/17/08 By: M.M.
Permit Issued Date: ~~1/5/2009~~ 12/18/2008
Permit Expiration Date: 4/5/09
Job No. 10367
Permit No. 2008-394
Well No. 5S/1W-04A005

JOB ADDRESS:
Approximately 50 feet southeast of Lander St. and Robin St. intersection. Located behind sidewalk along Robin St. (Robin F)

When properly signed (Robin-F)

THIS APPLICATION IS A VALID PERMIT

to perform only work described below at the given job address, in accordance with the City Ordinance checked above and all other applicable laws and regulations. Discontinuation of work may result in revocation of permit by Inspecting Officer. ***Permittee must schedule the work in advance with ACWD.*** *ACWD's approval of drawings, designs, specifications, reports and incidental work or materials shall not in any way relieve the applicant of responsibility for the technical adequacy of the work. Except for special circumstances, all work to be inspected must be performed within ACWD work hours – 7:00 a.m. to 4:30 p.m., Monday through Friday.*

PROPERTY OWNER
NAME: City of Fremont / ACWD
ADDRESS: 3300 Capitol Avenue
Fremont, California 94537
TELEPHONE: 510-284-4000

CONSULTING ENGINEER
NAME: Alamdeda County Water District - Douglas Young
ADDRESS: 43885 South Grimmer Boulevard
Fremont, California 94538
TELEPHONE: 510-668-4452 RG/CEG/RCE NO. 5859

WELL DRILLING CONTRACTOR
NAME: Precision Sampling
ADDRESS: 2365 Wigwam Drive
Stockton, California 95205
TELEPHONE: 209-465-8712 STATE LIC. NO. C57 636387

PLEASE CHECK TYPE OF PROPOSED WORK AND INDICATE NUMBER OF BOREHOLES

WATER (Pumping) WELL		GEOTECHNICAL INVESTIGATION AND OTHER CATEGORIES		CHEMICAL INVESTIGATION	
Construction	☐	Exploratory Holes	☐	Exploratory Holes	☐
Repair or Reconstruction	☐	No. of Exploratory Holes ____		No. of Exploratory Holes ____	
Destruction	☐	Monitoring Wells, Construction	☑	Monitoring Well Construction	☐
Dewatering	☐	Monitoring Wells, Destruction	☐	Monitoring Well Destruction	☐
		Cathodic Protection Well	☐	Injection Well	☐
		Elevator Shafts	☐	Vapor Extraction Well	☐
		Piers or Pilings	☐		

DESCRIPTION OF PROPOSED WORK:
Installation of one 2-inch diameter monitoring well to approx. ~~250~~ 350 feet below ground surface.

TOTAL ESTIMATED COST
$ ____

PERMIT CONDITIONS:
Monitoring Well Construction to comply with current ACWD Groundwater Monitoring Guidelines

FEES: Private ☐ Public (Governmental) Agency ☑

ESTIMATE		ACTUAL	
Permit Issuance Fee	$ 0	Permit Issuance Fee	$ 0
Field Investigation and Inspection Fee	$ 0	Field Investigation and Inspection Fee	$ 0
ESTIMATE TOTAL	$ 0	ACTUAL TOTAL	$ 0

DEPOSIT: Date Received ____ Cash ____ Check No. ____ P.O. No. ____
Estimated Amount $ 0
Actual Amount $ 0
Difference $ 0

GUARANTEE OF PERFORMANCE
Cash Deposit ____ Bond ____
Amount $ ____ Date ____
(NOT TO EXCEED TOTAL ESTIMATED COST)

Refund $ ____
Refund Date ____
Billed for $ ____
Billed for Date ____

ACWD SITE NO. ____
APPROVED FOR SCHEDULING BY: [signature] DATE: 12/18/08
INSPECTING OFFICER APPROVAL: [signature] DATE: 12/18/08

I hereby agree to comply with all conditions of this permit in accordance with the City Well Ordinance checked above, and to furnish the Alameda County Water District a completed copy of D.W.R. water well Drillers Report (form 188) or acceptable facsimile as well as any chemical testing results within fifteen (15) days after completion.

Title: Hydrogeologist Signature: [signature] Date: 12/17/08

Representing: Alameda County Water District Name (printed): Douglas Young

ACWD #458 12-08

ALAMEDA COUNTY WATER DISTRICT
43885 South Grimmer Blvd. • P.O. Box 5110
Fremont, CA 94537-5110
Engineering Department (510) 668-4460

APPLICATION FOR DRILLING PERMIT

WELL ORDINANCE
- ☑ City of Fremont No. 963
- ☐ City of Newark No. 136
- ☐ City of Union City No. 109-73

Application Received Date: 12/17/08 By: M.M.
Permit Issued Date: 12/18/08
Permit Expiration Date: 4/18/09
Job No. 1367
Permit No. 2008-385
Well No. 7S/1W-32K014

JOB ADDRESS:
Behind the sidewalk, 300 feet NW of Serra Ave. along Serra Way. (Serra - C.)

PROPERTY OWNER
NAME: City of Fremont
ADDRESS: 3300 Capitol Avenue
Fremont, California 94537
TELEPHONE: 510-284-4000

CONSULTING ENGINEER
NAME: Alamdeda County Water District - Douglas Young
ADDRESS: 43885 South Grimmer Boulevard
Fremont, California 94538
TELEPHONE: 510-668-4452 RG/CEG/RCE NO. 5859

WELL DRILLING CONTRACTOR
NAME: Precision Sampling
ADDRESS: 2365 Wigwam Drive
Stockton, California 95205
TELEPHONE: 209-465-8712 STATE LIC. NO. C57 636387

When properly signed (Serra - C.)

THIS APPLICATION IS A VALID PERMIT

to perform only work described below at the given job address, in accordance with the City Ordinance checked above and all other applicable laws and regulations. Discontinuation of work may result in revocation of permit by Inspecting Officer. ***Permittee must schedule the work in advance with ACWD.*** *ACWD's approval of drawings, designs, specifications, reports and incidental work or materials shall not in any way relieve the applicant of responsibility for the technical adequacy of the work. Except for special circumstances, all work to be inspected must be performed within ACWD work hours – 7:00 a.m. to 4:30 p.m., Monday through Friday.*

PLEASE CHECK TYPE OF PROPOSED WORK AND INDICATE NUMBER OF BOREHOLES

WATER (Pumping) WELL		GEOTECHNICAL INVESTIGATION AND OTHER CATEGORIES		CHEMICAL INVESTIGATION	
Construction	☐	Exploratory Holes	☐	Exploratory Holes	☐
Repair or Reconstruction	☐	No. of Exploratory Holes ____		No. of Exploratory Holes ____	
Destruction	☐	Monitoring Wells, Construction	☒	Monitoring Well Construction	☐
Dewatering	☐	Monitoring Wells, Destruction	☐	Monitoring Well Destruction	☐
		Cathodic Protection Well	☐	Injection Well	☐
		Elevator Shafts	☐	Vapor Extraction Well	☐
		Piers or Pilings	☐		

DESCRIPTION OF PROPOSED WORK:
Installation of one 2-inch diameter monitoring well to approx. 250 feet below ground surface. (Monitoring Well Construction to comply with current ACWD Groundwater Monitoring Guidelines.)

TOTAL ESTIMATED COST $

PERMIT CONDITIONS: Monitoring Well Construction to comply with current ACWD Groundwater Monitoring Guidelines.

FEES: Private ☐ Public (Governmental) Agency ☐

ESTIMATE		ACTUAL	
Permit Issuance Fee	$ 0	Permit Issuance Fee	$ 0
Field Investigation and Inspection Fee	$ 0	Field Investigation and Inspection Fee	$ 0
ESTIMATE TOTAL	$ 0	ACTUAL TOTAL	$ 0

DEPOSIT: Cash ____ Check No. ____ P.O. No. ____
Estimated Amount $ 0
Actual Amount $ 0
Difference $ 0

GUARANTEE OF PERFORMANCE
Cash Deposit ____ Bond ____
Amount $ ____ Date ____
(NOT TO EXCEED TOTAL ESTIMATED COST)

Refund $ ____
Refund Date ____
Billed for $ ____
Billed for Date ____

ACWD SITE NO. ____
APPROVED FOR SCHEDULING BY: [signature] DATE: 12/18/08
INSPECTING OFFICER APPROVAL: [signature] DATE: 12/18/08

I hereby agree to comply with all conditions of this permit in accordance with the City Well Ordinance checked above, and to furnish the Alameda County Water District a completed copy of D.W.R. water well Drillers Report (form 188) or acceptable facsimile as well as any chemical testing results within fifteen (15) days after completion.

Title: Hydrogeologist Signature: [signature] Date: 12/17/08

Representing: Alameda County Water District Name (printed): Douglas Young

ACWD #458 12-08

Appendix B
Access Agreements

LICENSE AGREEMENT FOR USE OF CITY PROPERTY BY ALAMEDA COUNTY WATER DISTRICT FOR INSTALLATION AND MAINTENANCE OF MONITORING WELLS

This License Agreement ("AGREEMENT") is made and entered into as of _____ 2009 ("Effective Date"), by and between the City of Fremont, ("CITY") and Alameda County Water District ("District"). CITY and DISTRICT may be collectively referred to as the "parties" or "party".

RECITALS

A. CITY is the owner of the real property located in the City of Fremont, generally known as Noll Park and the Fremont Main Library, and more particularly described on Exhibits "A" and "B", ("City Property") attached to and made a part of this Agreement.

B. DISTRICT, in connection with its efforts to protect and manage the Niles Cone Groundwater Basin to ensure a reliable supply of high quality water for present and future needs, desires to install and maintain on portions of the City Property as shown in Exhibits "A" and "B" (the "PREMISES") four groundwater monitoring wells to detect and monitor brackish water (the "Improvements").

C. DISTRICT is also installing similar improvements in various locations within the public right of way in the CITY and is in the process of obtaining encroachment permits to authorize the installation and maintenance of its facilities in the public right of way. Issuance of the encroachment permits is governed by Chapter 1 of Title VI of the City Municipal Code commencing with section 6-1100 ("Encroachment Ordinance"). It is the intent of the parties that the requirements and procedures for encroachment permits apply as much as possible to the installation and maintenance of the Improvements on the Premises pursuant to this Agreement.

D. CITY is willing to allow DISTRICT to construct and maintain the Improvements on the PREMISES until such time as City has another conflicting use for the PREMISES.

E. DISTRICT has agreed to install, maintain and remove the Improvements on the PREMISES in accordance with the terms and conditions of this AGREEMENT.

THEREFORE, in consideration of the mutual covenants and conditions identified herein, the parties hereby agree as follows:

AGREEMENT

1. **GRANT OF LICENSE TO USE PREMISES.** Subject to the terms, conditions and restrictions set forth in this AGREEMENT, and in consideration of DISTRICT's performance of its obligations hereunder, CITY hereby grants to DISTRICT a revocable, personal, non-exclusive and non-possessory license ("LICENSE") to enter upon and use the PREMISES, for the purposes described below, under

Section 2., Use of PREMISES. This LICENSE does not constitute a grant of any ownership, leasehold, easement or other property interest or estate in the PREMISES. The DISTRICT's rights under this AGREEMENT shall be subordinate to the rights of the CITY to use the PREMISES for any legitimate public purpose.

DISTRICT expressly acknowledges and agrees that the PREMISES are being made available for DISTRICT's use "as is" and hereby ACCEPTS THE PREMISES "AS IS" IN ITS PRESENT CONDITION AND WITHOUT REPRESENTATION OR WARRANTY BY CITY OF ANY KIND INCLUDING, WITHOUT LIMITATION, THE CONDITION OF THE PREMISES OR ITS SUITABILITY OR SAFETY FOR DISTRICT'S USE.

2. **USE OF PREMISES.** DISTRICT may enter and use the premises for the sole purpose of constructing, using, repairing and maintaining the Improvements in accordance with this Agreement.

3. **CONDITIONS TO USE OF PREMISES.** DISTRICT shall comply with the following procedures and regulations set forth in the Encroachment Ordinance:
   - **a.** Make submittals associated with issuance of the encroachment permit as set forth in FMC sections 6-1302 and 6-1402 and as determined by the City Engineer.
   - **b.** Conditions of use as set forth in FMC section 6-1400, replacing "PROW" with Premises.
   - **c.** Construction and Maintenance requirements as set forth in FMC section 6-1403

4. **TERM.** The privilege given to DISTRICT pursuant to this AGREEMENT is temporary only. The term of this LICENSE shall commence upon full execution of this Agreement and continue to the earlier to occur of (1) the DISTRICT"s removal of the Improvements and restoration of the PREMISES to their pre-existing condition or better or (2) the effective date of any notice from CITY of cancellation of this Agreement for cause due to a conflicting need of the CITY or default by DISTRICT as provided for in Section 12 below or for no cause as provided in Section 20 below. In the event DISTRICT shall continue its use of the PREMISES after the term of this AGREEMENT expires, such use shall not be considered a renewal of this AGREEMENT; rather, DISTRICT may use the PREMISES on a day-to-day basis in accordance with all other requirements of this AGREEMENT.

5. **RESTRICTIONS ON USE.** DISTRICT shall not use and shall not allow its employees, contractors or other invitees to use the PREMISES for any activities other than the uses described in Section 2 above. By way of example only, and without limitation, the following uses of the PREMISES by DISTRICT are prohibited:

   A. DISTRICT shall not construct or place any permanent structures or improvements on the PREMISES, nor shall DISTRICT alter any existing structures, signs or improvements on the PREMISES other than as provided in section 2.

B. DISTRICT shall not damage CITY's real property nor shall it conduct any unauthorized activities on or about the PREMISES that constitute waste or nuisance.

C. DISTRICT shall not cause or allow any Hazardous Material to be brought upon, kept, used, stored, generated or disposed of in, on or about the PREMISES, or transported to or from the PREMISES.

D. DISTRICT shall immediately notify CITY of any release or suspected release of Hazardous Material. DISTRICT shall comply with all laws requiring notice of such releases or threatened releases to CITY, and shall take all action necessary to mitigate the release or minimize the spread of contamination. In the event of a release of Hazardous Material, DISTRICT shall, without cost to CITY and in accordance with all laws and regulations, return the PREMISES to the condition immediately prior to the release. DISTRICT shall allow CITY to participate in any discussion regarding any settlement AGREEMENT, cleanup or abatement AGREEMENT, consent decree or other compromise proceeding involving Hazardous Material.

E. For purposes of this License, "Hazardous Material" includes, without limitation, the following: any material defined as a "hazardous substance, pollutant or contaminant" pursuant to the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (42 U.S.C. Sections 9601 et seq.), or pursuant to Section 25316 of the California Health & Safety Code; a "hazardous waste" listed pursuant to Section 25140 of the California Health & Safety Code; any asbestos and asbestos containing materials; and any petroleum, including, without limitation, crude oil or any fraction thereof, natural gas or natural gas liquids. The term "release" or "threatened release" shall include any actual or imminent spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing in, on, under or about the PREMISES.

6. PERMITS, LICENSES, AND COMPLIANCE WITH LAW

A. Permits and Licenses. DISTRICT shall separately obtain any required regulatory approvals of CITY or any other governmental agency for the permitted use of the PREMISES as described in Section 2 above.

B. Compliance with Law. DISTRICT shall comply with all applicable legal requirements including all federal, state, and local laws (including ordinances and resolutions), for its Limited Permitted Use whether or not said laws are expressly stated in this AGREEMENT.

7. COMPLIANCE BY DISTRICT'S EMPLOYEES, CONTRACTORS AND OTHER INVITEES. Should DISTRICT allow its employees, contractors or other invitees on the PREMISES during the term of this AGREEMENT, DISTRICT shall be responsible for their compliance with all applicable provisions of this AGREEMENT.

8. **CITY'S RIGHT TO ENTER THE PREMISES.** CITY shall have the right at all times to enter upon the PREMISES to inspect the same and determine if the provisions of this AGREEMENT or being complied with and to abate any breaches of this AGREEMENT.

9. **MAINTENANCE**. DISTRICT shall at all times maintain the Improvements and surrounding area within the PREMISES in a neat, safe and orderly fashion.

10. **REPAIR OF DAMAGE.** DISTRICT shall promptly, at its sole cost, repair or replace, to CITY's satisfaction, any and all facilities and properties that the CITY reasonably determines have been damaged, destroyed, defaced or otherwise injured as a result of DISTRICT's use of the PREMISES.

11. **REPORTING DAMAGES.** If any damage including death, personal injury or property damage occurs in connection with DISTRICT's use of the PREMISES, DISTRICT shall immediately notify the CITY's risk manager's office by telephone at (510) 284-4050, and DISTRICT shall promptly submit to the CITY's risk manager and the CITY's authorized representative, a written report (in a form acceptable to the CITY) with the following information: (a) detailed description of the damage (including the name and address of the injured party or deceased person(s), and a description of the damaged property) (b) name and address of witnesses , and (c) name and address of DISTRICT's insurance company.

12. **CITY'S RIGHT TO CANCEL.** CITY reserves the right to suspend all activities under this AGREEMENT or to cancel or terminate this AGREEMENT upon the happening of any of the conditions listed below. Upon such cancellation, DISTRICT shall surrender the PREMISES within the time period set forth below.

    A. DISTRICT is in material breach of any of the other terms, covenants or conditions of this AGREEMENT; or DISTRICT's activities or use under this LICENSE interfere with or detrimentally affect CITY's existing or proposed operations or uses, as reasonably determined by the CITY. CITY will provide the DISTRICT with written notice of and a reasonable time, as determined by CITY, to cure such default or breach or interference but reserves the right to cancel this LICENSE immediately if in CITY's reasonable judgment such action is warranted by such default or breach or interference.

    B. CITY determines that there is an emergency or lapse of liability coverage or insurance requiring cancellation of the LICENSE.

    Should this LICENSE be cancelled under this section, CITY may remove from the PREMISES all property and equipment of DISTRICT, its agents, invitees or vendors, all at DISTRICT's sole expense if DISTRICT has not vacated PREMISES after reasonable notice, which in no case will be less than thirty (30) days.

13. **CITY'S RIGHT TO CURE DISTRICT'S DEFAULTS.** If DISTRICT defaults in the performance of any of its obligations under this AGREEMENT, CITY may, at its

sole option, remedy such failure for DISTRICT's account and at DISTRICT's expense by providing DISTRICT with five (5) business days prior written notice of CITY's intention to cure such default (except that no such prior notice shall be required in the event of an emergency as determined by CITY and only if DISTRICT does not cure the default within that five (5) business day period). Such action by CITY shall not be construed as a waiver of any rights or remedies of CITY under this AGREEMENT, and nothing herein shall imply any duty of CITY to do any act that DISTRICT is obligated to perform. DISTRICT shall pay to CITY upon demand, all costs, damages, expenses or liabilities incurred by CITY, including with limitation, reasonable attorney's fees and costs, in remedying or attempting to remedy such default. DISTRICT's obligations under this section shall survive the cancellation, expiration or termination of this AGREEMENT.

14. **CONDITION OF PREMISES UPON TERMINATION.** Upon expiration or termination of this AGREEMENT, except as otherwise agreed to herein, DISTRICT shall return the PREMISES to CITY in substantially the same condition that existed on the Effective Date of this AGREEMENT, free from hazards and clear of all debris, excepting only damages caused by reasonable wear and tear or any cause of nature beyond the reasonable control of DISTRICT. Any and all of DISTRICT's improvements to the PREMISES will be removed, at DISTRICT's expense, unless CITY agrees in writing to waive this requirement.

15. **INSURANCE.** DISTRICT shall, throughout the duration of this AGREEMENT, maintain sufficient insurance and coverage to cover DISTRICT (including its agents, representatives, contractors, and employees) in connection with its use of the PREMISES. This AGREEMENT identifies the minimum insurance and coverage levels with which DISTRICT shall comply; however, the minimum insurance and coverage levels shall not relieve DISTRICT of any other performance responsibilities under this AGREEMENT (including the indemnity requirements), and DISTRICT may carry, at its own expense, any additional insurance and coverage it deems necessary or prudent. Concurrently with the execution of this AGREEMENT by the DISTRICT, and prior to using the PREMISES, the DISTRICT shall furnish written proof of coverage and insurance (certificates and endorsements), in a form acceptable to the CITY. DISTRICT shall provide substitute written proof of coverage and insurance no later than 30 days prior to the expiration date of any coverage or insurance policy required by this LICENSE..

A. Minimum Insurance and Coverage Levels. DISTRICT shall maintain insurance at the following minimum levels:

(1) Commercial General Liability (with coverage at least as broad as ISO form CG 00 01 01 96) coverage in an amount not less than $1,000,000 general aggregate and $2,000,000 per occurrence for general liability, bodily injury, personal injury, and property damage.

(2) Automobile Liability (with coverage at least as broad as ISO form CA 00 01 07 97, for "any auto") coverage in an amount not less than $1,000,000 per accident for bodily injury and property damage.

(3) Workers' Compensation coverage as required by the State of California. DISTRICT is not responsible for or providing Workers' Compensation coverage for its contractors. However, DISTRICT agrees to provide CITY with contractor's proof of Workers' Compensation coverage.

B. Endorsements. DISTRICT agrees the insurance and coverage policies shall be endorsed as follows:

(1) For the commercial general liability coverage, the CITY (including its elected officials, employees, and agents) shall be named, and the policy shall be endorsed with a form at least as broad as ISO form CG 20 10 11 85.

(2) DISTRICT's insurance and coverage policies are primary to any other insurance or coverage available to the CITY with respect to any claim arising out of this License. Any insurance maintained by the CITY shall be excess of the DISTRICT's coverage and shall not contribute with it.

(3) DISTRICT's insurance or coverage policies will not be canceled, limited, or allowed to expire without renewal until after 30 days written notice has been given to the CITY.

C. Qualifications of Insurers and Coverage Providers. All companies providing coverage to DISTRICT shall be authorized to transact business in the State of California, and shall have an A.M Best's rating of not less than "A:VII." The DISTRICT is a California special district and its liability coverage is provided by a risk management joint powers authority (JPA) formed under Government Code Section 6500 (pursuant to Government Code Section 12463.1). DISTRICT warrants that its liability coverage provider has an AM Best rating of Excellent; financial size category VII.

16. **WAIVER OF CLAIMS.** Neither CITY, nor its officers, agents or employees shall be liable for the security of or any damage to the property of DISTRICT, its officers, agents, employees, invitees, or contractors or for any bodily injury or death to such persons, or for any other loss, resulting or arising from the condition of the PREMISES or its use by DISTRICT.

DISTRICT fully releases, waives and discharges forever any and all claims, demands, rights, and causes of action against, and covenants not to sue, CITY under any present or future laws, statutes or regulations (a) for any claim or event relating to the condition of the PREMISES or DISTRICT's use thereof, and (b) in the event that CITY exercises its right to terminate this AGREEMENT.

In connection with the foregoing release, DISTRICT acknowledges that it is familiar with Section 1542 of the California Civil Code, which reads:

"A general release does not extend to claims which the creditor does not know or

suspect to exist in his or her favor at the time of executing the release, which if known by him or her must have materially affected his or her settlement with the debtor."

17. **INDEMNIFICATION.** DISTRICT shall indemnify, hold harmless, and defend CITY (including its elected officials, officers, agents and employees) from and against any and all claims (including all litigation, demands, liabilities, costs, and expenses, and including court costs and attorney fees), resulting or arising from (a) the DISTRICT's negligent acts or omissions in connection with the use of the PREMISES or activities conducted thereon by DISTRICT, or its employees, contractors or other invitees; (b) any failure by DISTRICT, or its employees, contractors or other invitees to observe or perform any of the terms, covenants or conditions of this AGREEMENT; (d) any release or discharge or threatened release or discharge of hazardous material caused or allowed by DISTRICT or its contractor or other invitees, on, on under or about the PREMISES or into the environment (with the exception of the sole negligence or willful misconduct of the CITY). The DISTRICT's obligations under this section shall survive termination of this AGREEMENT.

18. **LIAISON.** Both parties, in order to expedite any questions regarding rules and regulations, business practices, or other related matters, will establish liaisons to deal with such matters. The CITY's contact shall be Randy Sabado at (510) 494-4715. DISTRICT's liaison shall be Doug Young at (510) 668-4452. Either party may change its liaison by providing written notice to the other party.

19. **NOTICES.** All notices required or contemplated by this AGREEMENT shall be in writing and shall be personally delivered or delivered to the respective party as set forth in this section. Communications shall be deemed to be effective upon the first to occur of: (a) actual receipt by a party's authorized representative, or (b) actual receipt at the address designated below, or (c) three working days following deposit in the United States mail of registered or certified mail sent to the address designated below. Either party may modify their respective contact information identified in this section by providing written notice to the other party.

TO: CITY
Attn: Jill Keimach

CITY of Fremont
39550 Liberty Street
Fremont, CA 94538

TO: DISTRICT
Attn: Robert Shaver

Alameda County Water District
43885 Grimmer Blvd.
Fremont, CA 94538

20. **RELATIONSHIP BETWEEN THE PARTIES.** DISTRICT is not CITY's agent, and shall have no authority to act on behalf of the CITY or to bind the CITY to any obligation whatsoever, unless the CITY provides prior written authorization to DISTRICT. DISTRICT is, and at all times shall remain, solely responsible for all

acts of its employees, agents, contractors, or invitees including any negligent acts or omissions.

21. **TERMINATION.** The AGREEMENT can be canceled by either party without cause by giving 30 days written notice.

22. **NONDISCRIMINATION.** DISTRICT and its employees, contractors and invitees, shall not in their Limited Permitted Use of or in conducting activities on the PREMISES discriminate against any person because of race, color, religious creed, national origin, physical disability, mental disability, medical condition, marital status, sexual orientation, or gender.

23. **GENERAL PROVISIONS.**

A. Headings. The heading titles for each paragraph of this AGREEMENT are included only as a guide to the contents and are not to be considered as controlling, enlarging, or restricting the interpretation of the AGREEMENT.

B. Severability. If any term of this AGREEMENT (including any phrase, provision, covenant, or condition) is held by a court of competent jurisdiction to be invalid or unenforceable, the AGREEMENT shall be construed as not containing that term, and the remainder of this AGREEMENT shall remain in full force and effect; provided, however, this paragraph shall not be applied to the extent that it would result in a frustration of the parties' intent under this AGREEMENT.

C. Governing Law, Jurisdiction, and Venue. The interpretation, validity, and enforcement of this AGREEMENT shall be governed by and interpreted in accordance with the laws of the State of California. Any suit, claim, or legal proceeding of any kind related to this AGREEMENT shall be filed and heard in a court of competent jurisdiction in the County of Alameda.

D. Time. Time is of the essence of this AGREEMENT.

E. Attorney's Fees. In the event any legal action is commenced to enforce this AGREEMENT, the prevailing party is entitled to reasonable attorney's fees, costs, and expenses incurred.

F. Assignment, Delegation. This AGREEMENT, and any portion thereof, shall not be assigned, or transferred, nor shall any of the DISTRICT's duties be delegated, without the written consent of the CITY. Any attempt to assign, or delegate this AGREEMENT without the written consent of the CITY shall be void and of no force and effect. A consent by the CITY to one assignment shall not be deemed to be a consent to any subsequent assignment.

G. Modifications. This AGREEMENT may not be modified orally or in any manner other than by an AGREEMENT in writing signed by both parties. Further, the physical destruction or loss of this document shall not be construed as a modification or termination of the AGREEMENT contained herein.

H. Waivers. Waiver of a breach or default under this AGREEMENT shall not constitute a continuing waiver or a waiver of a subsequent breach of the same or any other provision of this AGREEMENT.

I. Entire Agreement. This AGREEMENT, including all documents incorporated herein by reference, comprises the entire integrated understanding between the parties concerning the services described herein. This AGREEMENT supersedes all prior negotiations, agreements, and understandings regarding this matter, whether written or oral. The documents incorporated by reference into this AGREEMENT are complementary; what is called for in one is binding as if called for in all.

J. Signatures. The individuals executing this AGREEMENT represent and warrant that they have the right, power, legal capacity, and authority to enter into and to execute this AGREEMENT on behalf of the respective legal entities of the DISTRICT and the CITY. This AGREEMENT shall inure to the benefit of and be binding upon the parties hereto and their respective successors and assigns.

K. Counterparts. This AGREEMENT may be signed in counterparts, with the same effect as if the signature on each counterpart were upon the same instrument. Delivery of an executed counterpart of a signature page by email or facsimile transmission shall be effective as delivery of a manually executed originally signed counterpart.

IN WITNESS WHEREOF, the CITY and DISTRICT do hereby agree to the full performance of the terms set forth herein.

CITY OF FREMONT

_____

By: Jill Keimach
Title: Community Development Director
Date: _____

PERMITTEE

By: Robert Shaver
Title: Engineering Manager
Date: 4/9/09

APROVED AS TO FORM:

_____

By: Nellie Ancel
Title: Senior Deputy City Attorney

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California
County of Alameda }

On April 9, 2009 (Date) before me, J. Gausmann, Notary Public (Here Insert Name and Title of the Officer),

personally appeared Robert Thomas Shaver (Name(s) of Signer(s))

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature J. Gausmann (Signature of Notary Public)

J. GAUSMANN
COMM. # 1785587
NOTARY PUBLIC - CALIFORNIA
ALAMEDA COUNTY
My Comm. Exp. Dec. 17, 2011

Place Notary Seal Above

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: _____

Document Date: _____ Number of Pages: _____

Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: _____
☐ Individual
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney in Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____
Signer Is Representing: _____

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

Signer's Name: _____
☐ Individual
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney in Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____
Signer Is Representing: _____

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

ENCROACHMENT PERMIT
Engineering Division
Permit No. ENC2009-00338
Type: Utility, Public Agency

INLAND SALT

Address / Work Location: 2450 STEVENSON BLVD

Behind parking lot in planter area close to Stevenson/Paseo Padre.

Project Description :

Install two (2) monitoring wells in the planter area behind parking lot.

Comment: Permit is attached to Property Entry Agreement Onto City Property, ACWD Inland Salter Intrusion Monitoring Wells Project.
Main contact person: Doug Young; 510-668-4452.

____	Access Over ROW	____	Mat'l Storage	____	Res. #2716 Poles - 0
____	Curb & Gutter LF	____	Misc Sm Storage	____	Sidewalk SF
____	Curb Painting	____	Misc Lg Storage	____	Traffic Control
____	Driveway LF	____	Paving SF	Y	Well Installation / Abandoned
____	Dumpster	____	Planter Strip	____	Other
____	Excavation LF				
____	Job Cost & Work Order #				

Application Date: 11/24/2008
Issued Date: 04/23/2009
Est. Start Date: 04/21/2009
Est. End Date: 04/21/2010

Applicant Name: ACWD
Applicant Address: 43885 SOUTH GRIMMER BLVD P.O. BOX 5110, FREMONT, CA 9
Applicant Phone: 668 4499
Owner Name:
Contractor Name:

Bond / Deposit Type	Reference No.	Bank / Surety Name	Amount

Fees

Inspection Fee $ 514.00
Application Fee

In consideration of the granting of this permit and other good and valuable consideration therefor, the undersigned intending to be legally bound does hereby for the undersigned and the heirs, executors, administrators and assigns of the undersigned agree that applicant and permittee shall be responsible for all liability imposed by law for personal injury and property damage proximately caused by failure on Permittee's part to perform his obligations under said permit in respect to maintenance. If any claim of such liability is made against the CITY OF FREMONT, its officers, or employees, Permittee shall defend, indemnify and hold them, and each of them, harmless from such claim. Nothing herein is intended to impose on Permittee any different or higher standard of care than that required by law.

Applicant Signature _____ **Date** _____

THIS SPACE IS FOR APPROVING DEPARTMENT

Approved By Daniel Chiu **DATE** 11/24/2008

Approval of this Permit is subject to all of the provisions of the Encroachment Ordinance and such special provisions as are checked.

1 [X] 2 [X] 3 [X] 4 [X] 5 [X]

***** Attention - PHONE INSPECTOR 24 HOURS PRIOR TO COMMENCEMENT AND UPON COMPLETION OF WORK *****

Inspector Mario Ochoa **Phone** 494-4705 **Pager** 802-5399

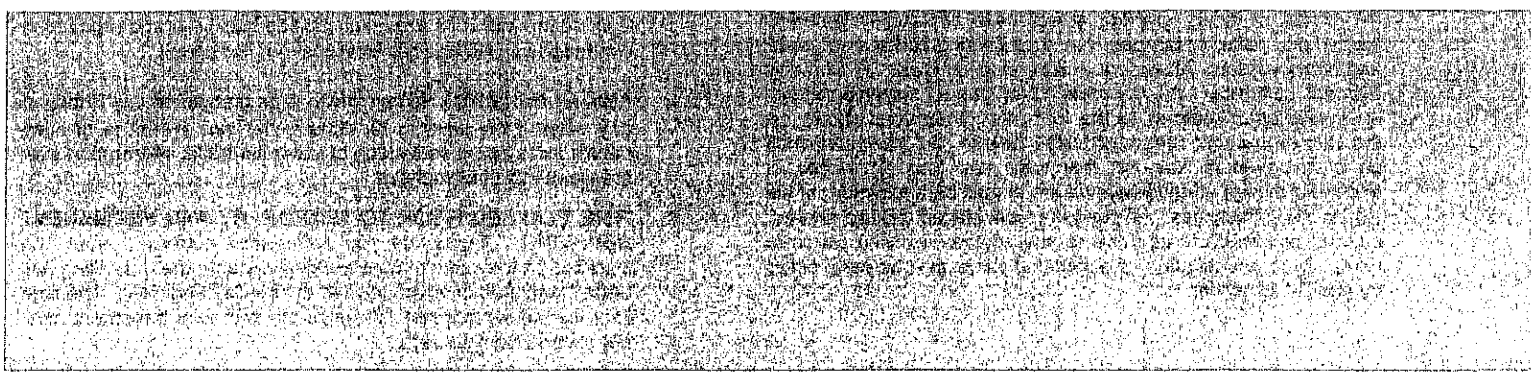
Inspector Signature _____ **Completed Date** _____

ENC010F-Permit Run Date & Time:04/23/2009 , 11:53:39AM

☐ Applicant Copy ☐ Office Copy ☐ Finance Copy ☐ Job Copy

CITY OF
Fremont
Development & Environment Services
39550 Liberty St. P.O.Box 5006
Fremont, CA 94537-5006
(510) 494-4700

WORK COPY - KEEP AT SITE DURING CONSTRUCTION PERIOD
THIS PERMIT APPLIES TO WORK ONLY WITHIN CITY R/W
PERMITTEE MUST IMPLEMENT BEST MANAGEMENT PRACTICES AND EROSION CONTROL MEASURES THROUGHOUT THE PROJECT DURATION
PHONE UNDERGROUND SERVICE ALERT 48 HOURS PRIOR TO COMMENCINT WORK - (800) 227-2600 TOLL FREE



ENCROACHMENT PERMIT
Engineering Division
Permit No. ENC2009-00339
Type: Utility, Public Agency

INLAND SALT

Address / Work Location: 39700 LOGAN DR

Knoll Park, across the street from 39700 Logan Dr.

Project Description :

Install one monitoring well approximately 10 ft. away from existing monitoring well.

Comment: Permit is attached to Property Entry Agreement Onto City Property, ACWD Inland Salter Intrusion Monitoring Wells Project.
Main contact person: Doug Young; 510-668-4452.

____	Access Over ROW	____	Mat'l Storage	____	Res. #2716 Poles - 0
____	Curb & Gutter LF	____	Misc Sm Storage	____	Sidewalk SF
____	Curb Painting	____	Misc Lg Storage	____	Traffic Control
____	Driveway LF	____	Paving SF	Y	Well Installation / Abandoned
____	Dumpster	____	Planter Strip	____	Other
____	Excavation LF				
____	Job Cost & Work Order #				

Application Date: 11/24/2008
Issued Date: 04/23/2009
Est. Start Date: 04/21/2009
Est. End Date: 04/21/2010

Applicant Name: ACWD
Applicant Address: 43885 SOUTH GRIMMER BLVD P.O. BOX 5110, FREMONT, CA 9
Applicant Phone: 668 4499
Owner Name:
Contractor Name:

Bond / Deposit Type	Reference No.	Bank / Surety Name	Amount

Fees

Inspection Fee $ 514.00
Application Fee

In consideration of the granting of this permit and other good and valuable consideration therefor, the undersigned intending to be legally bound does hereby for the undersigned and the heirs, executors, administrators and assigns of the undersigned agree that applicant and permittee shall be responsible for all liability imposed by law for personal injury and property damage proximately caused by failure on Permittee's part to perform his obligations under said permit in respect to maintenance. If any claim of such liability is made against the CITY OF FREMONT, its officers, or employees, Permittee shall defend, indemnify and hold them, and each of them, harmless from such claim. Nothing herein is intended to impose on Permittee any different or higher standard of care than that required by law.

Applicant Signature _____ **Date** _____

THIS SPACE IS FOR APPROVING DEPARTMENT

Approved By Daniel Chiu **DATE** 11/24/2008

Approval of this Permit is subject to all of the provisions of the Encroachment Ordinance and such special provisions as are checked.

1 [X] 2 [X] 3 [X] 4 [X] 5 [X]

*** Attention - PHONE INSPECTOR 24 HOURS PRIOR TO COMMENCEMENT AND UPON COMPLETION OF WORK ***

Inspector Thomas Ringot **Phone** 494-4734 **Pager** _____

Inspector Signature _____ **Completed Date** _____

ENC010F-Permit Run Date & Time:04/23/2009 , 11:53:18AM

☐ Applicant Copy ☐ Office Copy ☐ Finance Copy ☐ Job Copy

CITY OF
Fremont
Development & Environment Services
39550 Liberty St. P.O.Box 5006
Fremont, CA 94537-5006
(510) 494-4700

WORK COPY - KEEP AT SITE DURING CONSTRUCTION PERIOD
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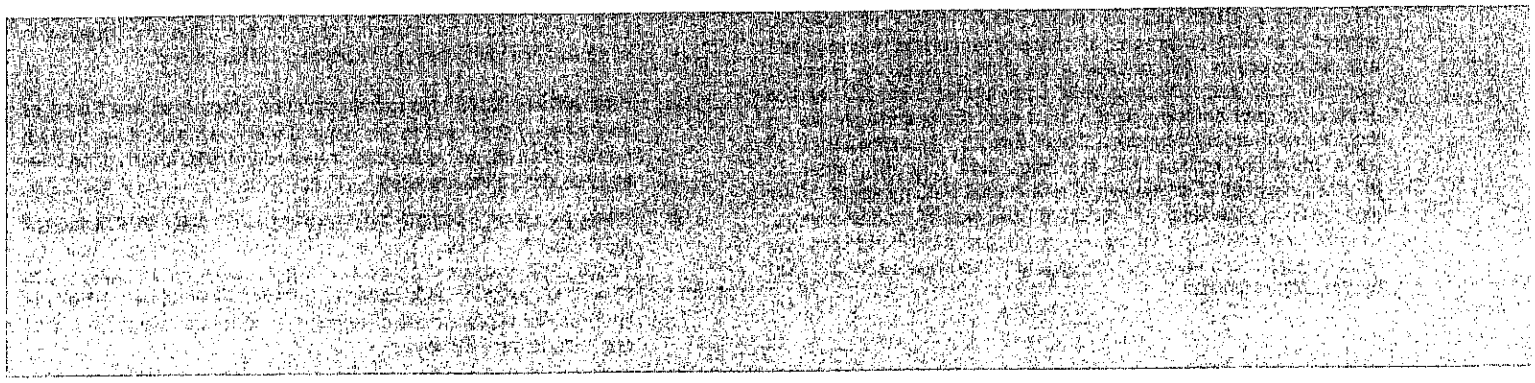
PHONE UNDERGROUND SERVICE ALERT 48 HOURS PRIOR TO COMMENCINT WORK - (800) 227-2600 TOLL FREE



CITY OF Fremont

COPY

ENCROACHMENT PERMIT
Engineering Division
Permit No. ENC2009-00334
Type: Utility, Public Agency

INLAND SALT

Address / Work Location: 40340 FREMONT BLVD
Aproximately 200 ft. south of property on Frontage Rd., near St. Lenards Way.

Project Description :
Install one monitoring well in planter strip.
***Updated on (3/20/09). ACWD changed location of monitoring well. Two (2) monitoring wells will now be placed at the NW corner of Blanchard St. and Margery Dr.

____	Access Over ROW	____	Mat'l Storage	____	Res. #2716 Poles - 0
____	Curb & Gutter LF	____	Misc Sm Storage	____	Sidewalk SF
____	Curb Painting	____	Misc Lg Storage	____	Traffic Control
____	Driveway LF	____	Paving SF	Y	Well Installation / Abandoned
____	Dumpster	____	Planter Strip	____	Other
____	Excavation LF				
____	Job Cost & Work Order #				

Application Date: 11/24/2008
Issued Date: 11/25/2008
Est. Start Date: 11/24/2008
Est. End Date: 11/24/2009

Applicant Name: ACWD
Applicant Address: 43885 SOUTH GRIMMER BLVD P.O. BOX 5110, FREMONT, CA 9
Applicant Phone: 668 4499
Owner Name:
Contractor Name:

Bond / Deposit Type Reference No.	Bank / Surety Name	Amount

Fees	
Inspection Fee	$514.00
Application Fee	

Comment: Main contact person: Doug Young; 510-668-4452.

WORK COPY - KEEP AT SITE DURING CONSTRUCTION PERIOD
THIS PERMIT APPLIES TO WORK ONLY WITHIN CITY R/W
PERMITTEE MUST IMPLEMENT BEST MANAGEMENT PRACTICES AND EROSION CONTROL MEASURES THROUGHOUT THE PROJECT DURATION
PHONE UNDERGROUND SERVICE ALERT 48 HOURS PRIOR TO COMMENCING WORK - (800) 227-2600 TOLL FREE

In consideration of the granting of this permit and other good and valuable consideration therefor, the undersigned intending to be legally bound does hereby for the undersigned and the heirs, executors, administrators and assigns of the undersigned agree that applicant and permittee shall be responsible for all liability imposed by law for personal injury and property damage proximately caused by failure on Permittee's part to perform his obligations under said permit in respect to maintenance. If any claim of such liability is made against the CITY OF FREMONT, its officers, or employees, Permittee shall defend, indemnify and hold them, and each of them, harmless from such claim. Nothing herein is intended to impose on Permittee any different or higher standard of care than that required by law.

Applicant Signature _____ **Date** _____

THIS SPACE IS FOR APPROVING DEPARTMENT

Approved By Daniel Chiu **DATE** 11/24/2008

Approval of this Permit is subject to all of the provisions of the Encroachment Ordinance and such special provisions as are checked.

1 [X] 2 [X] 3 [X] 4 [X] 5 [X]

***** Attention - PHONE INSPECTOR 24 HOURS PRIOR TO COMMENCEMENT AND UPON COMPLETION OF WORK *****

Inspector Mario Ochoa **Phone** 494-4705 **Pager** 802-5399

Inspector Signature _____ **Completed Date** _____

ENC020F-PermitCpy Run Date & Time: 3/24/2009 8:24:36AM

☐ Applicant Copy ☐ Office Copy ☐ Finance Copy ☐ Job Copy


SFPUC
Fremont
BLVD
St Leonard
Margery Dr.
BLANCHARD ST

CITY OF
Fremont
Development & Environment Services
39550 Liberty St. P.O.Box 5006
Fremont, CA 94537-5006
(510) 494-4700

ENCROACHMENT PERMIT
Engineering Division
Permit No. ENC2009-00337
Type: Utility, Public Agency

RECEIVED
NOV 25 2008
A.C.W.D.
ENGINEERING DEPT.

INLAND SALT

Address / Work Location: 38801 BLACOW RD
On Frontage Rd. In front of property.

Project Description :
Install one monitoring well in planter strip.

COMPLETED

Comment: Main contact person: Doug Young, 510-668-4452.

____	Access Over ROW	____	Mat'l Storage	____	Res. #2716 Poles - 0
____	Curb & Gutter LF	____	Misc Sm Storage	____	Sidewalk SF
____	Curb Painting	____	Misc Lg Storage	____	Traffic Control
____	Driveway LF	____	Paving SF	Y	Well Installation / Abandoned
____	Dumpster	____	Planter Strip	____	Other
____	Excavation LF				
____	Job Cost & Work Order #				

Application Date: 11/24/2008
Issued Date: 11/25/2008
Est. Start Date: 11/24/2008
Est. End Date: 11/24/2009

Applicant Name: ACWD
Applicant Address: 43885 SOUTH GRIMMER BLVD P.O. BOX 5110, FREMONT, CA 9
Applicant Phone: 668 4499
Owner Name:
Contractor Name:

Bond / Deposit Type **Amount**
Reference No. **Bank / Surety Name**

Fees
Inspection Fee $ 514.00
Application Fee

WORK COPY - KEEP AT SITE DURING CONSTRUCTION PERIOD
THIS PERMIT APPLIES TO WORK ONLY WITHIN CITY R/W
PERMITTEE MUST IMPLEMENT BEST MANAGEMENT PRACTICES AND EROSION CONTROL MEASURES THROUGHOUT THE PROJECT DURATION
PHONE UNDERGROUND SERVICE ALERT 48 HOURS PRIOR TO COMMENCING WORK - (800) 227-2600 TOLL FREE

In consideration of the granting of this permit and other good and valuable consideration therefor, the undersigned intending to be legally bound does hereby for the undersigned and the heirs, executors, administrators and assigns of the undersigned agree that applicant and permittee shall be responsible for all liability imposed by law for personal injury and property damage proximately caused by failure on Permittee's part to perform his obligations under said permit in respect to maintenance. If any claim of such liability is made against the CITY OF FREMONT, its officers, or employees, Permittee shall defend, indemnify and hold them, and each of them, harmless from such claim. Nothing herein is intended to impose on Permittee any different or higher standard of care than that required by law.

Applicant Signature _____ **Date** _____

THIS SPACE IS FOR APPROVING DEPARTMENT

Approved By Daniel Chiu **DATE** 11/24/2008

Approval of this Permit is subject to all of the provisions of the Encroachment Ordinance and such special provisions as are checked.

1 [X] 2 [X] 3 [X] 4 [X] 5 [X]

*** Attention - PHONE INSPECTOR 24 HOURS PRIOR TO COMMENCEMENT AND UPON COMPLETION OF WORK ***

Inspector Thomas Ringot **Phone** 494-4734 **Pager** _____

Inspector Signature _____ **Completed Date** _____

ENC010F-Permit Run Date & Time:11/25/2008 , 2:00:18PM

☐ Applicant Copy ☐ Office Copy ☐ Finance Copy ☐ Job Copy

GENERAL PROVISIONS

1. **ACCEPTANCE OF PROVISIONS:** It is understood and agreed by the permittee that the doing of any work under this permit shall constitute an acceptance of the provisions.
2. **INSPECTION AND APPROVAL:** Fremont Municipal Code, Sec. 6-1407. All work shall be subject to inspection and approval by the City Engineer.
3. **INSPECTION:** F.M.C., Sec. 6-1407. A minimum of twenty-four (24) hours notice shall be required for inspection prior to the placing of any backfill, connection to any existing facility, or the placement of any concrete or paving work. No additional charge will be made for occasional routine inspections.
4. **PERMITS FROM OTHER AGENCIES:** F.M.C., Sec. 6-1203. The permittee shall, whenever necessary or required by law, secure the written order or consent to do work affecting other agencies, from such agency or agencies affected. This permit shall not be valid until such order or consent is obtained. A permit may be required for this work from the following agency or agencies:
   a. Caltrans
   b. Alameda County Public Works Agency
   c. Union Sanitary District
   d. Alameda County Water District
   e. San Francisco Water Department
   f. State Department of Water Resource
5. **STANDARDS OF CONSTRUCTION:** F.M.C., Sec. 6-1407. All work shall conform to recognized standards of construction. All street cuts shall further conform to the provisions of City Standard Details and Specifications.
6. **REPAIRS.** F.M.C., Sec. 6-1405. In every case the permittee shall be responsible for restoring to its former condition any portion of the street, sidewalk, area or other encroachment which has been excavated or otherwise disturbed by permittee. Permittee shall be responsible for said work for a period of one year after completion and acceptance of the work by the City Engineer.
7. **MINIMUM INTERFERENCE WITH AND PROTECTION OF TRAFFIC:** F.M.C., Sec. 6-1400. All work shall be planned and carried out so there shall be the least possible inconvenience to the traveling public. Permittee is authorized to place flagmen to stop and warn or direct traffic, but traffic shall not be unreasonably delayed. One way traffic shall be maintained at all times. Adequate provisions shall be made for the protection of the traveling public. Placing of lights, barricades, warning signs and other safety devices and other measures required for the public safety shall be the responsibility of the permittee.
8. **MAINTENANCE:** F.M.C., Sec. 6-1204. The permittee agrees to maintain properly any encroachment placed by him and to exercise reasonable care in inspecting for and preventing any damage to any portion of the street or sidewalk area resulting from the encroachment.
9. **KEEP PERMIT ON THE JOBSITE:** F.M.C., Sec. 6-1209. This permit shall be kept on the jobsite and must be shown to any representative of the Development and Environmental Services Department or any law enforcement officer of the City of Fremont on demand.
10. **CARE OF DRAINAGE:** F.M.C., Sec. 6-1403. If the work herein contemplated shall interfere with the established drainage, ample provisions shall be made by the permittee to provide for such drainage as directed by the City Engineer.
11. **STORAGE OF MATERIALS:** F.M.C., Sec. 6-1408. Unless otherwise approved by the City Engineer, no material shall be stored within (5) feet of a public street. Any excess earth materials from trenching or other operations shall be removed from the pavement, traveled way, or shoulders as the trench is backfilled or other work carried forward.
12. **CLEANUP OF JOBSITE:** F.M.C., Sec. 6-1405. Upon completion of work the jobsite shall be restored to a condition of order and cleanliness.

SPECIAL PROVISIONS

1. **ALL TRENCHING, BACKFILL, AND RESURFACING** shall be in accordance with City Standard Details and Specifications, or as otherwise authorized by the City Engineer (F.M.C., Sec 6-1407).
2. **PORTLAND CEMENT CURBS, GUTTERS, SIDEWALKS AND DRIVEWAYS.** Existing concrete work shall be removed to the nearest score mark or construction joint. Sidewalk and/or curb and gutter shall be cut cleanly and removed for the entire width. Concrete work shall be replaced on subgrade consisting of four (4) inches of clean, graded, select base, thoroughly watered, graded and rolled or tamped to a solid bearing and true to grade and cross section. All concrete used shall have a minimum of 564 lbs of Portland Cement per cubic yard of concrete. All concrete curb, gutter, sidewalk and/or driveways shall conform to the form and dimensions shown on the City of Fremont Standard Detail Sheets. Unless otherwise specified on this permit, all sidewalks shall be a minimum of four (4) feet wide and four (4) inches in thickness except at driveways where it shall be a minimum of six (6) inches in thickness. All concrete work placed shall be scored, colored and made to conform to any adjacent existing concrete work. Type and location of expansion joints shall be as directed by the City Engineer.
3. **NO LATERAL STREET CUTS PERMITTED:** No lateral street cut will be permitted in connection with this permit unless approved by the City Engineer. Street cuts used for locating existing utilities and for connecting laterals to the main shall be minimal in size and shall be approved in advance of cutting the street pavement, unless approved by the City Engineer. Connecting pipe shall be bored completely under the street paving, curb and/or gutter and sidewalk. If a sidewalk cut is necessary, the sidewalk shall be replaced in conformance with Special Provision 2 of this permit. The street cut shall be backfilled and repaved in conformance with Special Provision 1 of this permit.
4. **FRIDAY PERMITS:** No permits shall be granted on any Friday of any week if the work to be done under said permit is of such nature as to cause pedestrian or vehicular traffic interruption over the weekend if incompleted.
5. **TIME ELAPSED PRIOR TO TEMPORARY AND PERMANENT REPAVING:** Temporary or permanent surfacing shall be installed on the same or next working day after the backfilling has been completed or when directed by the City Engineer. The time limit for the replacement of temporary with final pavement shall not exceed ten (10) days.

CITY OF
Fremont
Development & Environment Services
39550 Liberty St. P.O.Box 5006
Fremont, CA 94537-5006
(510) 494-4700

ENCROACHMENT PERMIT
Engineering Division
Permit No. ENC2009-00519
Type: Utility, Public Agency

Address / Work Location: 38225 GLENMOOR DR

See attached plans.

Project Description :

Install two Monitoring Wells in planter strip.

Comment: Main contact person: Doug Young, 510-668-4481.

____	Access Over ROW	____	Mat'l Storage	____	Res. #2716 Poles - 0
____	Curb & Gutter LF	____	Misc Sm Storage	____	Sidewalk SF
____	Curb Painting	____	Misc Lg Storage	____	Traffic Control
____	Driveway LF	____	Paving SF	Y	Well Installation / Abandoned
____	Dumpster	____	Planter Strip	____	Other
____	Excavation LF				
____	Job Cost & Work Order #				

Application Date: 02/20/2009
Issued Date: 02/23/2009
Est. Start Date: 02/20/2009
Est. End Date: 02/20/2010

Applicant Name: ACWD
Applicant Address: 43885 SOUTH GRIMMER BLVD P.O. BOX 5110, FREMONT, CA 9
Applicant Phone: 668 4499
Owner Name:
Contractor Name:

Bond / Deposit Type	Reference No.	Bank / Surety Name	Amount

Fees

Inspection Fee	$ 514.00
Application Fee	

WORK COPY - KEEP AT SITE DURING CONSTRUCTION PERIOD
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PHONE UNDERGROUND SERVICE ALERT 48 HOURS PRIOR TO COMMENCINT WORK - (800) 227-2600 TOLL FREE

In consideration of the granting of this permit and other good and valuable consideration therefor, the undersigned intending to be legally bound does hereby for the undersigned and the heirs, executors, administrators and assigns of the undersigned agree that applicant and permittee shall be responsible for all liability imposed by law for personal injury and property damage proximately caused by failure on Permittee's part to perform his obligations under said permit in respect to maintenance. If any claim of such liability is made against the CITY OF FREMONT, its officers, or employees, Permittee shall defend, indemnify and hold them, and each of them, harmless from such claim. Nothing herein is intended to impose on Permittee any different or higher standard of care than that required by law.

Applicant Signature _____ **Date** _____

THIS SPACE IS FOR APPROVING DEPARTMENT

Approved By Daniel Chiu **DATE** 02/20/2009

Approval of this Permit is subject to all of the provisions of the Encroachment Ordinance and such special provisions as are checked

1 [X] 2 [X] 3 [X] 4 [X] 5 [X]

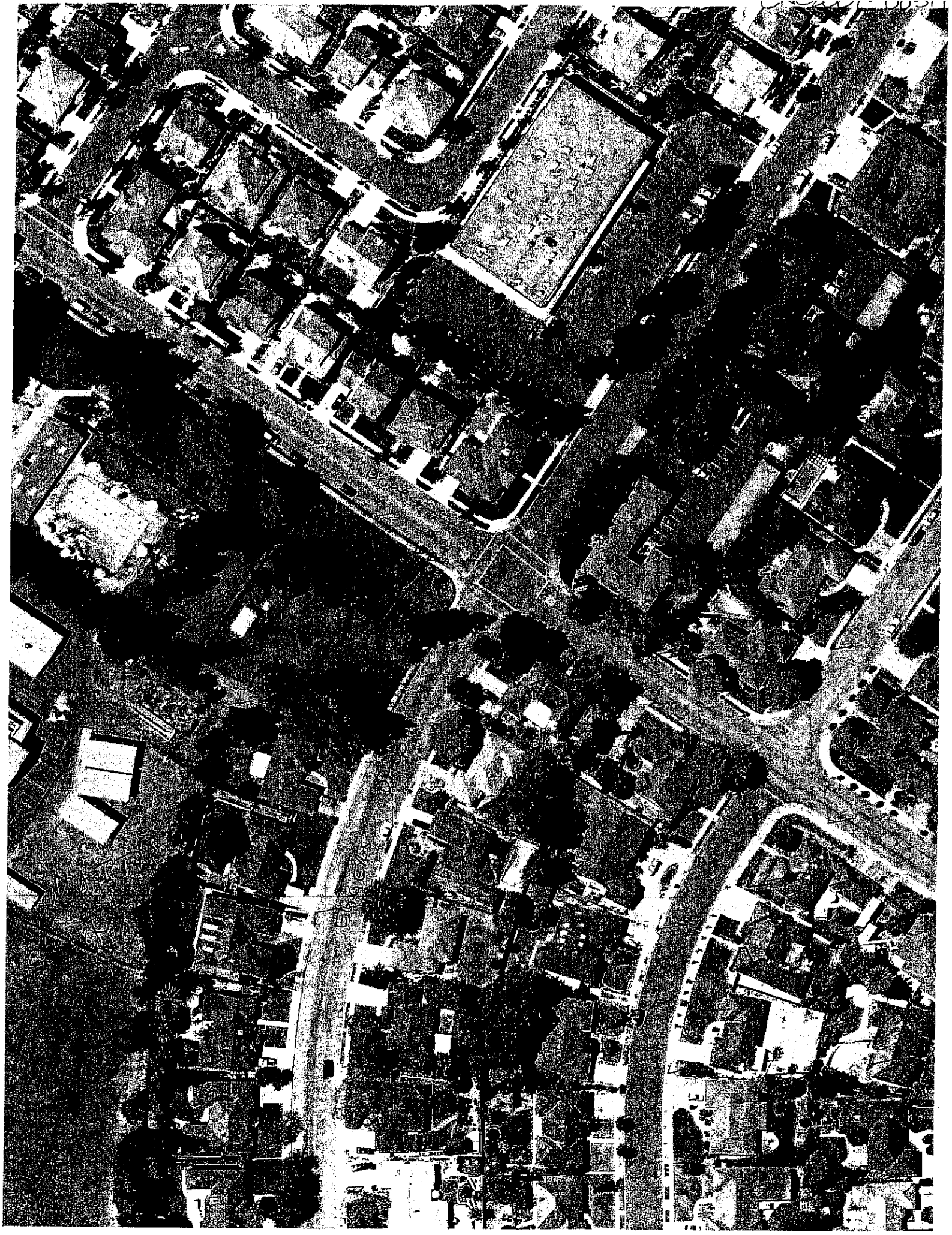
*** Attention - PHONE INSPECTOR 24 HOURS PRIOR TO COMMENCEMENT AND UPON COMPLETION OF WORK ***

Inspector Lyle Travis **Phone** 494-4709 **Pager** 802-4664

Inspector Signature _____ **Completed Date** _____

ENC010F-Permit Run Date & Time:02/23/2009 , 10:20:40AM

☐ Applicant Copy ☐ Office Copy ☐ Finance Copy ☐ Job Copy



CITY OF
Fremont
Development & Environment Services
39550 Liberty St. P.O.Box 5006
Fremont, CA 94537-5006
(510) 494-4700

ENCROACHMENT PERMIT
Engineering Division
Permit No. ENC2009-00335
Type: Utility, Public Agency

RECEIVED
NOV 25 2008
A.C.W.D.
ENGINEERING DEPT.

INLAND SALT

Address / Work Location: 4530 LADNER ST
Near intersection of Ladner St. and Robin St.

Project Description :
Install one monitoring well in planter strip.

Comment: Main contact person: Doug Young, 510-668-4452.

COMPLETED

	Access Over ROW		Mat'l Storage		Res. #2716 Poles - 0
	Curb & Gutter LF		Misc Sm Storage		Sidewalk SF
	Curb Painting		Misc Lg Storage		Traffic Control
	Driveway LF		Paving SF	Y	Well Installation / Abandoned
	Dumpster		Planter Strip		Other
	Excavation LF				
	Job Cost & Work Order #				

Application Date: 11/24/2008
Issued Date: 11/25/2008
Est. Start Date: 11/24/2008
Est. End Date: 11/24/2009

Applicant Name: ACWD
Applicant Address: 43885 SOUTH GRIMMER BLVD P.O. BOX 5110, FREMONT, CA 9
Applicant Phone: 668 4499
Owner Name:
Contractor Name:

Bond / Deposit Type	Reference No.	Bank / Surety Name	Amount

Fees

Inspection Fee	$ 514.00
Application Fee	

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PHONE UNDERGROUND SERVICE ALERT 48 HOURS PRIOR TO COMMENCING WORK - (800) 227-2600 TOLL FREE

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Applicant Signature _____ **Date** _____

THIS SPACE IS FOR APPROVING DEPARTMENT

Approved By Daniel Chiu **DATE** 11/24/2008

Approval of this Permit is subject to all of the provisions of the Encroachment Ordinance and such special provisions as are checked.

1 [X] 2 [X] 3 [X] 4 [X] 5 [X]

*** Attention - PHONE INSPECTOR 24 HOURS PRIOR TO COMMENCEMENT AND UPON COMPLETION OF WORK ***

Inspector Mario Ochoa **Phone** 494-4705 **Pager** 802-5399

Inspector Signature _____ **Completed Date** _____

ENC010F-Permit Run Date & Time:11/25/2008 , 1:59:07PM

☐ Applicant Copy ☐ Office Copy ☐ Finance Copy ☐ Job Copy

GENERAL PROVISIONS

1. **ACCEPTANCE OF PROVISIONS:** It is understood and agreed by the permittee that the doing of any work under this permit shall constitute an acceptance of the provisions.
2. **INSPECTION AND APPROVAL:** Fremont Municipal Code, Sec. 6-1407. All work shall be subject to inspection and approval by the City Engineer.
3. **INSPECTION:** F.M.C., Sec. 6-1401. A minimum of twenty-four (24) hours notice shall be required for inspection prior to the placing of any backfill, connection to any existing facility, or the placement of any concrete or paving work. No additional charge will be made for occasional routine inspections.
4. **PERMITS FROM OTHER AGENCIES:** F.M.C., Sec. 6-1203. The permittee shall, whenever necessary or required by law, secure the written order or consent to do work affecting other agencies, from such agency or agencies affected. This permit shall not be valid until such order or consent is obtained. A permit may be required for this work from the following agency or agencies:
   a. Caltrans
   b. Alameda County Public Works Agency
   c. Union Sanitary District
   d. Alameda County Water District
   e. San Francisco Water Department
   f. State Department of Water Resource
5. **STANDARDS OF CONSTRUCTION:** F.M.C., Sec. 6-1407. All work shall conform to recognized standards of construction. All street cuts shall further conform to the provisions of City Standard Details and Specifications.
6. **REPAIRS.** F.M.C., Sec. 6-1405. In every case the permittee shall be responsible for restoring to its former condition any portion of the street, sidewalk, area or other encroachment which has been excavated or otherwise disturbed by permittee. Permittee shall be responsible for said work for a period of one year after completion and acceptance of the work by the City Engineer.
7. **MINIMUM INTERFERENCE WITH AND PROTECTION OF TRAFFIC:** F.M.C., Sec. 6-1400. All work shall be planned and carried out so there shall be the least possible inconvenience to the traveling public. Permittee is authorized to place flagmen to stop and warn or direct traffic, but traffic shall not be unreasonably delayed. One way traffic shall be maintained at all times. Adequate provisions shall be made for the protection of the traveling public. Placing of lights, barricades, warning signs and other safety devices and other measures required for the public safety shall be the responsibility of the permittee.
8. **MAINTENANCE:** F.M.C., Sec. 6-1204. The permittee agrees to maintain properly any encroachment placed by him and to exercise reasonable care in inspecting for and preventing any damage to any portion of the street or sidewalk area resulting from the encroachment.
9. **KEEP PERMIT ON THE JOBSITE:** F.M.C., Sec. 6-1209. This permit shall be kept on the jobsite and must be shown to any representative of the Development and Environmental Services Department or any law enforcement officer of the City of Fremont on demand.
10. **CARE OF DRAINAGE:** F.M.C., Sec. 6-1403. If the work herein contemplated shall interfere with the established drainage, ample provisions shall be made by the permittee to provide for such drainage as directed by the City Engineer.
11. **STORAGE OF MATERIALS:** F.M.C., Sec. 6-1408. Unless otherwise approved by the City Engineer, no material shall be stored within (5) feet of a public street. Any excess earth materials from trenching or other operations shall be removed from the pavement, traveled way, or shoulders as the trench is backfilled or other work carried forward.
12. **CLEANUP OF JOBSITE:** F.M.C., Sec. 6-1405. Upon completion of work the jobsite shall be restored to a condition of order and cleanliness.

SPECIAL PROVISIONS

1. **ALL TRENCHING, BACKFILL, AND RESURFACING** shall be in accordance with City Standard Details and Specifications, or as otherwise authorized by the City Engineer (F.M.C., Sec 6-1407).
2. **PORTLAND CEMENT CURBS, GUTTERS, SIDEWALKS AND DRIVEWAYS.** Existing concrete work shall be removed to the nearest score mark or construction joint. Sidewalk and/or curb and gutter shall be cut cleanly and removed for the entire width. Concrete work shall be replaced on subgrade consisting of four (4) inches of clean, graded, select base, thoroughly watered, graded and rolled or tamped to a solid bearing and true to grade and cross section. All concrete used shall have a minimum of 564 lbs of Portland Cement per cubic yard of concrete. All concrete curb, gutter, sidewalk and/or driveways shall conform to the form and dimensions shown on the City of Fremont Standard Detail Sheets. Unless otherwise specified on this permit, all sidewalks shall be a minimum of four (4) feet wide and four (4) inches in thickness except at driveways where it shall be a minimum of six (6) inches in thickness. All concrete work placed shall be scored, colored and made to conform to any adjacent existing concrete work. Type and location of expansion joints shall be as directed by the City Engineer.
3. **NO LATERAL STREET CUTS PERMITTED:** No lateral street cut will be permitted in connection with this permit unless approved by the City Engineer. Street cuts used for locating existing utilities and for connecting laterals to the main shall be minimal in size and shall be approved in advance of cutting the street pavement, unless approved by the City Engineer. Connecting pipe shall be bored completely under the street paving, curb and/or gutter and sidewalk. If a sidewalk cut is necessary, the sidewalk shall be replaced in conformance with Special Provision 2 of this permit. The street cut shall be backfilled and repaved in conformance with Special Provision 1 of this permit.
4. **FRIDAY PERMITS:** No permits shall be granted on any Friday of any week if the work to be done under said permit is of such nature as to cause pedestrian or vehicular traffic interruption over the weekend if incompleted.
5. **TIME ELAPSED PRIOR TO TEMPORARY AND PERMANENT REPAVING:** Temporary or permanent surfacing shall be installed on the same or next working day after the backfilling has been completed or when directed by the City Engineer. The time limit for the replacement of temporary with final pavement shall not exceed ten (10) days.

CITY OF
Fremont
Development & Environment Services
39550 Liberty St. P.O.Box 5006
Fremont, CA 94537-5006
(510) 494-4700

ENCROACHMENT PERMIT
Engineering Division
Permit No. ENC2009-00336
Type: Utility, Public Agency

RECEIVED
NOV 25 2008
A.C.W.D.
ENGINEERING DEPT.

INLAND SALT

Address / Work Location: 39085 SERRA PL

Across the street from 39085 Serra Pl. in front of church property.

Project Description :

Install one monitoring well behind sidewalk approx. 10 ft. from existing monitoring well.

COMPLETED

Comment: Main contact person: Doug Young; 510-668-4452.

____ Access Over ROW	____ Mat'l Storage	____ Res. #2716 Poles - 0
____ Curb & Gutter LF	____ Misc Sm Storage	____ Sidewalk SF
____ Curb Painting	____ Misc Lg Storage	____ Traffic Control
____ Driveway LF	____ Paving SF	Y Well Installation / Abandoned
____ Dumpster	____ Planter Strip	____ Other
____ Excavation LF		
____ Job Cost & Work Order #		

Application Date: 11/24/2008
Issued Date: 11/25/2008
Est. Start Date: 11/24/2008
Est. End Date: 11/24/2009

Applicant Name: ACWD
Applicant Address: 43885 SOUTH GRIMMER BLVD P.O. BOX 5110, FREMONT, CA 9
Applicant Phone: 668 4499
Owner Name:
Contractor Name:

Bond / Deposit Type	Reference No.	Bank / Surety Name	Amount

Fees

Inspection Fee	$ 514.00
Application Fee	

WORK COPY - KEEP AT SITE DURING CONSTRUCTION PERIOD
THIS PERMIT APPLIES TO WORK ONLY WITHIN CITY R/W
PERMITTEE MUST IMPLEMENT BEST MANAGEMENT PRACTICES AND EROSION CONTROL MEASURES THROUGHOUT THE PROJECT DURATION
PHONE UNDERGROUND SERVICE ALERT 48 HOURS PRIOR TO COMMENCING WORK - (800) 227-2600 TOLL FREE

In consideration of the granting of this permit and other good and valuable consideration therefor, the undersigned intending to be legally bound does hereby for the undersigned and the heirs, executors, administrators and assigns of the undersigned agree that applicant and permittee shall be responsible for all liability imposed by law for personal injury and property damage proximately caused by failure on Permittee's part to perform his obligations under said permit in respect to maintenance. If any claim of such liability is made against the CITY OF FREMONT, its officers, or employees, Permittee shall defend, indemnify and hold them, and each of them, harmless from such claim. Nothing herein is intended to impose on Permittee any different or higher standard of care than that required by law.

Applicant Signature _____ **Date** _____

THIS SPACE IS FOR APPROVING DEPARTMENT

Approved By Daniel Chiu **DATE** 11/24/2008

Approval of this Permit is subject to all of the provisions of the Encroachment Ordinance and such special provisions as are checked.

1 [X] 2 [X] 3 [X] 4 [X] 5 [X]

***** Attention - PHONE INSPECTOR 24 HOURS PRIOR TO COMMENCEMENT AND UPON COMPLETION OF WORK *****

Inspector Thomas Ringot **Phone** 494-4734 **Pager** _____

Inspector Signature _____ **Completed Date** _____

ENC010F-Permit Run Date & Time:11/25/2008 , 1:59:46PM

☐ Applicant Copy ☐ Office Copy ☐ Finance Copy ☐ Job Copy

GENERAL PROVISIONS

1. **ACCEPTANCE OF PROVISIONS:** It is understood and agreed by the permittee that the doing of any work under this permit shall constitute an acceptance of the provisions.
2. **INSPECTION AND APPROVAL:** Fremont Municipal Code, Sec. 6-1407. All work shall be subject to inspection and approval by the City Engineer.
3. **INSPECTION:** F.M.C., Sec. 6-1401. A minimum of twenty-four (24) hours notice shall be required for inspection prior to the placing of any backfill, connection to any existing facility, or the placement of any concrete or paving work. No additional charge will be made for occasional routine inspections.
4. **PERMITS FROM OTHER AGENCIES:** F.M.C., Sec. 6-1203. The permittee shall, whenever necessary or required by law, secure the written order or consent to do work affecting other agencies, from such agency or agencies affected. This permit shall not be valid until such order or consent is obtained. A permit may be required for this work from the following agency or agencies:
   a. Caltrans
   b. Alameda County Public Works Agency
   c. Union Sanitary District
   d. Alameda County Water District
   e. San Francisco Water Department
   f. State Department of Water Resource
5. **STANDARDS OF CONSTRUCTION:** F.M.C., Sec. 6-1407. All work shall conform to recognized standards of construction. All street cuts shall further conform to the provisions of City Standard Details and Specifications.
6. **REPAIRS.** F.M.C., Sec. 6-1405. In every case the permittee shall be responsible for restoring to its former condition any portion of the street, sidewalk, area or other encroachment which has been excavated or otherwise disturbed by permittee. Permittee shall be responsible for said work for a period of one year after completion and acceptance of the work by the City Engineer.
7. **MINIMUM INTERFERENCE WITH AND PROTECTION OF TRAFFIC:** F.M.C., Sec. 6-1400. All work shall be planned and carried out so there shall be the least possible inconvenience to the traveling public. Permittee is authorized to place flagmen to stop and warn or direct traffic, but traffic shall not be unreasonably delayed. One way traffic shall be maintained at all times. Adequate provisions shall be made for the protection of the traveling public. Placing of lights, barricades, warning signs and other safety devices and other measures required for the public safety shall be the responsibility of the permittee.
8. **MAINTENANCE:** F.M.C., Sec. 6-1204. The permittee agrees to maintain properly any encroachment placed by him and to exercise reasonable care in inspecting for and preventing any damage to any portion of the street or sidewalk area resulting from the encroachment.
9. **KEEP PERMIT ON THE JOBSITE:** F.M.C., Sec. 6-1209. This permit shall be kept on the jobsite and must be shown to any representative of the Development and Environmental Services Department or any law enforcement officer of the City of Fremont on demand.
10. **CARE OF DRAINAGE:** F.M.C., Sec. 6-1403. If the work herein contemplated shall interfere with the established drainage, ample provisions shall be made by the permittee to provide for such drainage as directed by the City Engineer.
11. **STORAGE OF MATERIALS:** F.M.C., Sec. 6-1408. Unless otherwise approved by the City Engineer, no material shall be stored within (5) feet of a public street. Any excess earth materials from trenching or other operations shall be removed from the pavement, traveled way, or shoulders as the trench is backfilled or other work carried forward.
12. **CLEANUP OF JOBSITE:** F.M.C., Sec. 6-1405. Upon completion of work the jobsite shall be restored to a condition of order and cleanliness.

SPECIAL PROVISIONS

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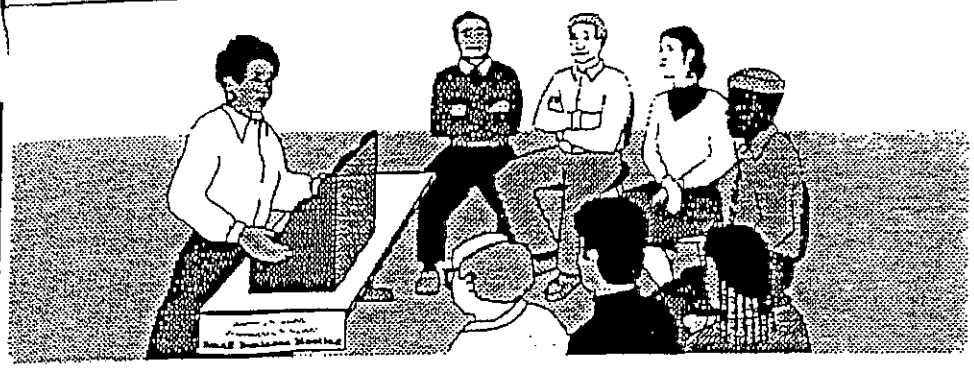
Appendix C
Storm Water Protection and Emergency Response Plans

ACTIVITY: EMPLOYEE/SUBCONTRACTOR TRAINING



Objectives

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

DESCRIPTION

Employee/subcontractor training, like maintenance or a piece of equipment, is not so much a best management practice as it is a method by which to implement BMPs. This fact sheet highlights the importance of training and of integrating the elements of employee/subcontractor training from the individual source controls into a comprehensive training program as part of a company's Storm Water Pollution Prevention Plan (SWPPP).

The specific employee/subcontractor training aspects of each of the source controls are highlighted in the individual fact sheets. The focus of this fact sheet is more general, and includes the overall objectives and approach for assuring employee/subcontractor training in storm water pollution prevention. Accordingly, the organization of this fact sheet differs somewhat from the other fact sheets in this chapter.

OBJECTIVES

Employee/subcontractor training should be based on four objectives:

Promote a clear identification and understanding of the problem, including activities with the potential to pollute storm water;

Identify solutions (BMPs);

- Promote employee/subcontractor ownership of the problems and the solutions; and
- Integrate employee/subcontractor feedback into training and BMP implementation.

APPROACH

- Integrate training regarding storm water quality management with existing training programs that may be required for your business by other regulations such as: the Illness and Injury Prevention Program (IIPP) (SB 198) (California Code of Regulations Title 8, Section 3203), the Hazardous Waste Operations and Emergency Response (HAZWOPER) standard (29 CFR 1910.120), the Spill Prevention Control and Countermeasure (SPCC) Plan (40 CFR 112), and the Hazardous Materials Management Plan (Business Plan) (California Health and Safety Code, Section 6.95).
- Businesses, particularly smaller ones that may not be regulated by Federal, State, or local regulations, may use the information in this Handbook to develop a training program to reduce their potential to pollute storm water.
- Use the quick reference on disposal alternatives (Table 4.2) to train employee/subcontractors in proper and consistent methods for disposal.

CA40

Best Management Practices

ACTIVITY: EMPLOYEE/SUBCONTRACTOR TRAINING (Continue)

- Consider posting the quick reference table around the job site or in the on-site office trailer to reinforce training.
- Train employee/subcontractors in standard operating procedures and spill cleanup techniques described in the fact sheets. Employee/subcontractors trained in spill containment and cleanup should be present during the loading/unloading and handling of materials.
- Personnel who use pesticides should be trained in their use. The California Department of Pesticide Regulation and county agricultural commissioners license pesticide dealers, certify pesticide applicators, and conduct on-site inspections.
- Proper education of off-site contractors is often overlooked. The conscientious efforts of well trained employee/subcontractors can be lost by unknowing off-site contractors, so make sure they are well informed about what they are expected to do on-site.

CA40

Best Management Practices

INTRODUCTION

This chapter describes specific Best Management Practices (BMPs) for common construction activities that may pollute storm water. Chapter 2 led you through the steps of identifying activities at your site that can pollute storm water, while Chapter 3 provided guidance on BMP selection. This chapter will provide a list of BMPs that can be used to fit your site's needs.

BMP fact sheets are provided for each of the contractor's activities, noted in the box, are consistent with Worksheet 4 in Chapter 2.

Each fact sheet contains a cover sheet with:

- A description of the BMP
- Approach
- Requirements
  - Costs, including capital costs, and operation and maintenance (O&M) costs
  - Maintenance (including administrative and staffing)
- Limitations
- References

The side bar presents information on which BMP objective applies, targeted constituents, and an indication of the level of effort and costs to implement. For some BMPs, further information is provided in additional sheets.

Contractor Activities

Construction Practices
- CA1 Dewatering Operations
- CA2 Paving Operations
- CA3 Structure Construction and Painting

Material Management
- CA10 Material Delivery and Storage
- CA11 Material Use
- CA12 Spill Prevention and Control

Waste Management
- CA20 Solid Waste Management
- CA21 Hazardous Waste Management
- CA22 Contaminated Soil Management
- CA23 Concrete Waste Management
- CA24 Sanitary/Septic Waste Management

Vehicle and Equipment Management
- CA30 Vehicle and Equipment Cleaning
- CA31 Vehicle and Equipment Fueling
- CA32 Vehicle and Equipment Maintenance

Contractor Training
- CA40 Employee/Subcontractor Training

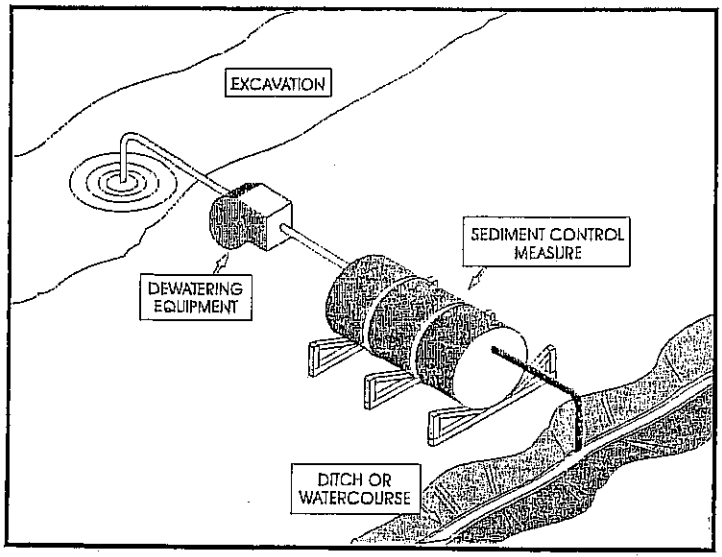
These BMP fact sheets are suitable for inclusion in many storm water pollution prevention plans for typical contractor activities. The BMPs listed are not an exhaustive list, nor will every BMP be appropriate for every situation. Therefore, suggested BMPs which are inappropriate may be deleted and additional BMPs for specific site conditions should be added. In addition, your selection and implementation of BMPs should be reviewed on a regular basis to match the changing conditions at construction sites.

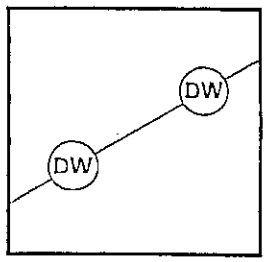
TABLE 4.1 CONTRACTOR ACTIVITIES AND BMP OBJECTIVES

	BMP CATEGORY	BMP OBJECTIVES						
		PRACTICE GOOD HOUSE-KEEPING	CONTAIN WASTE	MINIMIZE DISTURBED AREA	STABILIZE DISTURBED AREA	PROTECT SLOPES AND CHANNELS	CONTROL SITE PERIMETER	CONTROL INTERNAL EROSION
	Construction Practices							
CA01	Dewatering Operations	✓				✓	✓	✓
CA02	Paving Operations	✓						
CA03	Structure Construction and Painting	✓			✓			
	Material Management							
CA10	Material Delivery and Storage	✓						
CA11	Material Use	✓						
CA12	Spill Prevention and Control	✓						
	Waste Management							
CA20	Solid Waste Management		✓					
CA21	Hazardous Waste Management		✓					
CA22	Contaminated Soil Management		✓	✓	✓			
CA23	Concrete Waste Management		✓					
CA24	Sanitary/Septic Waste Management		✓					
	Vehicle and Equipment Management							
CA30	Vehicle and Equipment Cleaning	✓					✓	✓
CA31	Vehicle and Equipment Fueling	✓						
CA32	Vehicle and Equipment Maintenance	✓						
	Contractor Training							
CA40	Employee/Subcontractor Training	✓	✓					

Dewatering Operations

NS-2





BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose

Dewatering operations are practices that manage the discharge of pollutants from groundwater and accumulated precipitation dewatering operations.

Appropriate Applications

These practices are implemented where groundwater or accumulated precipitation will be discharged from a construction site. Controlling sediment from dewatering operations is required on all projects that pump sediment-laden water from work areas and plan to discharge the pumped water into a conveyance system or water body. Dewatering discharges include but are not limited to:

- Removal of uncontaminated groundwater.
- Removal of accumulated rainwater from work areas.
- Removing water from cofferdams or diversions.

Limitations

- Site conditions will dictate design and use of dewatering operations.
- The controls discussed in this best management practice (BMP) address sediment only. If the presence of polluted water is identified in the contract, the contractor shall implement dewatering pollution controls as required by the contract documents. If the quality of water to be removed by dewatering is not identified as polluted in the contract documents, but is later determined by observation or testing to be polluted, the contractor shall notify the Resident Engineer (RE) and comply with Standard Specifications Section 5-1.116, "Differing Site Conditions."
- The controls detailed in this BMP only allow for minimal settling time for sediment particles. Use only when site conditions restrict the use of the other control methods.

- Dewatering operations will require, and must comply with, applicable local permits.
- Avoid dewatering discharges where possible by using the water for dust control, by infiltration, etc.

Standards and Specifications

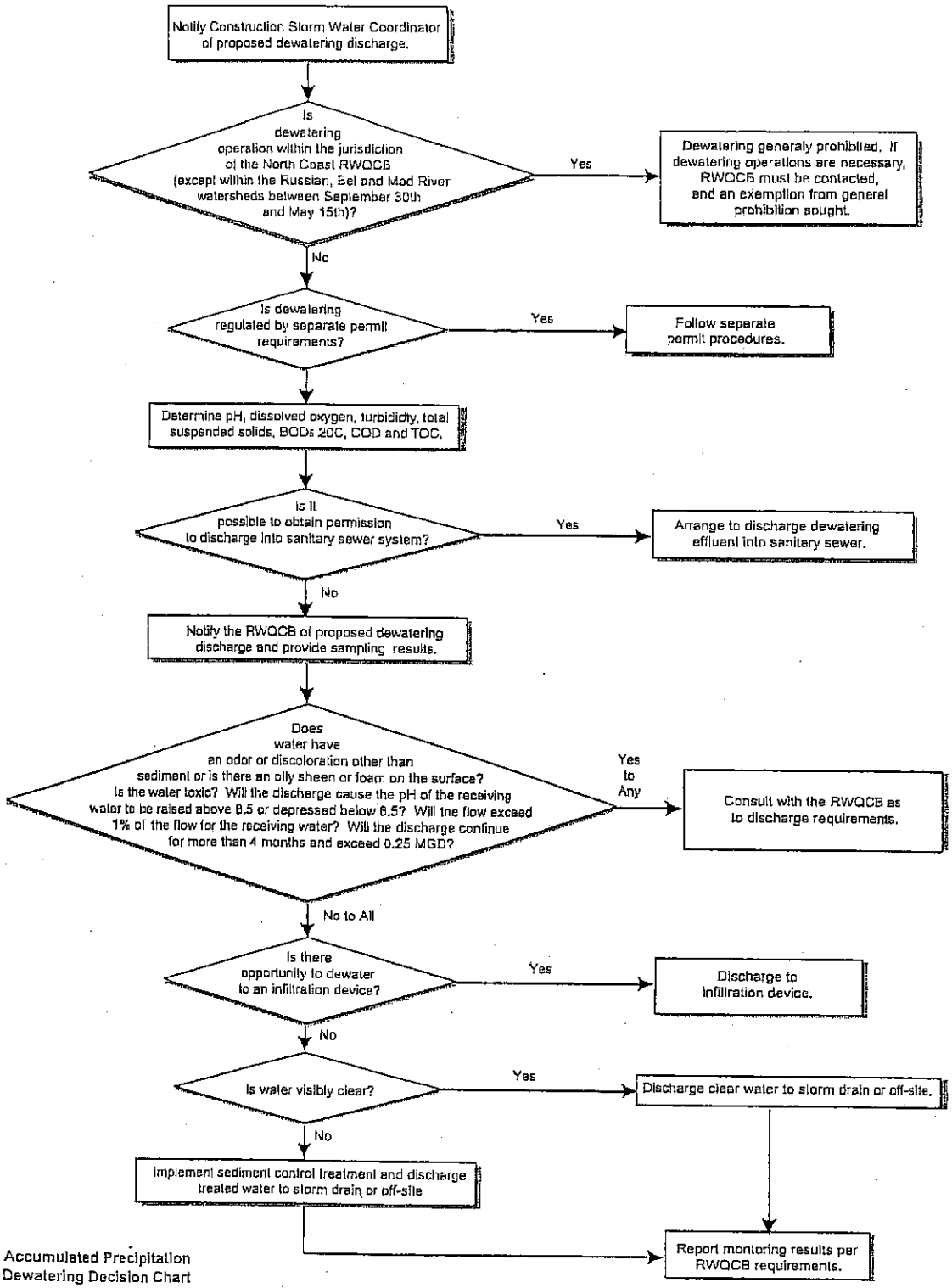
- The flow chart shown in page 3 of this BMP shall be utilized to guide dewatering operations.
- Contractor shall notify the RE of planned discharges.
- The RE will coordinate monitoring and permit compliance.
- Discharges must comply with regional and watershed-specific discharge requirements.
- Ensure that dewatering discharges do not cause erosion at the discharge point.
- Sediment Control Treatment: Dewatering effluent (groundwater and accumulated precipitation) that is laden with suspended solids shall be treated by a device designed to remove soil particles down to 0.02 mm in size. Desilting basins (see BMP SC-2) and sediment traps (see BMP SC-3) are examples of temporary treatment devices; these devices shall be designed according to the respective BMPs.
- A filtration devise may be substituted for a desilting basin or sediment trap if the Contractor can demonstrate, to the RE's satisfaction, that the filtration device provides equivalent or greater removal of suspended solids than the basin.
- Filter bags may be used for small-scale dewatering operations.

Maintenance and Inspection

- Prior to completion of permit application, notify the District Environmental Unit to perform testing requirements and complete necessary paper work for the permit.
- Inspect filtering device frequently and repair or replace once the sediment build-up prevents the structure from functioning as designed.
- Accumulated suspended solids removed from a dewatering device shall be spread on the project site and stabilized at locations designated by the RE, or shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13 of the Standard Specifications.

Dewatering Operations

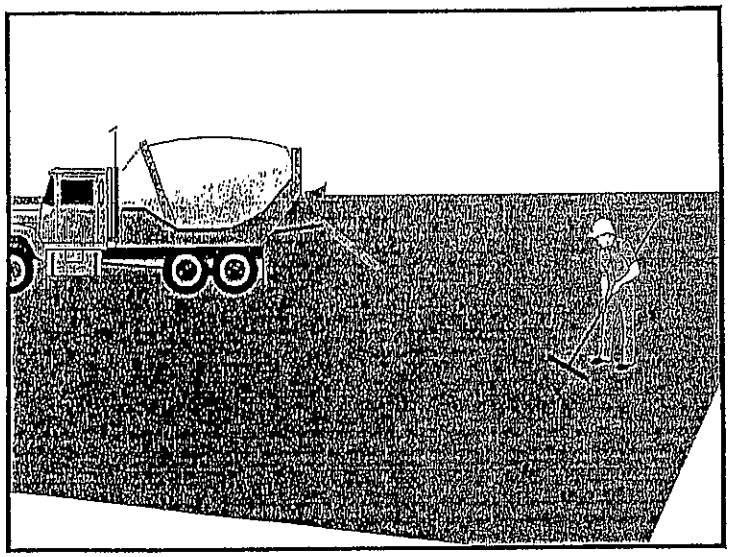
NS-2



Accumulated Precipitation
Dewatering Decision Chart

Paving and Grinding Operations

NS-3



BMP Objectives
- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose

Procedures that minimize pollution of storm water runoff during paving operations, including new paving and preparation of existing paved surfaces for overlays.

Appropriate Applications

These procedures are implemented where paving, surfacing, resurfacing, or sawcutting, may pollute storm water runoff or discharge to the storm drain system or watercourses.

Limitations

- Finer solids are not effectively removed by filtration systems.
- Paving opportunities may be limited during wet weather.

Standards and Specifications

- Substances used to coat asphalt transport trucks and asphalt trucks and asphalt spreading equipment shall not contain soap and shall be non-foaming and non-toxic.
- Place drip pans or absorbent materials under paving equipment while not in use, to catch and/or contain drips and leaks. See also BMP WM-10, "Liquid Waste Management".
- When paving involves asphaltic concrete (AC), the following steps shall be implemented to prevent the discharge of grinding residue, uncompacted or loose AC, tack coats, equipment cleaners, or unrelated paving materials:
  - Minimize the washing of sand or gravel from new asphalt into storm drains, streets, and creeks by sweeping where practical.
  - Old or spilled asphalt must be disposed as approved by the Resident Engineer (RE).

following characteristics, and shall be arranged with the construction storm water coordinator:

- Located away from storm drain inlets, drainage facilities, or watercourses
- Paved with concrete or asphalt and bermed to contain wash waters and to prevent run-on and runoff
- Configured with a sump to allow collection and disposal of wash water
- Wash waters shall not be discharged to storm drains or watercourses
- Used only when necessary

■ When cleaning vehicles/equipment with water:

- Use as little water as possible. High pressure sprayers may use less water than a hose, and shall be considered.
- Use positive shutoff valve to minimize water usage.

Maintenance and Inspection

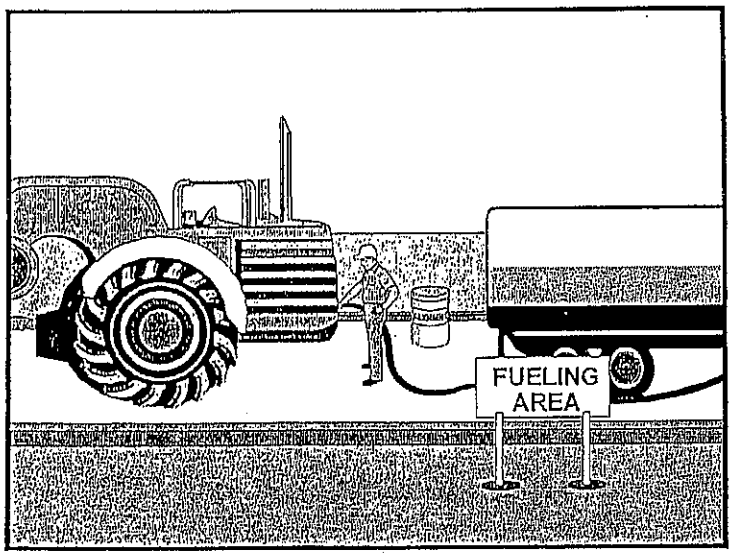
■ The control measure shall be inspected at a minimum of once a week.

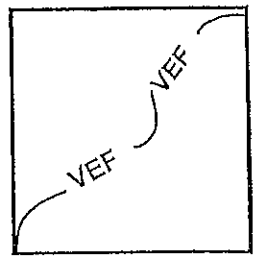
■ Monitor employees and subcontractors throughout the duration of the construction project to ensure appropriate practices are being implemented.

■ Inspect sump regularly and remove liquids and sediment as needed or as directed by the RE.

Vehicle and Equipment Fueling

NS-9





BMP Objectives
- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose

Procedures and practices to minimize or eliminate the discharge of fuel spills and leaks into the storm drain system or to watercourses.

Appropriate Applications

These procedures are applied on all construction sites where vehicle and equipment fueling takes place.

Limitations

- On-site vehicle and equipment fueling shall only be used where it's impractical to send vehicles and equipment off-site for fueling.

Standards and Specifications

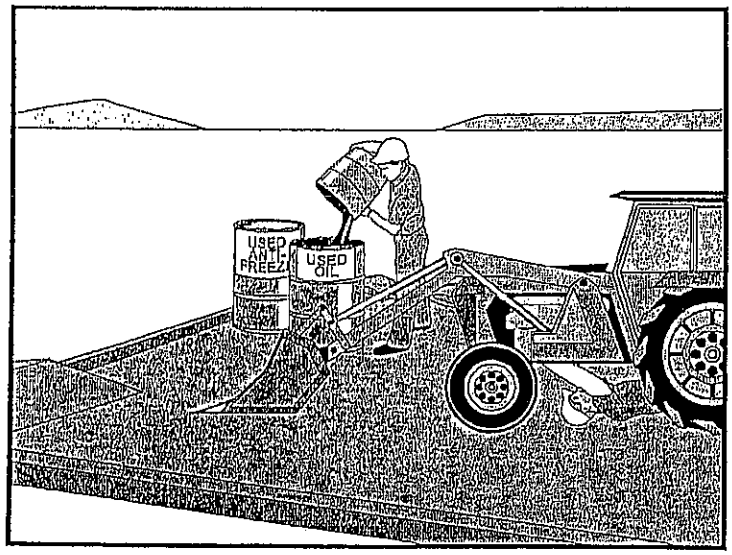
- When fueling must occur on-site, the contractor shall select and designate an area to be used, subject to approval of the Resident Engineer (RE).
- Absorbent spill clean-up materials and spill kits shall be available in fueling areas and on fueling trucks and shall be disposed of properly after use.
- Drip pans or absorbent pads shall be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
- Dedicated fueling areas shall be protected from storm water run-on and runoff, and shall be located at least 15 m from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Nozzles used in vehicle and equipment fueling shall be equipped with an automatic shut-off to control drips. Fueling operations shall not be left unattended.

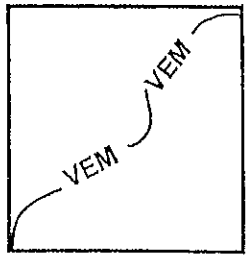
- Protect fueling areas with berms and/or dikes to prevent run-on, runoff, and to contain spills.
- Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management Districts (AQMD).
- Fuel tanks shall not be "topped-off."
- Vehicles and equipment shall be inspected on each day of use for leaks. Leaks shall be repaired immediately or problem vehicles or equipment shall be removed from the project site.
- Absorbent materials shall be used on small spills instead of hosing down or burying techniques. The spent absorbent material shall be removed promptly and disposed of properly.
- Federal, state, and local requirements shall be observed for any stationary above ground storage tanks.
- Mobile fueling of construction equipment throughout the site shall be minimized. Whenever practical, equipment shall be transported to the designated fueling area.

Maintenance and Inspection

- Fueling areas and storage tanks shall be inspected on a regular basis.
- Keep an ample supply of spill cleanup material on the site.
- Immediately cleanup spills and properly dispose of contaminated soil and cleanup materials.

Vehicle and Equipment Maintenance NS-10





BMP Objectives
- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose

Procedures and practices to minimize or eliminate the discharge of pollutants to the storm drain system or to watercourses from vehicle and equipment maintenance procedures.

Appropriate Applications

These procedures are applied on all construction projects where an on-site yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Limitations

None identified.

Standards and Specifications

- Drip pans or absorbent pads shall be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a dedicated maintenance area.
- All fueling trucks and fueling areas are required to have spill kits and/or use other spill protection devices.
- Dedicated maintenance areas shall be protected from storm water run-on and runoff, and shall be located at least 15 m from downstream drainage facilities and watercourses.
- Drip Pans or plastic sheeting shall be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than one hour.
- Absorbent spill clean-up materials shall be available in maintenance areas and shall be disposed of properly after use. Substances used to coat asphalt transport trucks and asphalt spreading equipment shall be non-toxic. Drainage inlet structures and manholes shall be covered with filter fabric

when seal coat, tack coat , slurry seal, or fog seal is applied to adjacent surfaces. Seal coat, tack coat, slurry seal, or fog seal shall not be applied if rainfall or thunderstorms are predicted to occur during the application or curing period.

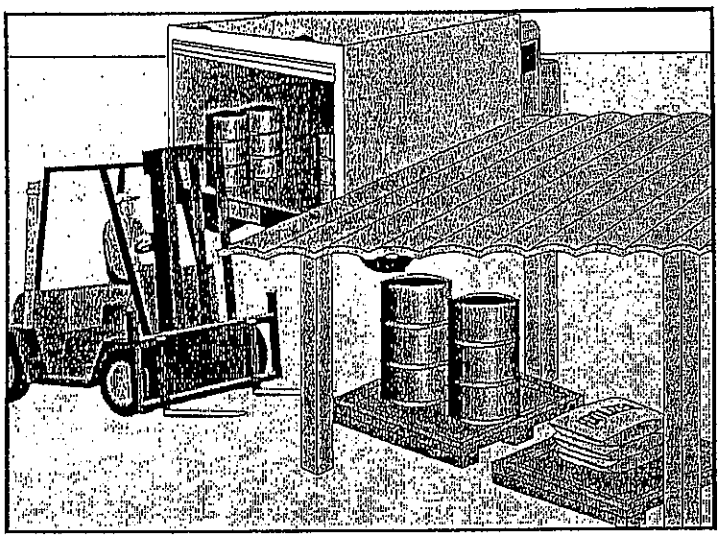
- Use off-site maintenance facilities whenever practical.
- For long-term projects, consider using portable tents or covers over maintenance areas.
- Properly dispose of used oils, fluids, lubricants and spill cleanup materials.
- Do not dump fuels and lubricants onto the ground.
- Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- Properly dispose of or recycle used batteries.
- Do not bury used tires.
- Repair leaks of fluids and oil immediately.
- Provide spill containment dikes or secondary containment around stored oil and chemical drums.

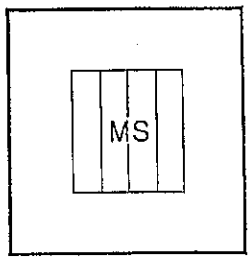
Maintenance and Inspection

- Maintain waste fluid containers in leak proof condition.
- Vehicle and equipment maintenance areas shall be inspected regularly.
- Vehicles and equipment shall be inspected on each day of use. Leaks shall be repaired immediately or the problem vehicle(s) or equipment shall be removed from the project site.
- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.

Material Delivery and Storage

WM-1





BMP Objectives
- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose

Procedures and practices for the proper handling and storage of materials in a manner that minimizes or eliminates the discharge of these materials to the storm drain system or to watercourses.

Appropriate Applications

These procedures are implemented at all construction sites with delivery and storage of the following:

- Soil
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease
- Asphalt and concrete components
- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Limitations

- Space limitation may preclude indoor storage.
- Storage sheds must meet building & fire code requirements.

Standards and Specifications

General

- Train employees and subcontractors on the proper material delivery and storage practices.
- Temporary storage area shall be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) shall be supplied to the Resident Engineer (RE) for all materials stored.

Material Storage Areas and Practices

Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 shall be handled in conformance with the following provisions:

- Storage, preparation, and mixing shall be accomplished in temporary containment facilities. Each temporary containment facility shall provide a spill containment volume equal to 1.5 times the volume of all containers therein and shall be impervious to the materials contained therein for a minimum contact time of 72 hours.
- Sufficient separation shall be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, shall not be stored in the same temporary containment facility.
- To provide protection from wind and rain, throughout the rainy season, temporary containment facilities shall be covered during non-working days and prior to rain events.
- Temporary containment facilities shall be maintained free of accumulated rainwater and spills.
- Materials shall be stored in their original containers and the original product labels shall be maintained in place in a legible condition. Damaged or otherwise illegible labels shall be replaced immediately.
- Liquid materials, petroleum products, and substances listed in 40 CFR Parts 110, 117 or 302 shall be stored in approved containers and drums shall not be overfilled. Containers shall be placed in temporary containment facilities for storage.
- Bagged and boxed materials shall be stored on pallets and shall not be allowed to accumulate on the ground. To provide protection from wind and rain, throughout the rainy season, bagged and boxed materials shall be covered during non-working days and prior to rain events.

- Stockpiles shall be protected in accordance with BMP WM-3, "Stockpile Management".
- Minimize the material inventory stored on-site (e.g., only a few days supply).
- Store materials indoors within existing structures or sheds when available.
- Have proper storage instructions posted at all times in an open and conspicuous location.
- Do not store hazardous chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and when possible, under cover in secondary containment.
- Keep hazardous chemicals well labeled and in their original containers.
- Keep ample supply of appropriate spill clean up material near storage areas.
- Also see BMP WM-6, "Hazardous Waste Management", for storing of hazardous materials.

Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored on-site.
- Employees trained in emergency spill clean-up procedures shall be present when dangerous materials or liquid chemicals are unloaded.

Spill Clean-up

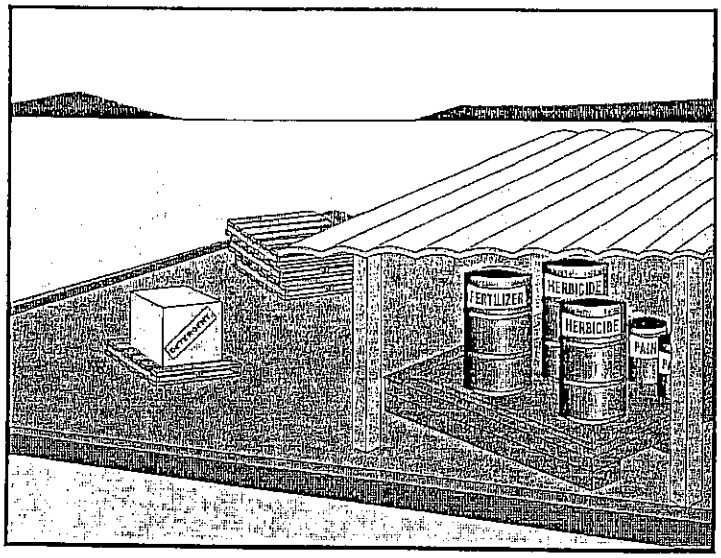
- Contain and clean up any spill immediately.
- If significant residual materials remain on the ground after construction is complete, properly remove and dispose any hazardous materials or contaminated soil.
- See BMP WM-4, "Spill Prevention and Control", for spills of chemicals and/or hazardous materials.

Maintenance and Inspection

- Storage areas shall be kept clean, well organized, and equipped with ample clean-up supplies as appropriate for the materials being stored.
- Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.
- Inspect storage areas before and after rainfall events, and at least weekly during other times.

Material Use

WM-2



MU

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose

These are procedures and practices for use of construction material in a manner that minimizes or eliminates the discharge of these materials to the storm drain system or to watercourses.

Appropriate Applications

This BMP applies to all construction projects. These procedures apply when the following materials are used or prepared on site:

- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease
- Asphalt and other concrete components
- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Limitations

- Safer alternative building and construction products may not be available or suitable in every instance.

Standards and Specifications

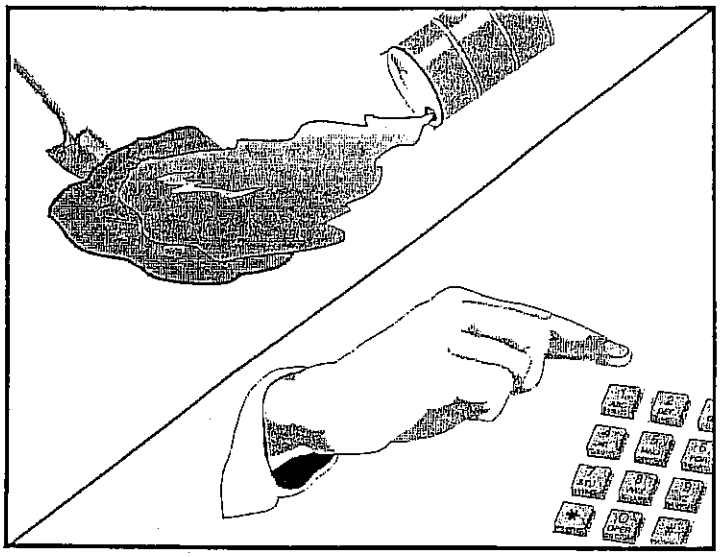
- Material Safety Data Sheets (MSDS) shall be supplied to the Resident Engineer (RE) for all materials.
- Latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, may be disposed of with other construction debris.
- Do not remove the original product label, it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint indoors, or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain or watercourse. Dispose of any paint thinners, residue and sludge(s), that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practical, and rinse to a drain leading to a sanitary sewer where permitted, or into a concrete washout pit or temporary sediment trap. For oil-based paints, clean brushes to the extent practical and filter and reuse thinners and solvents.
- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials on-site when practical.
- Do not over-apply fertilizers and pesticides. Prepare only the amount needed. Strictly follow the recommended usage instructions. Apply surface dressings in smaller applications, as opposed to large applications, to allow time for it to work in and to avoid excess materials being carried off-site by runoff.
- Application of herbicides and pesticides shall be performed by a licensed applicator.
- Contractors are required to complete the "Report of Chemical Spray Forms" when spraying herbicides and pesticides.
- Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.

Maintenance and Inspections

- Spot check employees and subcontractors monthly throughout the job to ensure appropriate practices are being employed.

Spill Prevention and Control

WM-4



BMP Objectives
- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose

These are procedures and practices implemented to prevent and control spills in a manner that minimizes or prevents the discharge of spilled material to the drainage system or watercourses.

Appropriate Application

This best management practice (BMP) applies to all construction projects. Spill control procedures are implemented anytime chemicals and/or hazardous substances are stored. Substances may include, but are not limited to:

- Soil stabilizers/binders
- Dust Palliatives
- Herbicides
- Growth inhibitors
- Fertilizers
- Deicing/anti-icing chemicals
- Fuels
- Lubricants
- Other petroleum distillates

To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110, 117, and 302, and sanitary and septic wastes shall be contained and cleaned up immediately.

Limitations

- This BMP only applies to spills caused by the contractor.
- Procedures and practices presented in this BMP are general. Contractor shall identify appropriate practices for the specific materials used or stored on-site.

Standards and Specifications

- To the extent that it doesn't compromise clean up activities, spills shall be covered and protected from storm water run-on during rainfall.
- Spills shall not be buried or washed with water.
- Used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose shall be stored and disposed of in conformance with the provisions in these special provisions.
- Water used for cleaning and decontamination shall not be allowed to enter storm drains or watercourses and shall be collected and disposed of in accordance with BMP WM-10, "Liquid Waste Management".
- Water overflow or minor water spillage shall be contained and shall not be allowed to discharge into drainage facilities or watercourses.
- Proper storage, clean-up and spill reporting instruction for hazardous materials stored or used on the project site shall be posted at all times in an open, conspicuous and accessible location.
- Waste storage areas shall be kept clean, well organized and equipped with ample clean-up supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers and liners shall be repaired or replaced as needed to maintain proper function.

Education

- Educate employees and subcontractors on what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills.
- Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

- The Contractor's Water Pollution Control Manager (WPCM) shall oversee and enforce proper spill prevention and control measures.

Clean up and Storage Procedures

- Minor Spills
  - Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.
  - Use absorbent materials on small spills rather than hosing down or burying the spill.
  - Remove the absorbent materials promptly and dispose of properly.
  - The practice commonly followed for a minor spill is:
    1. Contain the spread of the spill.
    2. Recover spilled materials.
    3. Clean the contaminated area and/or properly dispose of contaminated materials.

- Semi-Significant Spills
  - Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.
  - Clean up spills immediately:
    1. Notify the project foreman immediately. The foreman shall notify the Resident Engineer (RE).
    2. Contain spread of the spill.
    3. If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
    4. If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
    5. If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

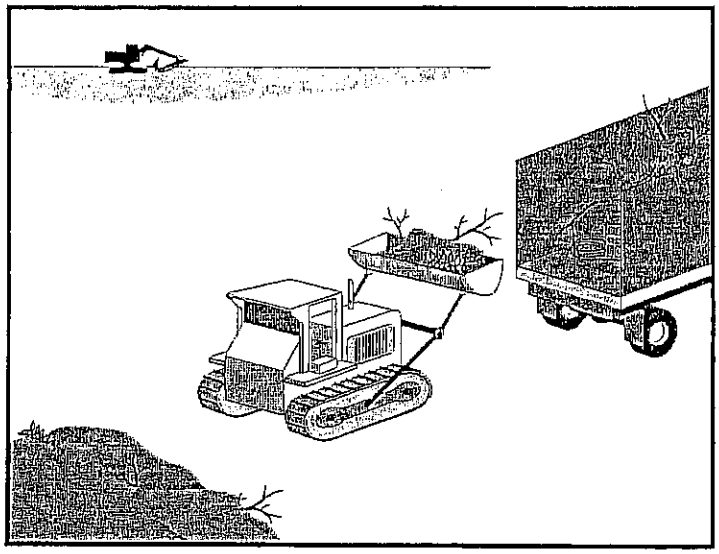
- Significant/Hazardous Spills
  - For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps shall be taken:
    1. Notify the RE immediately and follow up with a written report.
    2. Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
    3. Notify the Governor's Office of Emergency Services Warning Center, (805) 852-7550.
    4. For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor shall notify the National Response Center at (800) 424-8802.
    5. Notification shall first be made by telephone and followed up with a written report.
    6. The services of a spills contractor or a Haz-Mat team shall be obtained immediately. Construction personnel shall not attempt to clean up until the appropriate and qualified staff have arrived at the job site.
    7. Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, etc.

Maintenance and Inspection

- Verify weekly that spill control clean up materials are located near material storage, unloading, and use areas.
- Update spill prevention and control plans and stock appropriate clean-up materials whenever changes occur in the types of chemicals on site.

Solid Waste Management

WM-5



SWM

BMP Objectives
- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose

These are procedures and practices to minimize or eliminate the discharge of pollutants to the drainage system or to watercourses as a result of the creation, stockpiling, and removal of construction site wastes.

Appropriate Applications

Solid waste management practices are implemented on all construction projects that generate solid wastes.

Solid wastes include but are not limited to:

- Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials.
- Highway planting wastes, including vegetative material, plant containers, and packaging materials.
- Litter, including food containers, beverage cans, coffee cups, paper bags, plastic wrappers, and smoking materials, including litter generated by the public.

Limitations

Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

Standards and Specifications

Education

- The Contractor's Water Pollution Control Manager (WPCM) shall oversee and enforce proper solid waste procedures and practices.

- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Educate employees and subcontractors on solid waste storage and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Wherever possible, minimize production of solid waste materials.

Collection, Storage, and Disposal

- Littering on the project site shall be prohibited.
- To prevent clogging of the storm drainage system litter and debris removal from drainage grates, trash racks, and ditch lines shall be a priority.
- Trash receptacles shall be provided in the Contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Litter from work areas within the construction limits of the project site shall be collected and placed in water tight dumpsters at least weekly regardless of whether the litter was generated by the Contractor, the public, or others. Collected litter and debris shall not be placed in or next to drain inlets, storm water drainage systems or watercourses.
- Dumpsters of sufficient size and number shall be provided to contain the solid waste generated by the project.
- Full dumpsters shall be removed from the project site and the contents shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13 of the Standard Specifications.
- Litter stored in collection areas and containers shall be handled and disposed of by trash hauling contractors.
- Materials that are disposed of or temporarily stockpiled outside the highway right-of-way but are visible from the Highway, shall be in a neat and orderly fashion to the satisfaction of the Resident Engineer (RE).
- Storm water run-on shall be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or

through the use of measures to elevate waste form site surfaces.

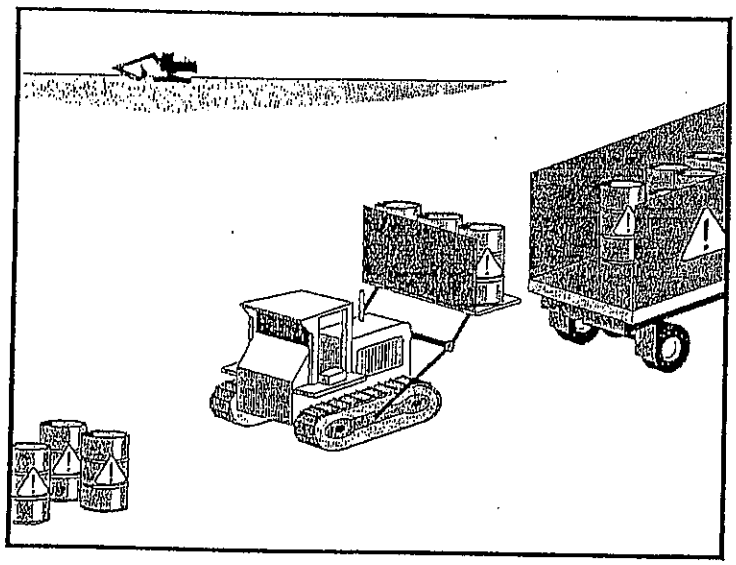
- Solid waste storage areas shall be located at least 15m from drainage facilities and watercourses and shall not be located in areas prone to flooding or ponding.
- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters shall be protected from wind and rain by securely covering the waste with tarps or plastic sheeting or protected in conformance with the applicable Disturbed Soil Area protection.
- Dumpster washout on the project site is not allowed.
- Notify trash hauling contractors that only watertight dumpsters are acceptable for use on-site.
- Plan for additional containers during the demolition phase of construction.
- Plan for more frequent pickup during the demolition phase of construction.
- Designate on-site waste storage areas and obtain approval of the RE.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Dispose of non-hazardous waste in accordance with Standard Specification 7-1.13, Disposal of Material Outside the Highway right-of-way.
- For disposal of hazardous waste, see BMP WM-6, "Hazardous Waste Management". Have hazardous waste hauled to an appropriate disposal and/or recycling facility.
- Salvage or recycle useful vegetation debris, packaging and/or surplus building materials when practical. For example, trees and shrubs from land clearing can be used as a brush barrier, or converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

Maintenance and Inspection

- The WPCM shall monitor on-site solid waste storage and disposal procedures.
- Police site for litter and debris.

Hazardous Waste Management

WM-6



BMP Objectives
- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose

These are procedures and practices to minimize or eliminate the discharge of pollutants from construction site hazardous waste to the storm drain system or to watercourses.

Appropriate Applications

- This best management practice (BMP) applies to all construction projects.
- Hazardous waste management practices are implemented on construction projects that generate waste from the use of:
  - Petroleum Products,
  - Asphalt Products,
  - Concrete Curing Compounds,
  - Pesticides,
  - Palliatives,
  - Acids,
  - Septic Wastes,
  - Paints,
  - Stains,
  - Solvents,
  - Wood Preservatives,
  - Roofing Tar, or
  - Any materials deemed a hazardous waste in California, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302.

Limitations

- Nothing in this BMP relieves the Contractor from responsibility for compliance with federal, state, and local laws regarding storage, handling, transportation, and disposal of hazardous wastes.
- This BMP does not cover aerially deposited lead (ADL) soils. For ADL soils refer to BMP WM-7, Contaminated Soil Management, and the project Special Provisions.

Standards and Specifications

Education

- Educate employees and subcontractors on hazardous waste storage and disposal procedures.
- Educate employees and subcontractors on potential dangers to humans and the environment from hazardous wastes.
- Instruct employees and subcontractors on safety procedures for common construction site hazardous wastes.
- Instruct employees and subcontractors in identification of hazardous and solid waste.
- Hold regular meetings to discuss and reinforce hazardous waste management procedures (incorporate into regular safety meetings).
- The Contractor's Water Pollution Control Manager (WPCM) shall oversee and enforce proper hazardous waste management procedures and practices.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.

Storage Procedures

- Wastes shall be stored in sealed containers constructed of a suitable material and shall be labeled as required by Title 22 CCR, Division 4.5 and 49 CFR Parts 172,173, 178, and 179.
- All hazardous waste shall be stored, transported, and disposed as required in Title 22 CCR, Division 4.5 and 49 CFR 261-263.
- Waste containers shall be stored in temporary containment facilities that shall comply with the following requirements:
  - Temporary containment facility shall provide a spill containment volume equal to 1.5 times the volume of all containers.
  - Temporary containment facility shall be impervious to the materials contained for a minimum contact time of 72 hours.
  - Temporary containment facilities shall be maintained free of accumulated rainwater and spills.
  - Sufficient separation shall be provided between stored containers to allow for spill cleanup and emergency response access.
  - Incompatible materials, such as chlorine and ammonia, shall not be stored in the same temporary containment facility.

  - Throughout the rainy season, temporary containment facilities shall be covered during non-working days, prior to rain events.

- Drums shall not be overfilled and wastes shall not be mixed.
- Paint brushes and equipment for water and oil based paints shall be cleaned within a contained area and shall not be allowed to contaminate site soils, watercourses or drainage systems. Waste paints, thinners, solvents, residues, and sludges that cannot be recycled or reused shall be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths shall be disposed of as solid waste.
- Ensure that adequate hazardous waste storage volume is available.
- Ensure that hazardous waste collection containers are conveniently located.
- Designate hazardous waste storage areas on site away from storm drains or watercourses and away from moving vehicles and equipment to prevent accidental spills.
- Minimize production or generation of hazardous materials and hazardous waste on the job site.
- Use containment berms in fueling and maintenance areas and where the potential for spills is high.
- Segregate potentially hazardous waste from non-hazardous construction site debris.
- Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.
- Clearly label all hazardous waste containers with the waste being stored and the date of accumulation.
- Place hazardous waste containers in secondary containment.
- Do not allow potentially hazardous waste materials to accumulate on the ground.
- Unless watertight, containers of dry waste shall be stored on pallets.
- Do not mix wastes.

Disposal Procedures

- Waste shall be disposed of outside the highway right-of-way within 90 days of being generated, or as directed by the Resident Engineer (RE).
- To minimize on-site storage, full containers of waste shall be disposed of outside the highway right-of-way at least weekly. In no case shall hazardous waste storage exceed requirements in Title 22 CCR, section 66262.34.
- Waste shall be disposed of by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility utilizing properly completed Uniform Waste Manifest forms. In no case shall hazardous waste storage exceed requirements in Title 22 CCR, section 66262.34.
- A Caltrans certified laboratory shall sample waste to determine the appropriate disposal facility.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for solid waste construction debris.
- Properly dispose of rainwater in secondary containment that may have mixed with hazardous waste.
- Recycle any useful material such as used oil or water-based paint when practical.
- Attention is directed to "Hazardous Material", "Contaminated Material", and "Aerially Deposited Lead" of the contract documents regarding the handling and disposal of hazardous materials.

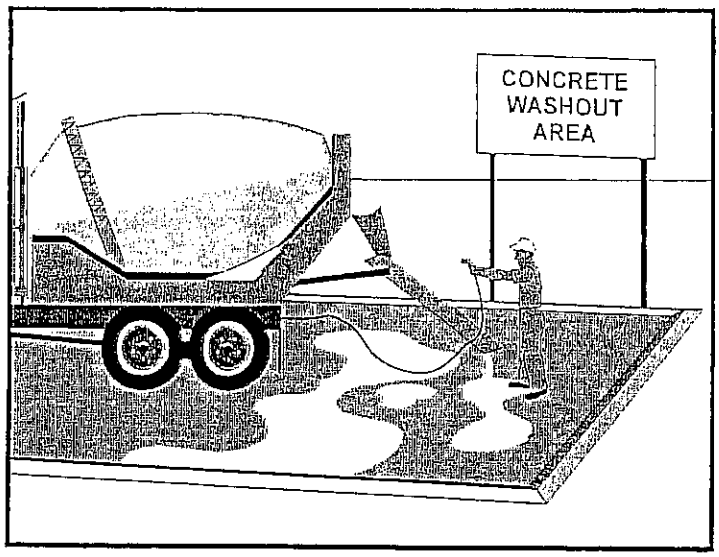
Maintenance and Inspection

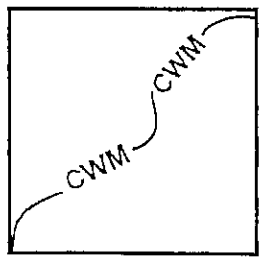
- The WPCM shall monitor on-site hazardous waste storage and disposal procedures.
- Waste storage areas shall be kept clean, well organized, and equipped with ample clean-up supplies as appropriate for the materials being stored.
- Storage areas shall be inspected in conformance with the provisions in the contract documents.
- Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.
- Hazardous spills shall be cleaned up and reported in conformance with the applicable Material Safety Data Sheet (MSDS) and the instructions posted at the project site.

- The National Response Center, at (800) 424-8802, shall be notified of spills of Federal reportable quantities in conformance with the requirements in 40 CFR parts 110, 117, and 302.
- Copy of Bill of Laden and disposal receipts shall be provided to the RE.

Concrete Waste Management

WM-8





BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose

These are procedures and practices that are implemented to minimize or eliminate the discharge of concrete waste materials to the storm drain system or to watercourses.

Appropriate Applications

- Concrete waste management practices are implemented on construction projects where concrete is used as a construction material or where concrete dust and debris result form demolition activities.
- Where slurries containing portland cement concrete (PCC) or asphalt concrete (AC) are generated, such as from sawcutting, coring, grinding, grooving, and hydro-concrete demolition.
- Where concrete trucks and other concrete-coated equipment are washed on site, when approved by the Resident Engineer (RE). See also NS-8, Vehicle and Equipment Cleaning.
- Where mortar-mixing stations exist.

Limitations

None identified.

Standards and Specifications

Education

- Educate employees, subcontractors, and suppliers on the concrete waste management techniques described herein.
- The Contractor's Water Pollution Control Manager (WPCM) shall oversee and enforce concrete waste management procedures.

Concrete Slurry Wastes

- PCC and AC waste shall not be allowed to enter storm drains or watercourses.
- PCC and AC waste shall be collected and disposed of outside the highway right-of-way in conformance with section 7-1.13 of Standard Specifications or placed in a temporary concrete washout facility.
- Disposal of hardened PCC and AC waste shall be in conformance with Section 15-3.02 of the Standard Specifications.
- A sign shall be installed adjacent to each temporary concrete washout facility to inform concrete equipment operators to utilize the proper facilities.
- Below grade concrete washout facilities are typical. Above grade facilities are used if excavation is not practical.
- Do not allow slurry residue from wet coring or saw-cutting AC or PCC to enter storm drains or receiving waters by:
  - Placing temporary berms or sandbags around coring or saw-cutting locations to capture and contain slurry runoff.
  - Placing straw bales, sandbags, or gravel dams around inlets to prevent slurry from entering storm drains.
- Vacuum slurry residue and dispose in a temporary pit (as described in *On-Site Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures*, below) and allow slurry to dry. Dispose of dry slurry residue in accordance with BMP WM-5, "Solid Waste Management", or, for on-site disposal, in accordance with Standard Specification 15-3.02, Removal Methods.
- Collect residue from grooving and grinding operations in accordance with Standard Specifications Section 42-1.02 and 42-2.02, "Construction."

On-site Temporary Concrete Washout Facility, Transit Truck Washout Procedures

- Temporary concrete washout facilities shall be located a minimum of 15 m (50 ft) from storm drain inlets, open drainage facilities, and watercourses, unless determined unfeasible by the RE. Each facility shall be located away from construction traffic or access areas to prevent disturbance or tracking.
- A sign shall be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities. The sign shall be

installed as shown on the plans and in conformance with the provisions in Section 56-2, "Roadside Signs", of the Standard Specifications.

- Temporary concrete washout facilities shall be constructed above grade or below grade at the option of the Contractor. Temporary concrete washout facilities shall be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

- Temporary washout facilities shall have a temporary pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.

- Perform washout of concrete trucks in designated areas only.

- Once concrete wastes are washed into the designated area and allowed to harden, the concrete shall be broken up, removed, and disposed of per BMP WM-5, "Solid Waste Management", and in conformance with the provisions in Section 15-3.02, "Removal Methods", of the Standard Specifications. Dispose of hardened concrete on a regular basis.

- *Temporary Concrete Washout Facility (Type Above Grade)*
  - Temporary concrete washout facility (type above grade) shall be constructed as shown on the plans, with a recommended minimum length and minimum width of 3m, but with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations. The length and width of a facility may be increased, at the Contractor's expense, upon approval of the RE.
  - Straw bales, wood stakes, and sandbag materials shall conform to the provisions in BMP SC-9, "Straw Bale Barrier".
  - Plastic lining material shall be a minimum of 60 mil polyethylene sheeting and shall be freeof holes, tears or other defects that compromise the impermeability of the material.
  - Portable delineators shall conform to the provisions in Section 12-3.04, "Portable Delineators", of the Standard Specifications. The delineator bases shall be cemented to the pavement in the same manner as provided for cementing pavement markers to pavement in Section 85-1.06, "Placement", of the Standard Specifications. Portable delineators shall be applied only to a clean, dry surface.

- *Temporary Concrete Washout Facility (Type Below Grade)*
  - Temporary concrete washout facility (type below grade) shall be constructed as shown on the plans, with a recommended minimum

length and minimum width of 3m (10 ft). The quantity and volume shall be sufficient to contain all liquid and concrete waste generated by washout operations. The length and width of a facility may be increased, at the Contractor's expense, upon approval of the RE. Lath and flagging shall be commercial type.

Removal of Temporary Concrete Washout Facilities

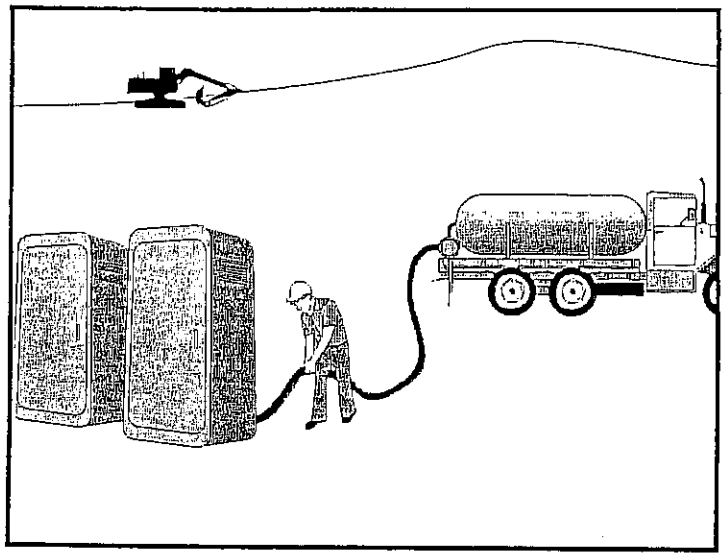
- When temporary concrete washout facilities are no longer required for the work, as determined by the RE, the hardened concrete shall be removed and disposed of in conformance with the provisions in Section 15-3.02 of the Standard Specifications. Materials used to construct temporary concrete washout facilities shall become the property of the Contractor, shall be removed from the site of the work, and shall be disposed of outside the highway right-of-way in conformance with the provisions in Section 7-1.13 of the Standard Specifications.
- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled and repaired in conformance with the provisions in Section 15-1.02, "Preservation of Property," of the Standard Specifications.

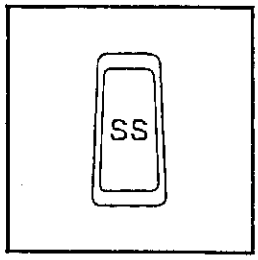
Maintenance and Inspection

- The Contractor's Water Pollution Control Manager (WPCM) shall monitor on site concrete waste storage and disposal procedures at least weekly.
- The WPCM shall monitor concrete working tasks, such as saw cutting, coring, grinding and grooving at least weekly to ensure proper methods are employed.
- Temporary concrete washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 100mm for above grade facilities and 300mm for below grade facilities. Maintaining temporary concrete washout facilities shall include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials shall be removed and disposed of in conformance with the provisions in Section 15-3.02, "Removal Methods," of the Standard Specifications.
- Existing facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.

Sanitary/Septic Waste Management

WM-9





BMP Objectives
- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose

Procedures and practices to minimize or eliminate the discharge of construction site sanitary/septic waste materials to the storm drain system or to watercourses.

Appropriate Applications

Sanitary/septic waste management practices are implemented on all construction sites that use temporary or portable sanitary/septic waste systems.

Limitations

Not applicable.

Standards and Specifications

Education

- Educate employees, subcontractors, and suppliers on sanitary/septic waste storage and disposal procedures.
- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary/septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary/septic waste.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

Storage and Disposal Procedures

- Temporary sanitary facilities shall be located away from drainage facilities, watercourses, and from traffic circulation. When subjected to high winds or risk of high winds, as determined by the Resident Engineer (RE), temporary

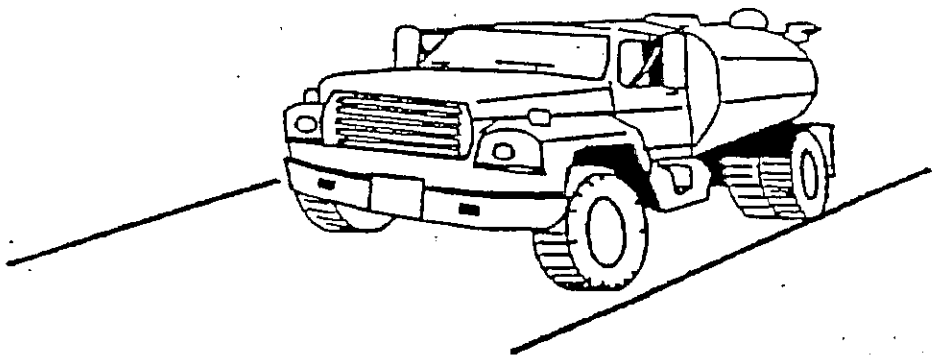
sanitary facilities shall be secured to prevent overturning.

- Wastewater shall not be discharged or buried within the highway right-of-way.
- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, shall comply with the local health agency, city, county, and sewer district requirements.
- If using an on site disposal system, such as a septic system, comply with local health agency requirements.
- Properly connect temporary sanitary facilities that discharge to the sanitary sewer system to avoid illicit discharges.
- Ensure that sanitary/septic facilities are maintained in good working order by a licensed service.
- Use only reputable, licensed sanitary/septic waste haulers.

Maintenance and Inspection

- The Contractor's Water Pollution Control Manager (WPCM) shall monitor on site sanitary/septic waste storage and disposal procedures at least weekly.

BMP: DUST CONTROLS



Objectives

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

GENERAL DESCRIPTION

Dust control measures are used to stabilize soil from wind erosion, and reduce dust generated by construction activities.

SUITABLE APPLICATIONS

- Clearing and grading activities.
- Construction vehicle traffic on unpaved roads.
- Drilling and blasting activities.
- Sediment tracking onto paved roads.
- Soil and debris storage piles.
- Batch drop from front end loaders.
- Areas with unstabilized soil.
- Final grading/site stabilization usually is sufficient to control post-construction dust sources.

INSTALLATION/APPLICATION CRITERIA

- Schedule construction activities to minimize exposed area (See ESC 1).
- Quickly stabilize exposed soils using vegetation, mulching, spray-on adhesives, calcium chloride, sprinkling, and stone/gravel layering (See ESC 10 and 11).
- Identify and stabilize key access points prior to commencement of construction (See ESC 24).
- Minimizing the impact of dust by anticipating the direction of prevailing winds.
- Direct most construction traffic to stabilized roadways within the project site (See ESC 23).

REQUIREMENTS

- Maintenance
  - Most dust control measures require frequent, often daily, attention.
- Cost
  - Installation costs for water/chemical dust suppression are low, but annual costs may be quite high since these measures are effective for only a few hours to a few days.

LIMITATIONS

- Watering prevents dust only for a short period and should be applied daily (or more often) to be effective.
- Overwatering may cause erosion.
- Oil should not be used for dust control because the oil may migrate into drainageway and/or seep into the soil.
- Certain chemically-treated subgrades may make soil water repellant, increasing runoff.

Targeted Pollutants

- ● Sediment
- ○ Nutrients
- ◒ Toxic Materials
- ◒ Oil & Grease
- ○ Floatable Materials
- ○ Other Construction Waste

- ● Likely to Have Significant Impact
- ○ Probable Low or Unknown Impact

Implementation Requirements

- ○ Capital Costs
- ◒ O&M Costs
- ◒ Maintenance
- ○ Training
- ○ Suitability for Slopes >5%

● High ○ Low

ESC21

Best Management Practices

Additional Information — Dust Controls

California's mediterranean climate, with short wet seasons and long hot dry seasons, allow the soils to thoroughly dry out. During these dry seasons, construction activities are at their peak, and disturbance and exposed areas are increasingly subject to wind erosion, sediment tracking and dust generated by construction equipment.

Dust control, as a BMP, is a practice that is already in place for many construction activities. Los Angeles, the North Coast and Sacramento, among others have enacted dust control ordinances for construction activities that cause dust to be transported beyond the construction project property line. Recently, the State Air Resources Control Board has, under the authority of the Clean Air Act, started to address air quality in relation to inhalable particulate matter less than 10 microns (PM-10). 90% of these small particles are considered to be dust. Existing dust control regulations by local agencies, municipal departments, public works department, and/or public health departments are in place in some regions within California. For jurisdictions that have no formal dust control regulations and/or standards, Sections 10, 17 and 18 of CalTrans' Standard Specifications provide detailed provisions for dust control practices.

Many local agencies require dust control in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act. The following are measures that local agencies may have already implemented as requirements for dust control from contractors:

- Construction & Grading Permits: Require provisions for dust control plans;
- Opacity Emission Limits: Enforce compliance with California air pollution control laws;
- Increase overall enforcement activities: Priority given to cases involving citizen complaints;
- Maintain Field Application Records: Require records of dust control measures from contractor;
- Stormwater Pollution Prevention Plan: (SWPPP): Integrate dust control measures into SWPPP.

Dust Control Practices

Dust control BMP's generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. Table ESC21.1 shows which Dust Control BMPs apply to site conditions which cause dust. For heavily traveled and disturbed areas, wet suppression (watering), chemical dust suppression, gravel or asphalt surfacing, temporary gravel construction entrances, equipment wash-out areas, and haul truck covers can be employed as dust control applications. Permanent or temporary vegetation and mulching and sand fences can be employed for areas of occasional or no construction traffic. Preventive measures would include minimizing surface areas to be disturbed, limiting on-site vehicle traffic to 15 miles per hour, and controlling the number and activity of vehicles on a site at any given time.

Many of the reasonably available control measures for controlling dust from construction sites can also be implemented as BMPs for storm water pollution prevention. Those BMPs include:

- Pave, vegetate, or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
- Provide covers for haul trucks transporting materials that contribute to dust.
- Provide for wet suppression or chemical stabilization of exposed soils.
- Provide for rapid clean-up of sediments deposited on paved roads. Furnish stabilized construction road entrances and vehicle wash down areas.
- Stabilize unpaved haul roads, parking and staging areas. Reduce speed and trips on unpaved roads.
- Implement dust control measures for material stockpiles.
- Prevent drainage of sediment laden storm water onto paved surfaces.
- Stabilize abandoned construction sites using vegetation or chemical stabilization methods.
- Limit the amount of areas disturbed by clearing and earth moving operations by scheduling these activities in phases.

For the chemical stabilization, there are many products available for chemically stabilizing gravel roadways and stockpiles. The types of chemicals available and recommendations for their use are tabulated in Table ESC 21.2, Commonly Used Chemicals for Dust Control.

ESC21

Additional Information — Dust Controls

In addition, there are many other BMPs identified in this handbook that provide dust control including:

- Seeding and Plantings (ESC 10)
- Mulching (ESC 11)
- Construction Road Stabilization (ESC 23)
- Stabilized Construction Entrances (ESC 24)

Limitations

- Oil treated subgrades should not be used because the oil may migrate into drainageways and/or seep into the soil.
- Chemically treated subgrades may make the soil water repellant, interfering with long-term infiltration, and the vegetation/re-vegetation of the site. Some chemical dust suppressants may be subject to freezing and may contain solvents and should be handled properly.
- Asphalt, as a mulch tack or chemical mulch, requires a 24 hour curing time to avoid adherence to equipment, worker shoes, etc. Application should be limited because asphalt surfacing may eventually migrate into the drainage system.
- In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.

REFERENCES

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

California Air Pollution Control Laws, California Air Resources Board, 1992.

CalTrans, Standard Specifications, Sections 10, "Dust Control"; Section 17, "Watering"; and Section 18, "Dust Palliative".

Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM10), Visibility Reducing Particles, Sulfates, Lead, and Hydrogen Sulfide, California Air Resources Board, April 1991.

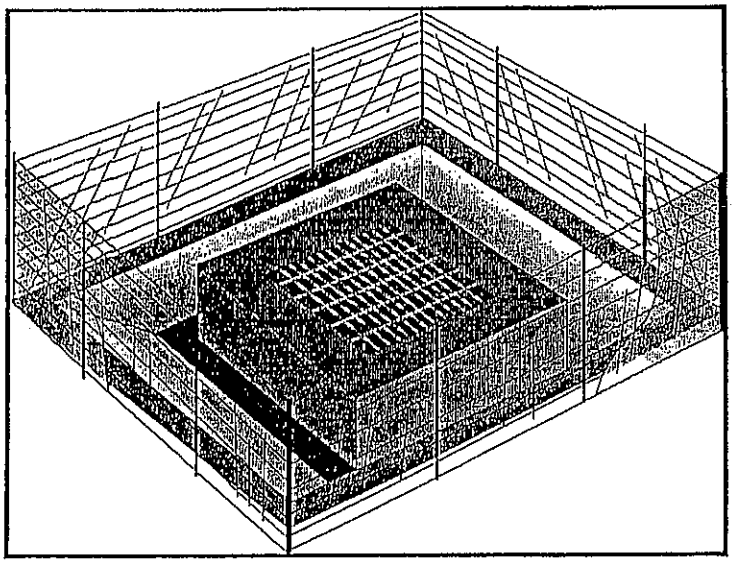
Sacramento County, Winterization Ordinance & Dust Control Ordinance (example).

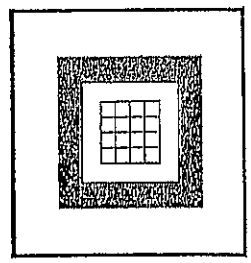
USDA Soil Conservation Service, "Guides for Erosion and Sediment Control".

ESC21

Storm Drain Inlet Protection

SC-10





BMP Objectives
- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose

Devices used at storm drain inlets that are subject to runoff from construction activities to detain and/or to filter sediment-laden runoff to allow sediment to settle and/or to filter sediment prior to discharge of storm water into storm water drainage systems or watercourses.

Appropriate Applications

- Where ponding will not encroach into highway traffic.
- Where sediment laden surface runoff may enter an inlet.
- Where disturbed drainage areas have not yet been permanently stabilized.
- Where the drainage area is 0.4 ha (1 ac) or less.
- Appropriate during wet and snow-melt seasons.

Limitations

- Use only when ponding will not encroach into highway traffic or onto erodible surfaces and slopes. If safety is a concern, use other methods of temporary protection to prevent sediment-laden storm water and non-storm water discharges to enter the storm drain system.
- Sediment removal may be difficult in high flow conditions or if runoff is heavily sediment laden. If high flow conditions are expected, use other on-site sediment trapping techniques in conjunction with inlet protection.
- Frequent maintenance is required.
- For drainage areas larger than 0.4 ha (1ac), runoff shall be routed to a sediment trapping device designed for larger flows. See BMPs SC-2, "Desilting Basin", and SC-3 "Sediment Traps".

- Filter fabric fence inlet protection appropriate in open areas is subject to sheet flow and for flows not exceeding 0.014 m^3/s (0.5 cfs).
- Sandbag barriers for inlet protection are applicable when sheet flows or concentrated flows exceed 0.014 m^3/s (0.5 cfs), and it is necessary to allow for overtopping to prevent flooding.
- Excavated drop inlet sediment traps are appropriate where relatively heavy flows are expected and overflow capability is needed.

Standards and Specifications

Identify existing and/or planned storm drain inlets that have the potential to receive sediment-laden surface runoff. Determine if storm drain inlet protection is needed, and which method to use.

Methods and Installation

- *DI Protection Type 1 - Filter Fabric Fence* - The filter fabric fence (Type 1) protection is illustrated in Page 4. Similar to constructing a silt fence. See BMP SC-1, "Silt Fence". Do not place filter fabric underneath the inlet grate since the collected sediment may fall into the drain inlet when the fabric is removed or replaced.
- *DI Protection Type 2 - Excavated Drop Inlet Sediment Trap* - The excavated drop inlet sediment trap (Type 2) is illustrated in Page 5. Similar to constructing a temporary silt fence, See BMP SC-1, "Silt Fence". Size excavated trap to provide a minimum storage capacity calculated at the rate of 130 m^3/ha (67 yd^3/ac) of drainage area.
- *DI Protection Type 3 - Sandbag Barrier* - The sandbag barrier (Type 3) is illustrated in Page 6. Flow from a severe storm shall not overtop the curb. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Construct sandbags in accordance with BMP SC-8, "Sandbag Barrier".

Maintenance and Inspection

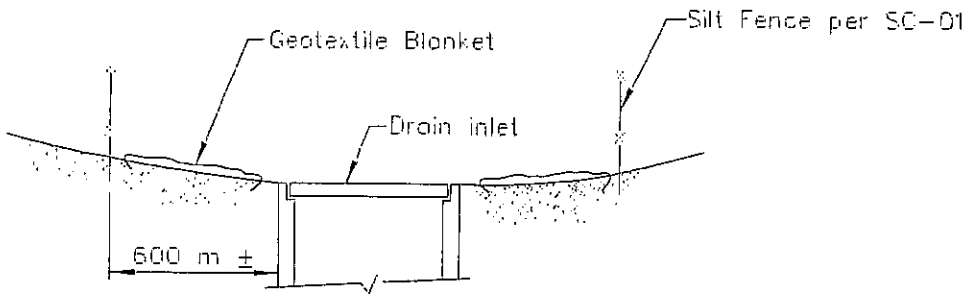
General

- Inspect all inlet protection devices before and after every rainfall event, and weekly during the rest of the rainy season. During extended rainfall events, inspect inlet protection devices at least once every 24 hours.
- Inspect the storm drain inlet after severe storms in the rainy season to check for bypassed material.
- Remove all inlet protection devices within thirty days after the site is stabilized, or when the inlet protection is no longer needed.

- Bring the disturbed area to final grade and smooth and compact it. Appropriately stabilize all bare areas around the inlet.
- Clean and re-grade area around the inlet and clean the inside of the storm drain inlet as it must be free of sediment and debris at the time of final inspection.

Requirements by Method

- *Type 1 - Filter Fabric Fence*
  - Make sure the stakes are securely driven in the ground and are in good shape (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground). Replace damaged stakes.
  - Replace or clean the fabric when the fabric becomes clogged with sediment. Make sure the fabric does not have any holes or tears. Repair or replace fabric as needed or as directed by the Resident Engineer (RE).
  - At a minimum, remove the sediment behind the fabric fence when accumulation reaches one-third the height of the fence or barrier height. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications.
- *Type 2 - Excavated Drop Inlet Sediment Trap*
  - Remove sediment from basin when the volume of the basin has been reduced by one-half.
- *Type 3 - Sandbag Barrier*
  - Inspect bags for holes, gashes, and snags.
  - Check sandbags for proper arrangement and displacement. Remove the sediment behind the barrier when it reaches one-third the height of the barrier. Removed sediment shall be incorporated in the project at locations designated by the RE or disposed of outside the highway right-of-way in conformance with the Standard Specifications.



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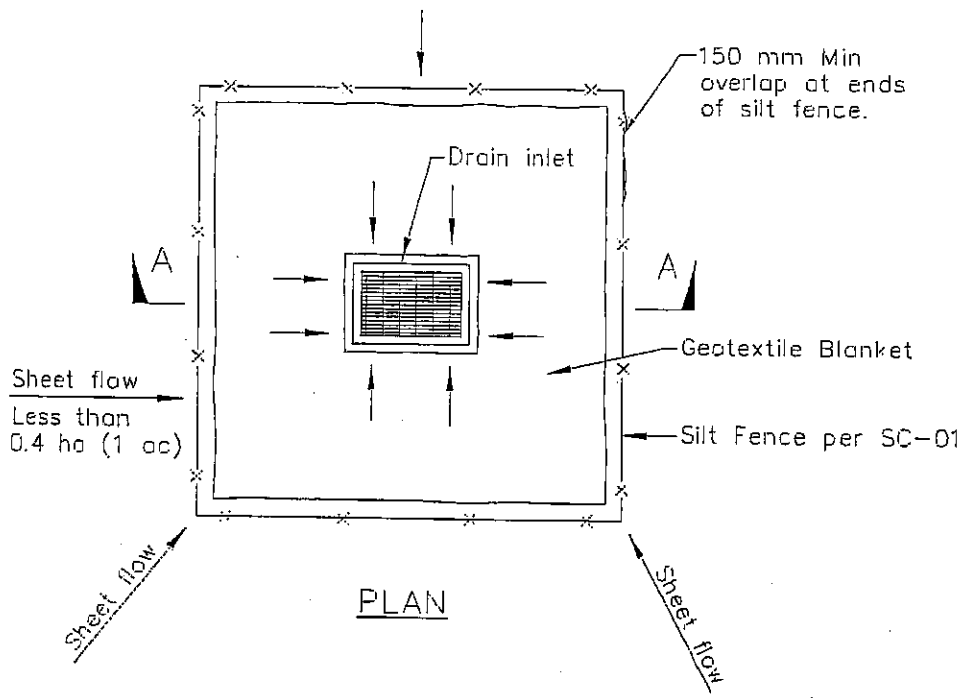
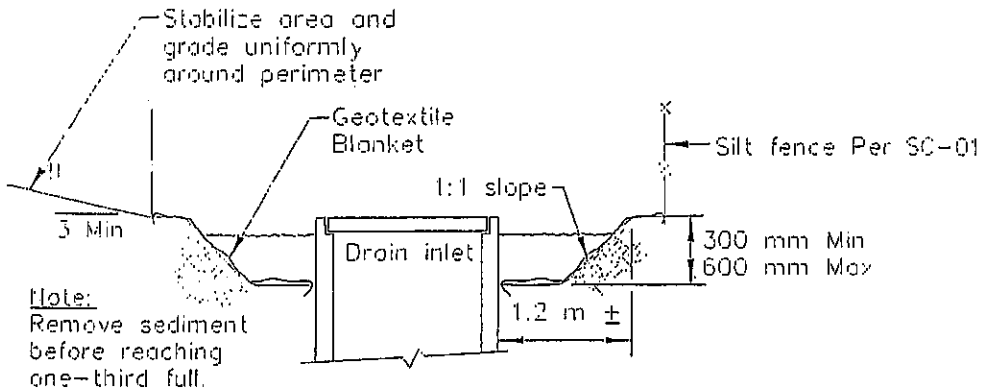


PLAN

DI PROTECTION TYPE 1
NOT TO SCALE

NOTES:

1. For use in areas where grading has been completed and final soil stabilization and seeding are pending.
2. Not applicable in paved areas.
3. Not applicable with concentrated flows.



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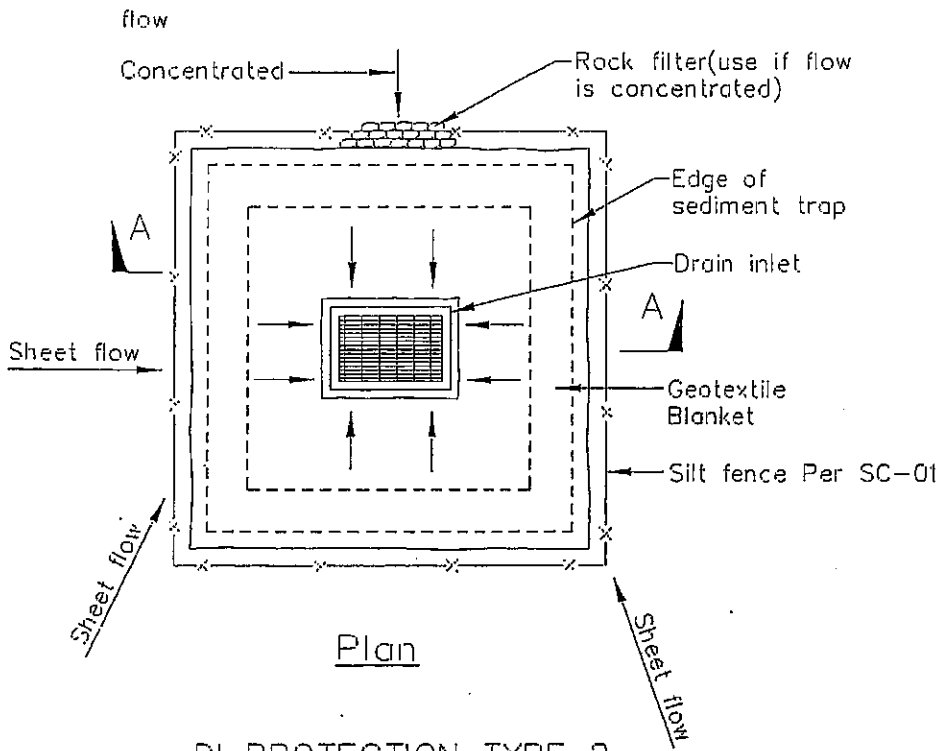
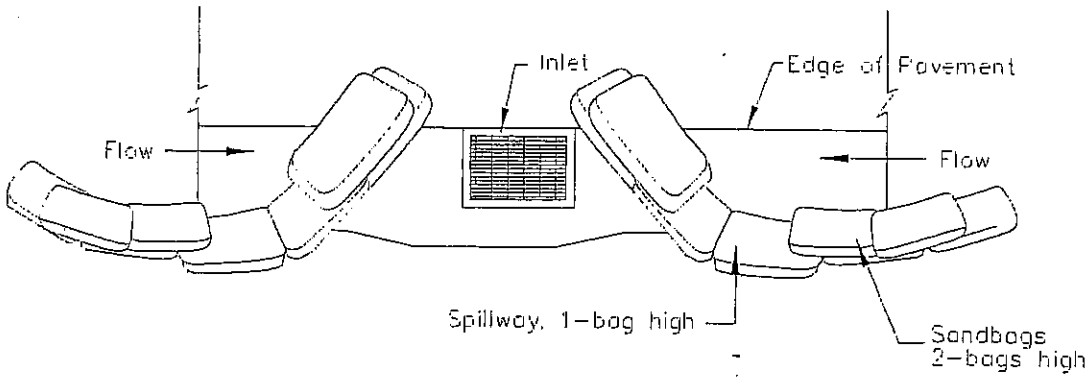


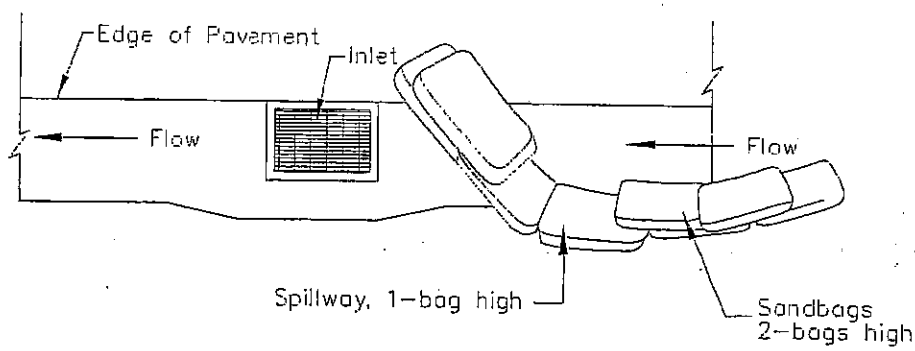
Plan

DI PROTECTION TYPE 2
NOT TO SCALE

Notes
1. For use in cleared and grubbed and in graded areas.
2. Shape basin so that longest inflow area faces longest length of trap.
3. For concentrated flows, shape basin in 2:1 ratio with length oriented towards direction of flow.



TYPICAL PROTECTION FOR INLET ON SUMP

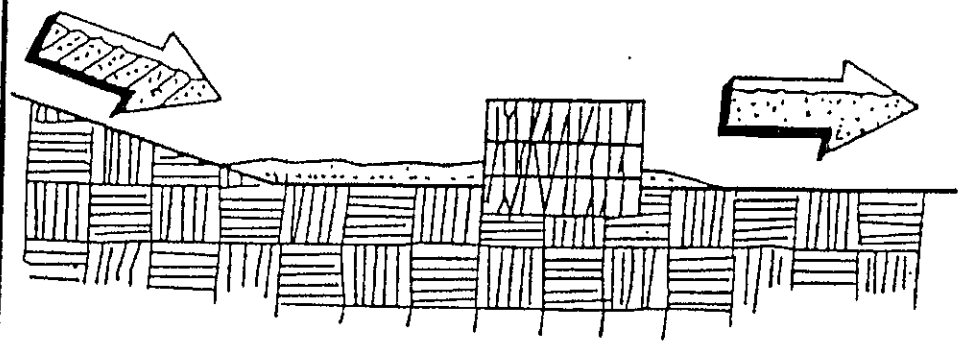


TYPICAL PROTECTION FOR INLET ON GRADE

NOTES:

1. Intended for short-term use.
2. Use to inhibit non-storm water flow.
3. Allow for proper maintenance and cleanup.
4. Bags must be removed after adjacent operation is completed
5. Not applicable in areas with high silts and clays without filter fabric.

BMP: STRAW BALE BARRIERS



Objectives

- Housekeeping Practice
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- **Control Site Perimeter**
- **Control Internal Erosion**

GENERAL DEFINITION

A straw bale barrier consists of straw bales placed end to end along a level contour in a shallow trench and staked to hold them in place. The barrier detains runoff, creating a pond behind the barrier where sedimentation occurs.

SUITABLE APPLICATIONS

- Along the perimeter of the site.
- Along streams and channels.
- Across swales with small catchments.
- Around temporary spoil areas.
- Below other small, cleared areas.

INSTALLATION/APPLICATION CRITERIA

- Use primarily in areas where sheet or rill flow occurs.
- No more than 1/4 acre per 100 feet of barrier should drain to the barrier.
- Install along a level contour.
- Place in a 4-inch deep trench.
- Backfill and compact the excavated soil on the upstream face of the barrier.
- Secure each bale with two stakes.
- Leave enough area (about 1200 sq. ft. per acre) behind the barrier for runoff to pond (no more than 1.5 ft. depth) and sediment to settle.

REQUIREMENTS

- Maintenance
  - Inspect weekly and after each rain.
  - Replace bales which have decomposed or whose bindings have broken.
  - Remove sediment behind the barrier when it reaches a depth of 6 inches.
- Costs (source: EPA, 1992)
  - Average annual cost for installation and maintenance (assumes 3 month useful life): $17 per lineal foot ($6,800 per drainage acre).

LIMITATIONS

- Straw bale barriers are not to be used for extended periods of time because they tend to rot and fall apart.
- Suitable only for sheet flow on slopes of 2% or flatter.
- Not appropriate for large drainage areas, limit to one acre or less.
- Straw bales lose their effectiveness rapidly due to rotting, thus constant maintenance is required.
- Not recommended for concentrated flow, inlet protection, channel flow, and live streams.
- Bale bindings of jute or cotton not recommended.

Targeted Pollutants

- ● Sediment
- ○ Nutrients
- ○ Toxic Materials
- ○ Oil & Grease
- ○ Floatable Materials
- ○ Other Construction Waste

- ● Likely to Have Significant Impact
- ○ Probable Low or Unknown Impact

Implementation Requirements

- ● Capital Costs
- ◒ O&M Costs
- ● Maintenance
- ○ Training
- ○ Suitibility for Slopes >5%

● High ○ Low

ESC51

Best Management Practices

- Straw bale barriers have not been as effective as expected due to improper use. These barriers have been placed in streams and drainageways where runoff volumes and velocities have caused the barriers to wash out. In addition, failure to stake and entrench the straw bale has allowed undercutting and end flow.

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Additional Information — Straw Bale Barrier

A straw bale barrier consists of a series of secured anchored bales placed to intercept sediment-laden runoff from small drainage areas of disturbed soil. The barrier ponds runoff and allow sediment to settle. Straw bale dikes should not be used for extended periods of time because they tend to rot and fall apart.

The straw bale barrier is used where there are no concentrations of water in a channel or drainageway, and where erosion would occur from sheet flow. These barriers are typically constructed below disturbed areas subject to sheet flow of runoff.

Installation/Application

Straw bale barriers should be used for drainage areas no more than 1/4 acre per 100 feet of barrier length, with no more than 100 ft upstream of any point along the barrier. The barrier should be placed along a level contour no greater than 2:1. When installed and maintained according to the guidelines on this fact sheet, straw bale dikes remove approximately 67% of the sediment transported in construction site runoff. This optimum efficiency can only be achieved through careful maintenance, with special attention to replacing rotted or broken bales. The barrier should be constructed on a level contour to prevent concentration of flow against a small portion of the barrier.

An effective straw bale barrier should be installed in the following manner:

1. Bales should be placed on the contour and in a row with ends tightly abutting the adjacent bales.
2. Leave area for runoff to pond upstream of the barrier by locating barrier away from the toe of slopes. This also provides access for maintenance.
3. Each bale should be embedded in the soil a minimum of (4) inches and placed so the bindings are horizontal. Bindings placed on soil will soon disintegrate and cause the barrier to fail.
4. Bales should be securely anchored in place by either two stakes or re-bars driven through the bale. The first stake in each bale should be driven toward the previously laid bale at an angle to force the bales together. Stakes should be driven flush with the bale.
5. Backfill and compact the excavated soil along the upstream face of the barrier.
6. Remove the barrier when it has served its usefulness so as not to block or impede storm flow or drainage.

REFERENCES

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

"Draft - Sedimentation and Erosion Control, An Inventory of Current Practices", U.S.E.P.A., April, 1990.

"Environmental Criteria Manual", City of Austin, Texas.

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Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April, 1992.

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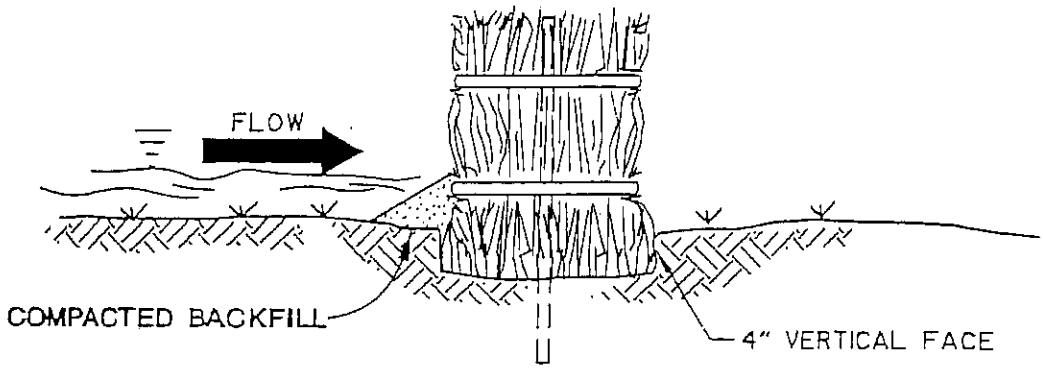
Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency - November 1988.

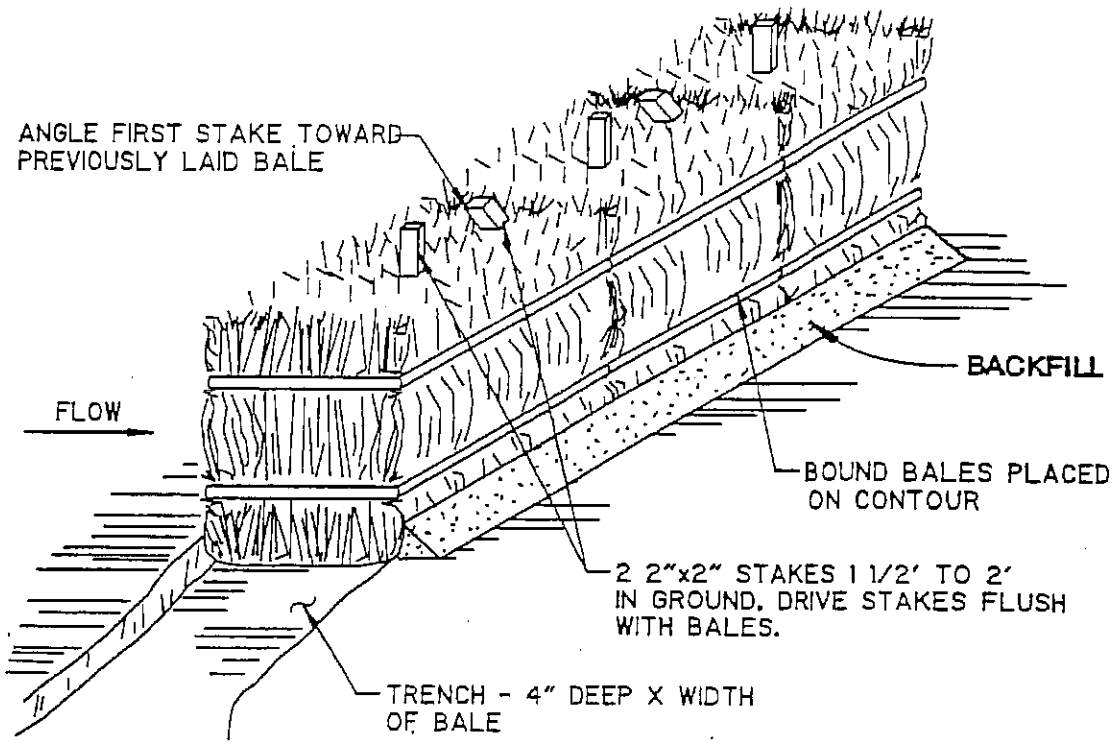
ESC51

Additional Information — Straw Bale Barrier



• PROMOTES ON SITE SEDIMENTATION BY CREATING A TEMPORARY POND.

BEDDING DETAIL



SUBSTITUTION OF STEEL BARS FOR WOODEN STAKES IS NOT RECOMMENDED DUE TO POTENTIAL FOR DAMAGING CONSTRUCTION EQUIPMENT

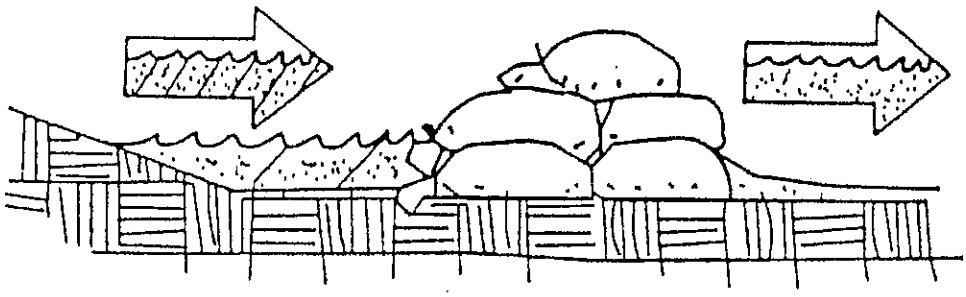
ANCHORING DETAIL

STRAW BALE BARRIERS

ESC51

Best Management Practices

BMP: SAND BAG BARRIER



Objectives

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- **Protect Slopes/Channels**
- **Control Site Perimeter**
- **Control Internal Erosion**

GENERAL DEFINITION

Stacking sand bags along a level contour creates a barrier which detains sediment-laden water, ponding water upstream of the barrier and promoting sedimentation.

SUITABLE APPLICATIONS

- Along the perimeter of the site.
- Check dams across streams and channels.
- Along streams and channels.
- Barrier for utility trenches in a channel.
- Across swales with small catchments.
- Division dike or berm.
- Below the toe of a cleared slope.
- Create a temporary sediment trap.
- Around temporary spoil areas.
- Below other small cleared areas.

INSTALLATION/APPLICATION CRITERIA

- May be used in drainage areas up to 5 acres.
- Install along a level contour.
- Base of sand bag barrier should be at least 48 inches wide.
- Height of sand bag barrier should be at least 18 inches high.
- 4 inch PVC pipe may be installed between the top layer of sand bags to drain large flood flows.
- Provide area behind barrier for runoff to pond and sediment to settle, size according to sediment trap BMP criteria (ESC55).
- Place below the toe of a slope.
- Use sand bags large enough and sturdy enough to withstand major flooding.

REQUIREMENTS

- Maintenance
  - Inspect after each rain.
  - Reshape or replace damaged sand bags immediately.
  - Remove sediment when it reaches six inches in depth.
- Cost
  - Sand bag barriers are more costly, but typically have a longer useful life than other barriers.

LIMITATIONS

- Sand bags are more expensive than other barriers, but also more durable.
- Burlap should not be used for sand bags.

Targeted Pollutants

- ● Sediment
- ○ Nutrients
- ○ Toxic Materials
- ○ Oil & Grease
- ○ Floatable Materials
- ○ Other Construction Waste

- ● Likely to Have Significant Impact
- ○ Probable Low or Unknown Impact

Implementation Requirements

- ● Capital Costs
- ○ O&M Costs
- ○ Maintenance
- ○ Training
- ◒ Suitability for Slopes >5%

● High ○ Low

ESC52

Best Management Practices

Additional Information — Sand Bag Barrier

Suitable Applications

Sand bag berms may be used during construction activities in stream beds and utility construction in channels, temporary channel crossing for construction equipment, etc. Sand bag berms may also be installed parallel to roadway construction. Sand bag berms may also be used to create temporary sediment traps, retention basins and in place of straw bales or silt fences. Examples of applications include:

- Check dams across stream channels.
- Barriers for utility trenches or other construction in a stream channel.
- At temporary channel crossings.
- May be used on a slope where straw bales and silt fences are not appropriate.
- As a diversion dike.
- Embankment for a temporary sediment basin or retention basin.
- Sediment barriers near the toe of slopes.
- At construction perimeter.

Advantages

- Provides a semi-permeable barrier in potentially wet areas.
- More permanent than silt fences or straw bales.
- Allows for easy relocation on site to meet changing needs during construction.

Installation/Application

Sand bag barriers may be used for sediment trapping in locations where silt fences and straw bale barriers are not strong enough. In addition, sand bag barriers are appropriate to use when construction of check dams or sumps in a stream is undesirable. The sand bag berms can provide the same function as a check dam without disturbing the stream or vegetation. The sand bag berm will also allow a small sediment retention area to be created prior to construction of final detention basins. For installation of a sand bag berm, the following criteria should be observed:

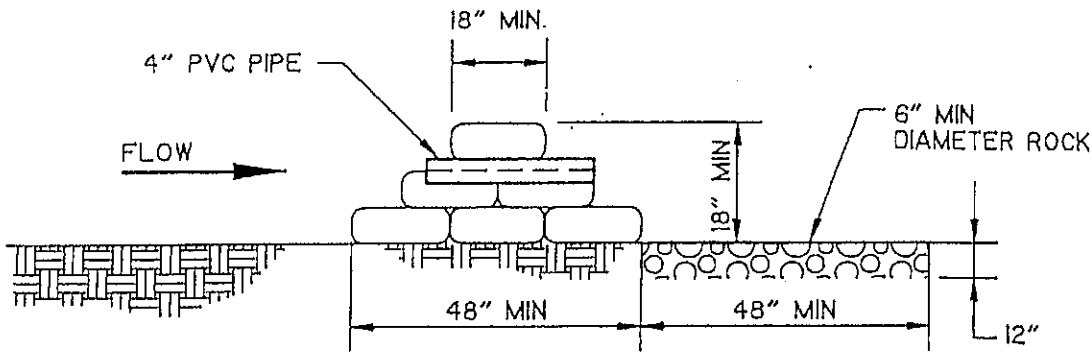
- Drainage Area - Up to five (5) acres.
- Height of Berm - 18 inches minimum height, measured from the top of the existing ground at the upslope toe to the top of the barrier.
- Width of Berm - 48 inches minimum width measured at the bottom of the barrier, 18 inches at the top.
- Sand bag Size - Length 24 to 30 inches, width 16 to 18 inches and thickness six (6) to eight (8) inches. Weight 90 to 125 pounds.
- Sand bag Material - Polypropylene, polyethylene or polyamide woven fabric, minimum unit weight four (4) ounces per square yard, mullen burst strength exceeding 300 psi and ultraviolet stability exceeding 70 percent. Use of burlap is discouraged since it rots and deteriorates easily.
- Grade of Sand - Coarse sand, gravel.
- Runoff water should be allowed to flow over the tops of the sand bags or through four (4) inch polyvinyl chloride pipes embedded below the top layer of bags.
- Area behind the sand bag barrier should be established according to sizing criteria for sediment trap BMP (ESC55).

REFERENCES

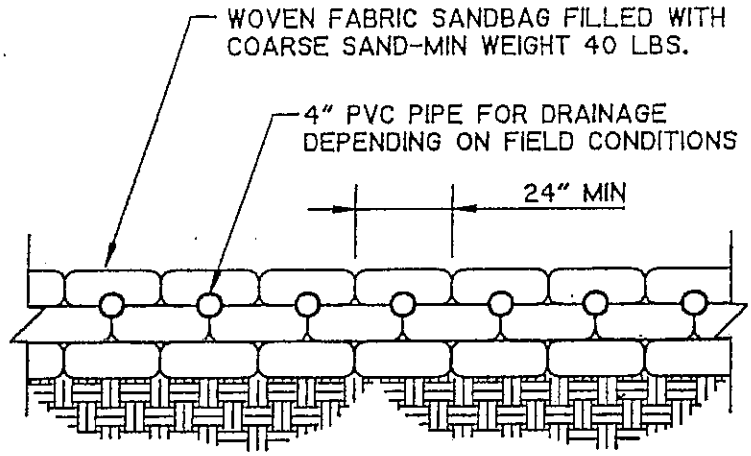
Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency - November 1988.

ESC52



CROSS-SECTION



FRONT VIEW

SAND BAG BERM

ESC52

Best Management Practices

Appendix D
Boring Logs
and
Well Completion Diagrams

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Blacow Road and Brophy Drive	**DATE:** 2/11/2009	**LOGGED BY:** Douglas Young and Brad Buerer	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W-32N002
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary	**SHEET: 1 of 3**
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 400 feet	**BORING** BLACOW-F

Depth (in feet) | Well Construction | Lithologic Pattern | Geophysical Sample

LITHOLOGIC DESCRIPTION

TOPSOIL

CL: Silty Clay; olive brown (2.5Y 4/4), moderate to high silt content, low plasticity, damp

@10' color change to gray brown (2.5Y 4/2), high plasticity

CL: Sandy Clay; olive brown (2.5Y 4/4), clay balls, low plasticity, sand is ~.1", subangular

SM: Silty Sand; fine to coarse sand

SP: Coarse Sand; ~.1", subrounded to subangular, well-sorted

CL: Silty Clay, olive brown (2.5Y 4/4), high sand content

SC: Clayey Sand; olive brown (2.5Y 4/4), poorly sorted

CL: Silty Clay; medium dark gray (N 4), low plasticity, silty, some sand present
@40' increasing sand content

SP: Coarse Sand; rounded, well-sorted, .1" to .15", one clast is .3"

SW: Coarse Sand; ~.1", trace gravel up to .3", poorly sorted, broken clasts

GP: Fine Gravel; well-sorted, subrounded to subangular, some coarse sand, .1" up to .3"

GW: Sandy Gravel; coarse sand to fine gravel, .1" to .5", subrounded, poorly sorted
@72' Fine Gravel; up to .6", rounded to subrounded, poorly sorted, coarsening, broken clasts present
@75' Gravel; up to .5", subangular, poorly sorted

@81' Gravel; up to .75", subrounded to subangular, poorly sorted, decreasing sand content

@85' Gravel; up to 1", medium to coarse sand, subrounded to subangular, very poorly sorted, increasing sand content

@90' medium to coarse sand and gravel up to .5", subrounded to subangular, trace clay, poorly sorted

@95' olive gray (5Y 3/2), increasing clay content

CL: Gravelly Clay; light olive gray (5Y 5/2), medium to coarse sand, gravel to .5" diameter, angular to subrounded, moderate plasticity

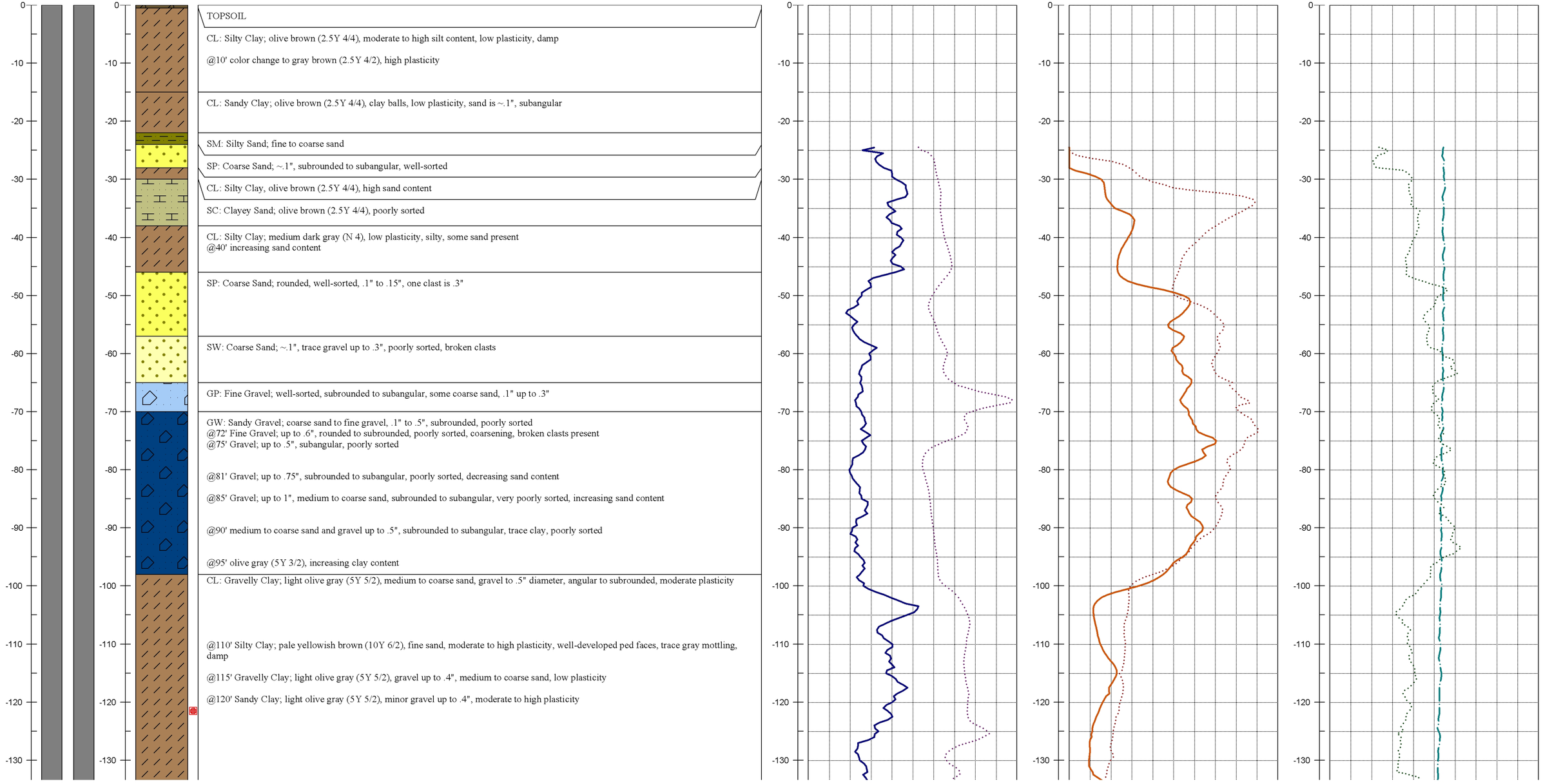
@110' Silty Clay; pale yellowish brown (10Y 6/2), fine sand, moderate to high plasticity, well-developed ped faces, trace gray mottling, damp

@115' Gravelly Clay; light olive gray (5Y 5/2), gravel up to .4", medium to coarse sand, low plasticity

@120' Sandy Clay; light olive gray (5Y 5/2), minor gravel up to .4", moderate to high plasticity

GEOPHYSICAL DATA

(0 Gamma Ray (GAPI) 200)
(- Spontaneous Potential (mV) +)
(0 Short Normal (Ohm-m) 100)
(0 Long Normal (Ohm-m) 100)
(60 Temperature (Farenheit) 70)
(0 Point Resistivity (Ohm) 50)



ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Blacow Road and Brophy Drive	**DATE:** 2/11/2009	**LOGGED BY:** Douglas Young and Brad Buerer	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W-32N002
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary	**SHEET: 2 of 3**
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 400 feet	**BORING** BLACOW-F

Depth (in feet) | Well Construction | Lithologic Pattern | Geophysical Sample

LITHOLOGIC DESCRIPTION

@135' Sandy Clay; light olive gray (5Y 5/2), coarse sand, low plasticity

SC: Clayey Sand; light olive gray (5Y 5/2), coarse sand up to .2", clay peds up to .5"
@141' yellowish gray (5Y 7/2), medium to coarse sand up to .1", subrounded to subangular, increasing sand content, few clay peds

GW: Sandy Gravel; coarse sand, fine gravel up to .3", subrounded to subangular, poorly sorted

GC: Clayey Gravel; light olive gray (5Y 5/2), gravel up to .3", sandy clay, high plasticity
@158' gravel to .3", increasing clay content, sandy clay peds up to .5", high plasticity

GW: Gravel; up to .5", poorly sorted, subrounded to subangular, trace clay

CL: Gravelly Clay; light olive gray (5Y 5/2), sandy clay peds up to .5", high plasticity, gravel up to .4", subangular, poorly sorted

@175' yellowish gray (5Y 7/2), sandy clay peds ~.1", moderate to high plasticity, gravel up to .3", angular to subangular, poorly sorted

CL: Sandy Clay; yellowish gray (5Y 7/2), high plasticity, coarse sand up to .1"

CL: Gravelly Clay; yellowish gray (5Y 7/2), high sand content, coarse sand to fine gravel up to .5", increase in gravel content

GW: Sandy Gravel; light olive gray (5Y 5/2) clay present, moderate to high plasticity, fine to coarse sand and fine gravel up to .7",subrounded to subangular/fractured, poorly sorted

@203' gravel up to .5"

@210' gravel up to .6"

SP: Sand; light olive gray (5Y 5/2), coarse-grained sandy clay peds, high plasticity, sand up to .1", well-sorted, subrounded to subangular

@225' little clay, no peds, sand ~ .1", poorly sorted, few gravels up to .2", subangular

@230' light olive gray (5Y 5/2), few sandy clay peds, moderate to high plasticity, sand up to .1", well-sorted, subrounded to angular,

CL: Sandy Clay; light olive gray (5Y 5/2), moderate to high plasticity, coarse sand grains up to .2", subrounded to subangular

@255' Increasing clay content

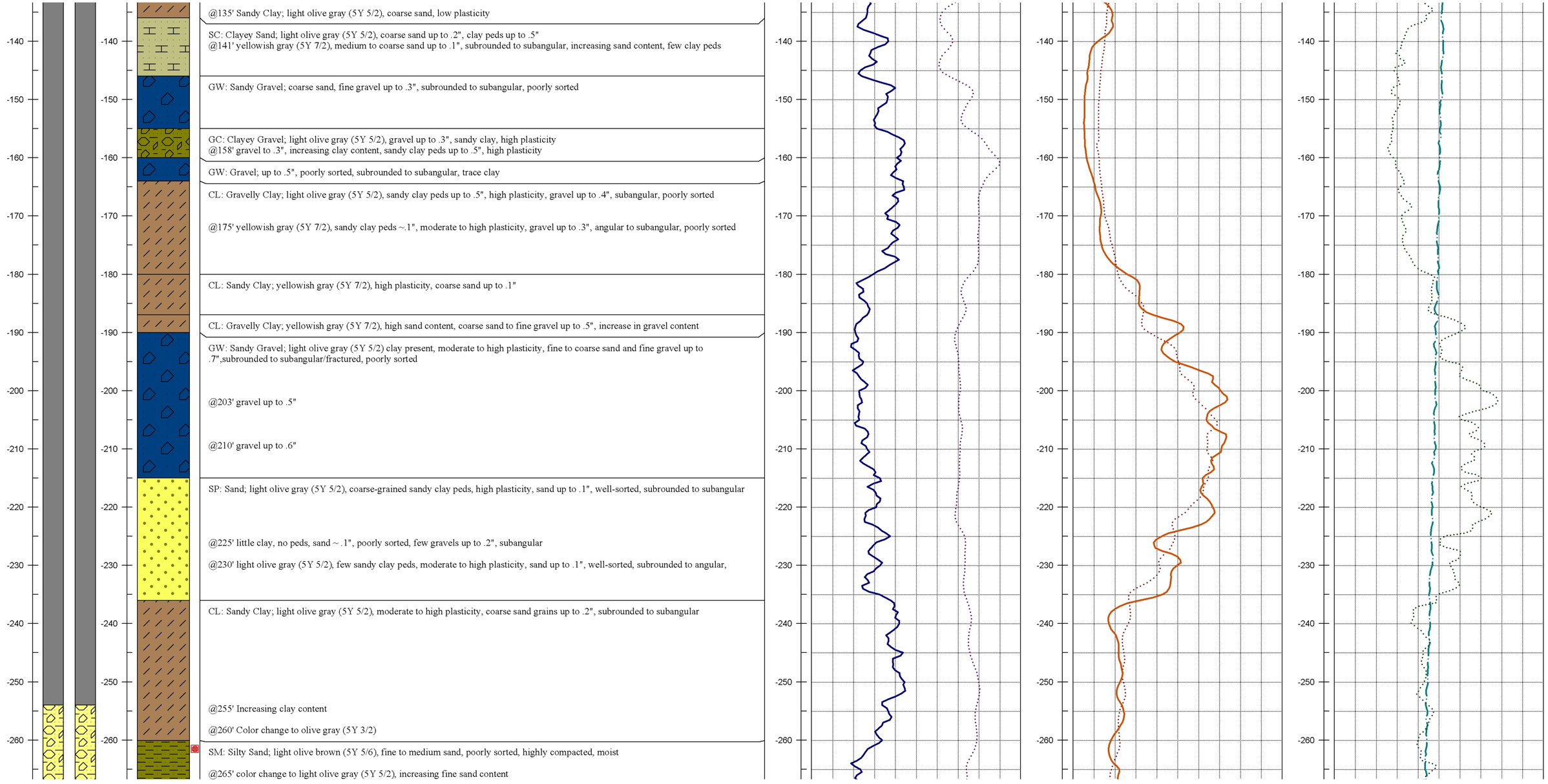
@260' Color change to olive gray (5Y 3/2)

SM: Silty Sand; light olive brown (5Y 5/6), fine to medium sand, poorly sorted, highly compacted, moist

@265' color change to light olive gray (5Y 5/2), increasing fine sand content

GEOPHYSICAL DATA

(0 Gamma Ray (GAPI) 200)
(- Spontaneous Potential (mV) +)
(0 Short Normal (Ohm-m) 100)
(0 Long Normal (Ohm-m) 100)
(60 Temperature (Farenheit) 70)
(0 Point Resistivity (Ohm) 50)



ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Blacow Road and Brophy Drive	**DATE:** 2/11/2009	**LOGGED BY:** Douglas Young and Brad Buerer	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W-32N002
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary	**SHEET: 3 of 3**
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 400 feet	**BORING** BLACOW-F

Depth (in feet) | Well Construction | Lithologic Pattern | Geophysical Sample

LITHOLOGIC DESCRIPTION

SC: Clayey Sand; light olive gray (5Y 5/2), silty clay peds up to .2", high plasticity, coarse sand up to .2", poorly sorted, subrounded to subangular

@283' increasing gravel
@285' color change to light olive brown (5Y 5/6), sand is angular/fractured

GW: Sandy Gravel; light olive gray (5Y 5/2), clay peds, gravel up to .4", subrounded to angular/broken, poorly sorted

SW: Sand; coarse angular fragments up to .1", poorly sorted

GC: Clayey Gravel; moderate olive brown (5Y 4/4), silty clay peds, gravel up to .3", poorly sorted, subrounded to subangular

SW: Sand; light olive brown (5Y 5/6) trace clay, coarse sand up to .2", poorly sorted, subrounded to subangular, overall finer than above

GW: Sandy Gravel; coarse sand up to .2", fine gravel up to .3", rounded to angular, poorly sorted, interbedded silt lenses

GC: Clayey Gravel; moderate olive brown (5Y 4/4), sandy clay peds, moderate to high plasticity, gravel up to .3", poorly sorted, well-rounded to angular/broken

GW: Sandy Gravel; coarse sand up to .2", fine gravel up to .4", poorly sorted, well-rounded to subangular, trace clay

SC: Clayey Sand; light olive gray (5Y 5/2), silty clay peds, coarse sand up to .1", subrounded to subangular, fine gravel up to .4"

CL: Sandy Clay; moderate olive brown (5Y 4/4), low plasticity, some coarse sand up to .1", subrounded to subangular

@361' Increasing sand content

@365' Increasing sand content, coarsening

SW: Gravelly Sand; gravel up to .5", poorly sorted, subrounded to subangular

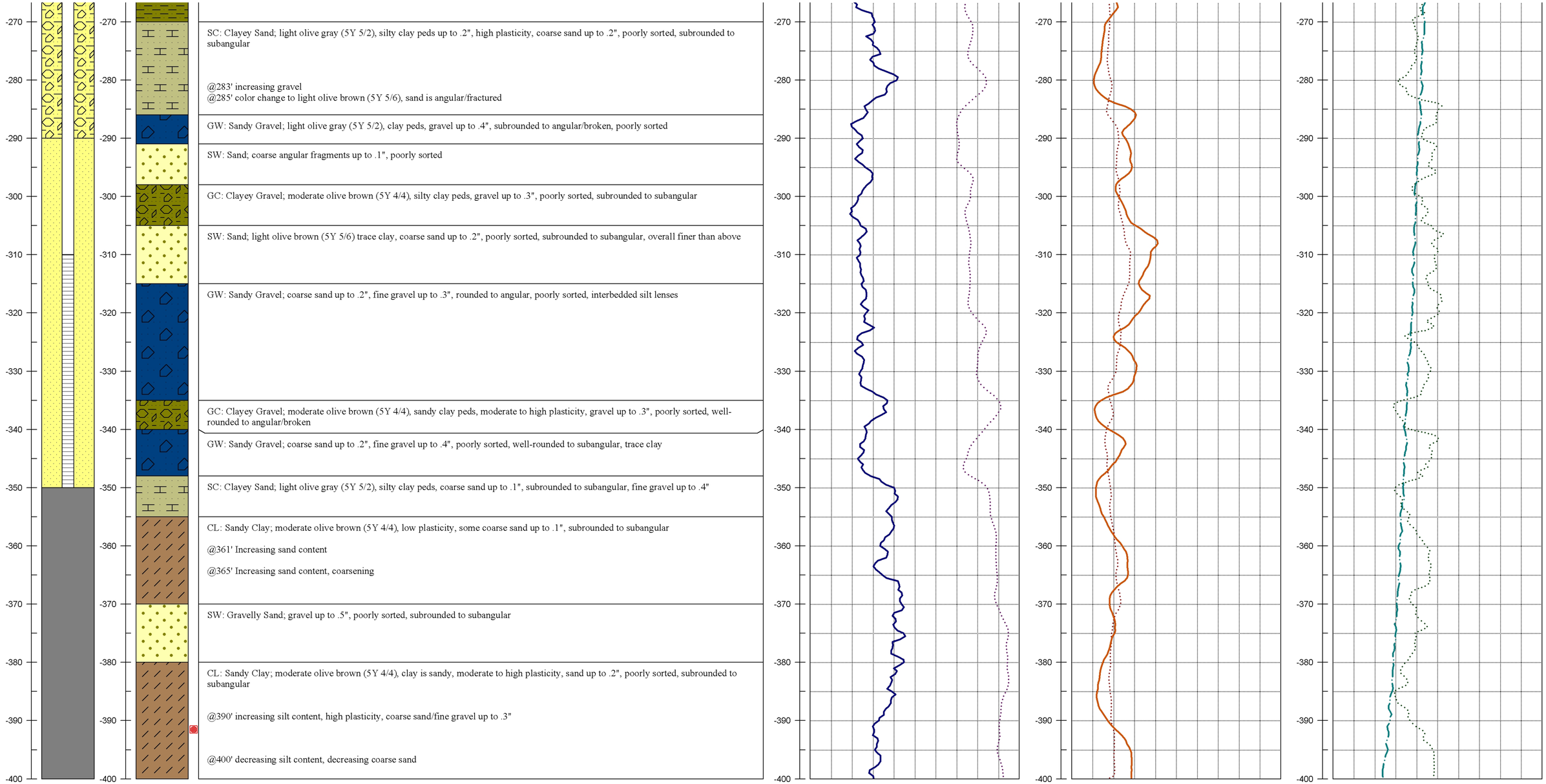
CL: Sandy Clay; moderate olive brown (5Y 4/4), clay is sandy, moderate to high plasticity, sand up to .2", poorly sorted, subrounded to subangular

@390' increasing silt content, high plasticity, coarse sand/fine gravel up to .3"

@400' decreasing silt content, decreasing coarse sand

GEOPHYSICAL DATA

(0 Gamma Ray (GAPI) 200)
(- Spontaneous Potential (mV) +)
(0 Short Normal (Ohm-m) 100)
(0 Long Normal (Ohm-m) 100)
(60 Temperature (Farenheit) 70)
(0 Point Resistivity (Ohm) 50)



ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Blacow Road and Brophy Drive	**DATE:** 2/23/2009	**LOGGED BY:** Douglas Young and Brad Buerer	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W-32N001
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary	**SHEET: 1 of 2**
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 250 feet	**BORING** BLACOW-C

Depth (in feet) | Well Construction | Lithologic Pattern | Geophysical Sample

LITHOLOGIC DESCRIPTION*

TOPSOIL

CL: Silty Clay; olive brown (2.5Y 4/4), moderate to high silt content, low plasticity, damp

@10' color change to gray brown (2.5Y 4/2), high plasticity

CL: Sandy Clay; olive brown (2.5Y 4/4), clay balls, low plasticity, sand is ~.1", subangular

SM: Silty Sand; fine to coarse sand

SP: Coarse Sand; ~.1", subrounded to subangular, well-sorted

CL: Silty Clay, olive brown (2.5Y 4/4), high sand content

SC: Clayey Sand; olive brown (2.5Y 4/4), poorly sorted

CL: Silty Clay; medium dark gray (N 4), low plasticity, silty, some sand present
@40' increasing sand content

SP: Coarse Sand; rounded, well-sorted, .1" to .15", one clast is .3"

SW: Coarse Sand; ~.1", trace gravel up to .3", poorly sorted, broken clasts

GP: Fine Gravel; well-sorted, subrounded to subangular, some coarse sand, .1" up to .3"

GW: Sandy Gravel; coarse sand to fine gravel, .1" to .5", subrounded, poorly sorted
@72' Fine Gravel; up to .6", rounded to subrounded, poorly sorted, coarsening, broken clasts present
@75' Gravel; up to .5", subangular, poorly sorted

@81' Gravel; up to .75", subrounded to subangular, poorly sorted, decreasing sand content

@85' Gravel; up to 1", medium to coarse sand, subrounded to subangular, very poorly sorted, increasing sand content

@90' medium to coarse sand and gravel up to .5", subrounded to subangular, trace clay, poorly sorted

@95' olive gray (5Y 3/2), increasing clay content

CL: Gravelly Clay; light olive gray (5Y 5/2), medium to coarse sand, gravel to .5" diameter, angular to subrounded, moderate plasticity

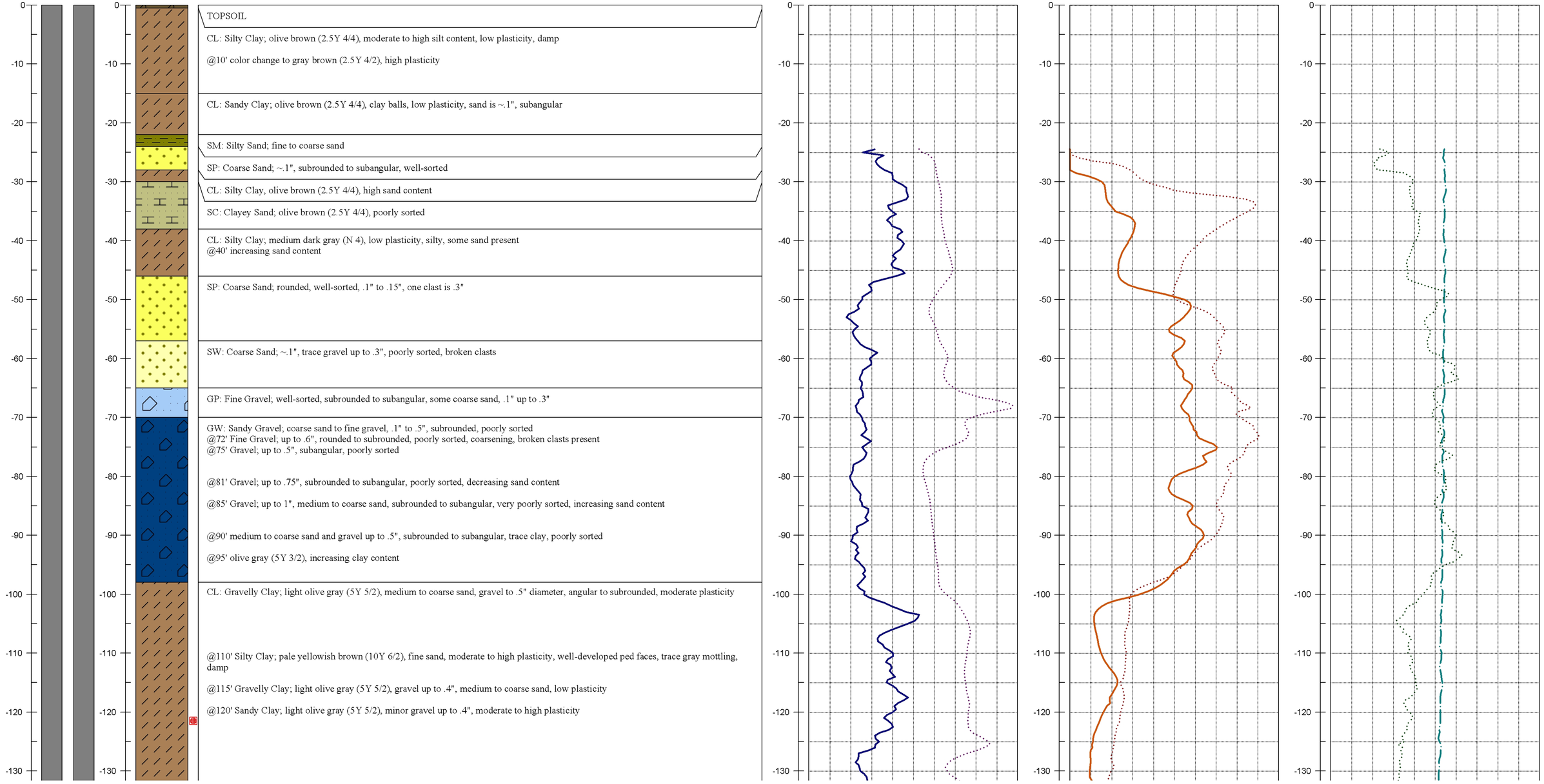
@110' Silty Clay; pale yellowish brown (10Y 6/2), fine sand, moderate to high plasticity, well-developed ped faces, trace gray mottling, damp

@115' Gravelly Clay; light olive gray (5Y 5/2), gravel up to .4", medium to coarse sand, low plasticity

@120' Sandy Clay; light olive gray (5Y 5/2), minor gravel up to .4", moderate to high plasticity

GEOPHYSICAL DATA

(0 Gamma Ray (GAPI) 200)
(- Spontaneous Potential (mV) +)
(0 Short Normal (Ohm-m) 100)
(0 Long Normal (Ohm-m) 100)
(60 Temperature (Farenheit) 70)
(0 Point Resistivity (Ohm) 50)



***BASED ON LOG FROM:** Blacow-F

ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Blacow Road and Brophy Drive	**DATE:** 2/23/2009	**LOGGED BY:** Douglas Young and Brad Buerer	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W-32N001	**BORING** BLACOW-C
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary		
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 250 feet	**SHEET: 2 of 2**	

Depth (in feet) / Well Construction / Lithologic Pattern / Geophysical Sample

LITHOLOGIC DESCRIPTION*

@135' Sandy Clay; light olive gray (5Y 5/2), coarse sand, low plasticity

SC: Clayey Sand; light olive gray (5Y 5/2), coarse sand up to .2", clay peds up to .5"
@141' yellowish gray (5Y 7/2), medium to coarse sand up to .1", subrounded to subangular, increasing sand content, few clay peds

GW: Sandy Gravel; coarse sand, fine gravel up to .3", subrounded to subangular, poorly sorted

GC: Clayey Gravel; light olive gray (5Y 5/2), gravel up to .3", sandy clay, high plasticity
@158' gravel to .3", increasing clay content, sandy clay peds up to .5", high plasticity

GW: Gravel; up to .5", poorly sorted, subrounded to subangular, trace clay

CL: Gravelly Clay; light olive gray (5Y 5/2), sandy clay peds up to .5", high plasticity, gravel up to .4", subangular, poorly sorted

@175' yellowish gray (5Y 7/2), sandy clay peds ~.1", moderate to high plasticity, gravel up to .3", angular to subangular, poorly sorted

CL: Sandy Clay; yellowish gray (5Y 7/2), high plasticity, coarse sand up to .1"

CL: Gravelly Clay; yellowish gray (5Y 7/2), high sand content, coarse sand to fine gravel up to .5", increase in gravel content

GW: Sandy Gravel; light olive gray (5Y 5/2) clay present, moderate to high plasticity, fine to coarse sand and fine gravel up to .7",subrounded to subangular/fractured, poorly sorted

@203' gravel up to .5"

@210' gravel up to .6"

SP: Sand; light olive gray (5Y 5/2), coarse-grained sandy clay peds, high plasticity, sand up to .1", well-sorted, subrounded to subangular

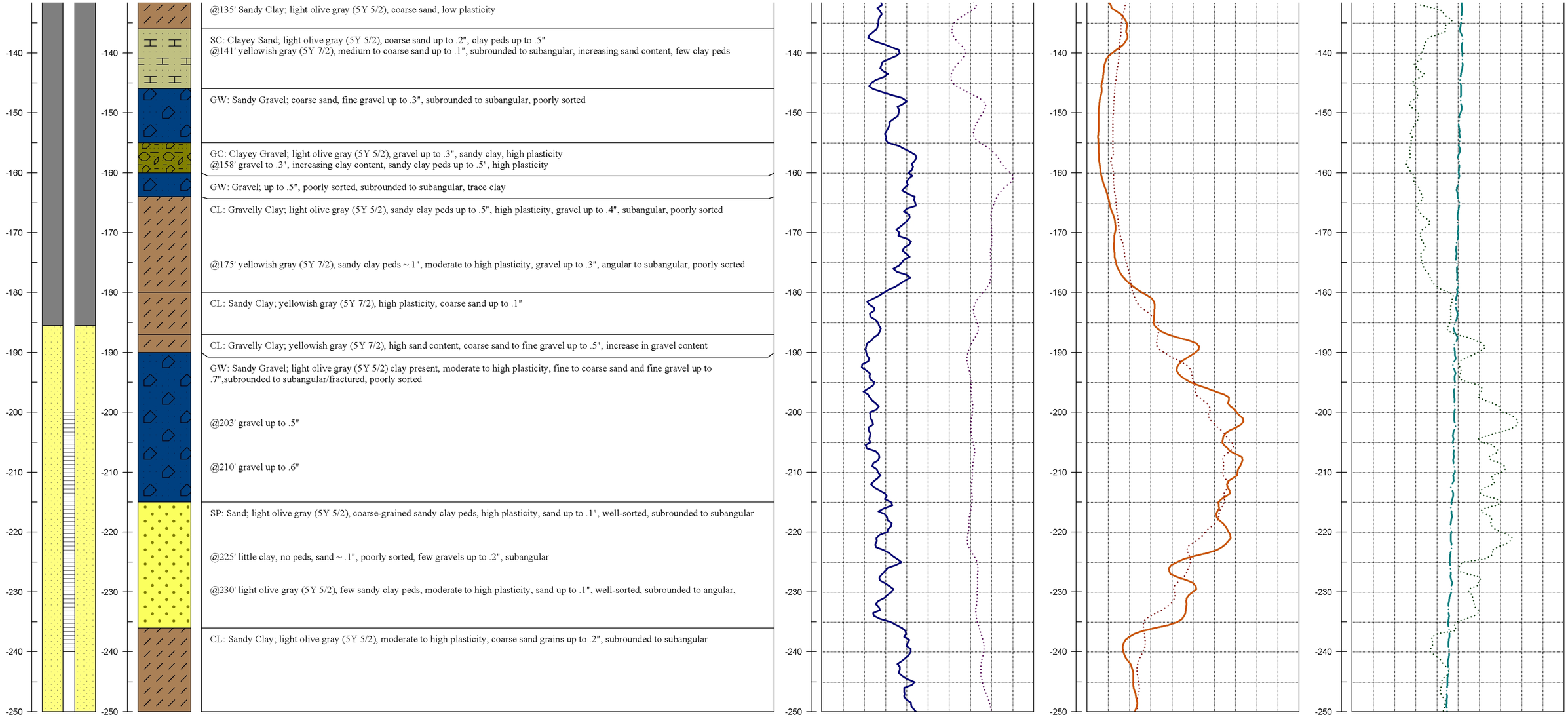
@225' little clay, no peds, sand ~ .1", poorly sorted, few gravels up to .2", subangular

@230' light olive gray (5Y 5/2), few sandy clay peds, moderate to high plasticity, sand up to .1", well-sorted, subrounded to angular,

CL: Sandy Clay; light olive gray (5Y 5/2), moderate to high plasticity, coarse sand grains up to .2", subrounded to subangular

GEOPHYSICAL DATA

(0 Gamma Ray (GAPI) 200)
(- Spontaneous Potential (mV) +)
(0 Short Normal (Ohm-m) 100)
(0 Long Normal (Ohm-m) 100)
(60 Temperature (Farenheit) 70)
(0 Point Resistivity (Ohm) 50)



***BASED ON LOG FROM:** Blacow-F

ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Stevenson Blvd @Paseo Padre Parkway	**DATE:** 5/192009	**LOGGED BY:** Douglas Young and Brian Grace	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W 28R003
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary	**BORING** Fremont Library-F
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 400 feet	**SHEET: 1 of 3**

Depth (in feet)
Well Construction
Lithologic Pattern
Geophysical Sample

LITHOLOGIC DESCRIPTION

TOPSOIL

CL: Silty Clay; dark yellowish-brown (10 YR 4/2), moderate plasticity, some sand, moist
@5' Moderate to pale yellowish-brown (10 YR 6/2), highly plastic, organics

GC: Clayey Gravel; gravel up to 0.6", angular to sub-angular, poorly sorted

SW: Gravelly Sand; up to 0.2", sub-angular to angular, poorly sorted

GP: Gravel; course gravel up to 1.2", well sorted, well rounded, highly plastic, trace clay, moderate yellowish-brown (10YR 5/4)

@35' Gravelly Sand, gravel up to 0.3", angular to, sub-rounded, moderatly sorted, clay highly plastic yellowish-brown (10YR 5/8

SP: Course Sand; poorly sorted sand with course, rounded gravel up to 1.1"

@45' Gravel fines downward, silty clay light-brown (5 YR 6/4)

GP: Gravel; Course gravel up to 1.3", well sorted, sub rounded

SC: Gravelly Sand; poorly sorted up to 1.0", sub-angular to angular

GC: Clayey Gravel; moderatly sorted coarse gravel up to 1.3", sub-rounded
@65' gravel fines down up to 1.0", poorly sorted

@75' gravel fines downward up to 0.7"

@85' gravely fines downward up to 0.4", clays are highly plastic

SW: Gravely Sand up to 0.8", angular, poorly sorted

GW: Sandy Gravel; gravel up to 1.0", sub-rounded, poorly sorted

@107' gravel fines donwward up to 0.4", angular, some clay, olive color (5Y5/6), highly plastic clay

@115' gravel coarsening downward up to 0.6", well sorted

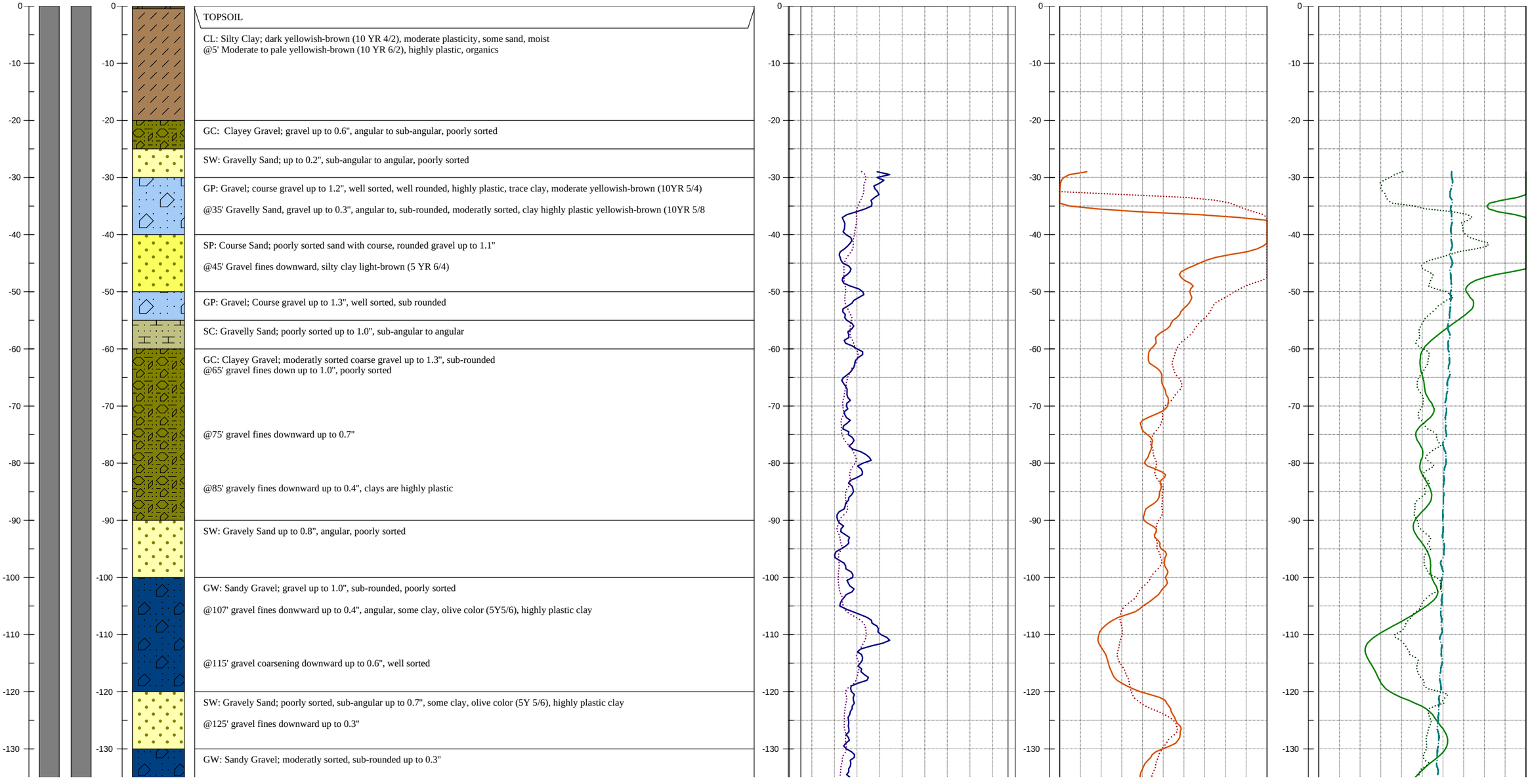
SW: Gravely Sand; poorly sorted, sub-angular up to 0.7", some clay, olive color (5Y 5/6), highly plastic clay

@125' gravel fines downward up to 0.3"

GW: Sandy Gravel; moderatly sorted, sub-rounded up to 0.3"

GEOPHYSICAL DATA

(0 **Gamma Ray (GAPI)** 200)
(- **Spontaneous Potential (mV)** +)
(0 **Short Normal (Ohm-m)** 100)
(0 **Long Normal (Ohm-m)** 100)
(60 **Temperature (Farenheit)** 70)
(0 **Guard (Ohm-m)** 100)
(0 **Point Resistivity (Ohm)** 50)



ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Stevenson Blvd @Paseo Padre Parkway	**DATE:** 5/192009	**LOGGED BY:** Douglas Young and Brian Grace	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W 28R003	**BORING** Fremont Library-F
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary		
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 400 feet	**SHEET: 2 of 3**	

Depth (in feet) | Well Construction | Lithologic Pattern | Geophysical Sample

LITHOLOGIC DESCRIPTION

CL: Silty Clay; moderate olive-brown (5 Y 4/4), moderate plasticity.

@165' coarse sand and gravel up to 0.4".

SW: Gravely Sand; multicolored, subrounded to angular/broken, up to 0.4"

GW: Gravel; poortly sorted up to 0.5", well rounded to sub-angular/broken

CL: Gravely Clay; moderate yellowish-brown (10 YR 5/4), moderate to high plasticity, gravel up to 0.6", poorly sorted, well rounded to sub-angular

SW: Gravely Sand, multicolored, coarse sand, gravel up to 0.3", sub-angular, moderatly sorted
@195' gravel coarsening downward up to 0.5'

SC: Clayey Sand; clay grayish-orange (10 YR 7/4), poorly sorted course sand

GC: Clayey Gravel; clay olive- gray (5Y 4/2), gravel moderatly sorted up to 0.5", sub-angular

CL: Silty Clay, olive-brown (2.5Y 4/4), moderate to high plasticity

GC: Clayey Gravel; dark yellowish-brown (10 YR 4/2), highly plastic clay, gravel moderatly sorted up to 0.2", sub-angular.

@250' increasing clay and silt content.

SC: Clayey Sand; olive color (5Y 5/6), moderate plasticity, sand well sorted, some silt.

@265' some sub-angular gravels up to 0.4".

GEOPHYSICAL DATA

(0 **Gamma Ray (GAPI)** 200)

(- **Spontaneous Potential (mV)** +)

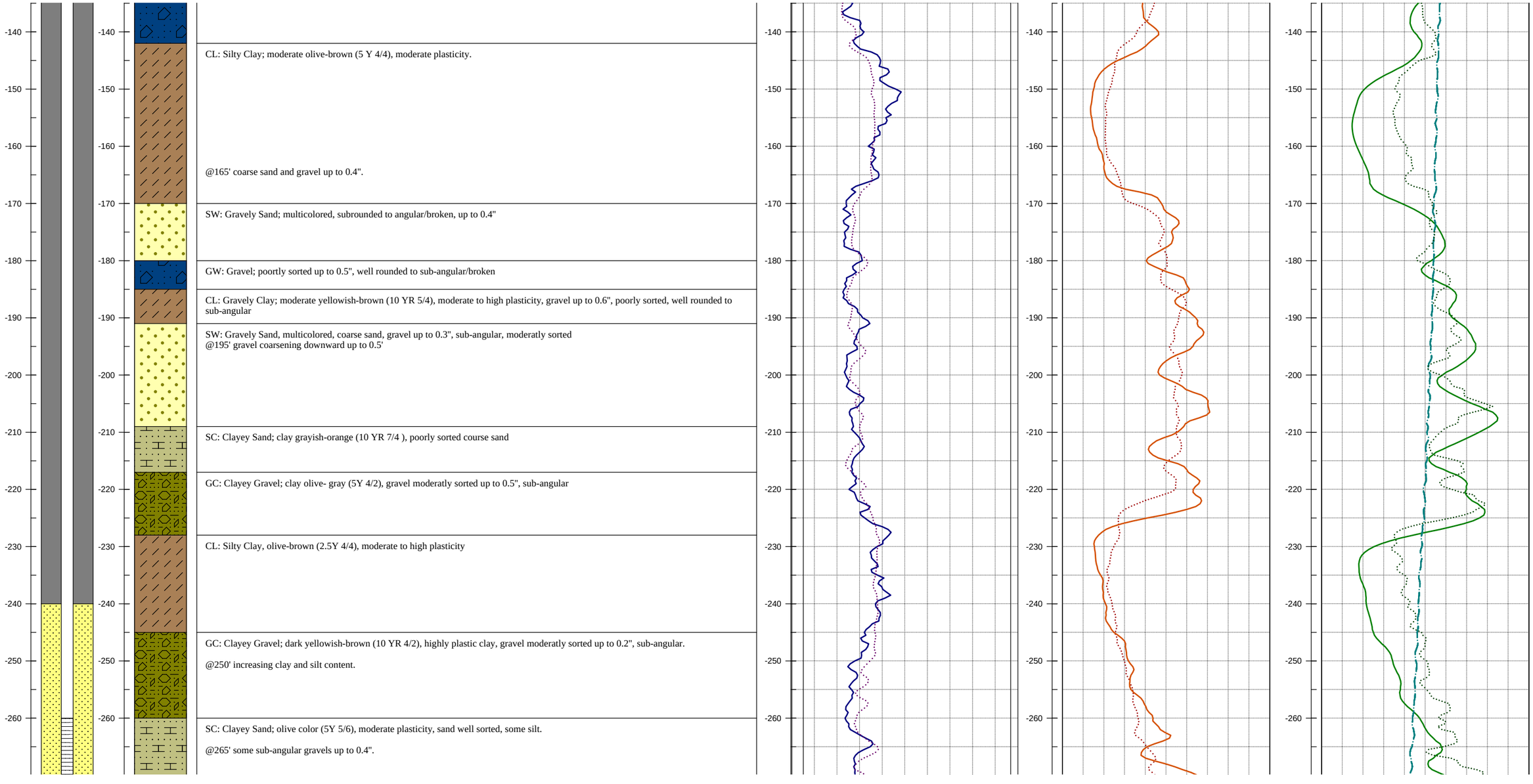
(0 **Short Normal (Ohm-m)** 100)

(0 **Long Normal (Ohm-m)** 100)

(60 **Temperature (Farenheit)** 70)

(0 **Guard (Ohm-m)** 100)

(0 **Point Resistivity (Ohm)** 50)



ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Stevenson Blvd @Paseo Padre Parkway	**DATE:** 5/192009	**LOGGED BY:** Douglas Young and Brian Grace	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W 28R003
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary	**BORING** Fremont Library-F
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 400 feet	**SHEET: 3 of 3**

Depth (in feet) | Well Construction | Lithologic Pattern | Geophysical Sample

LITHOLOGIC DESCRIPTION

SP: Gravely Sand; poorly sorted up to 0.4", some clay peds moderate yellowish-brown (10 YR 4/2), moderate to high plasticity.

@275' sand well sorted, gravel up to 0.3",

@280' much less gravel and no clay

SC: Clayey Sand; multicolor, well sorted, clay is dark yellowish-brown (10 YR 4/2), moderate plasticity, silty.
@295' sand coarsening downward, clay is olive-gray (5Y 4/2), moderate to high plasticity.

@310' poorly sorted sand with some angular gravel.

CL: Sandy Clay; gray-brown (2.5Y 4/2), moderate plasticity.

@330' clay is olive-brown (2.5 Y 4/4), high plasticity.

GC: Clayey Gravel; gray-brown (2.5Y 4/2), highly plastic clay, gravel is angular, poorly sorted.

SC: Gravely Sand; multicolored, poorly up to 0.4", angular.

CL: Clay; gray-brown (2.5Y 4/2), very fat, dense, highly plastic.

@ 375' sandy clay, gray-brown (2.5 Y 4/2), coarse angular sands, moderate plasticity.

ML: Silty clay/ clayey silt; gray-brown (2.5Y 4/2), moderate plasticity.

GEOPHYSICAL DATA

(0 **Gamma Ray (GAPI)** 200)

(- **Spontaneous Potential (mV)** +)

(0 **Short Normal (Ohm-m)** 100)

(0 **Long Normal (Ohm-m)** 100)

(60 **Temperature (Farenheit)** 70)

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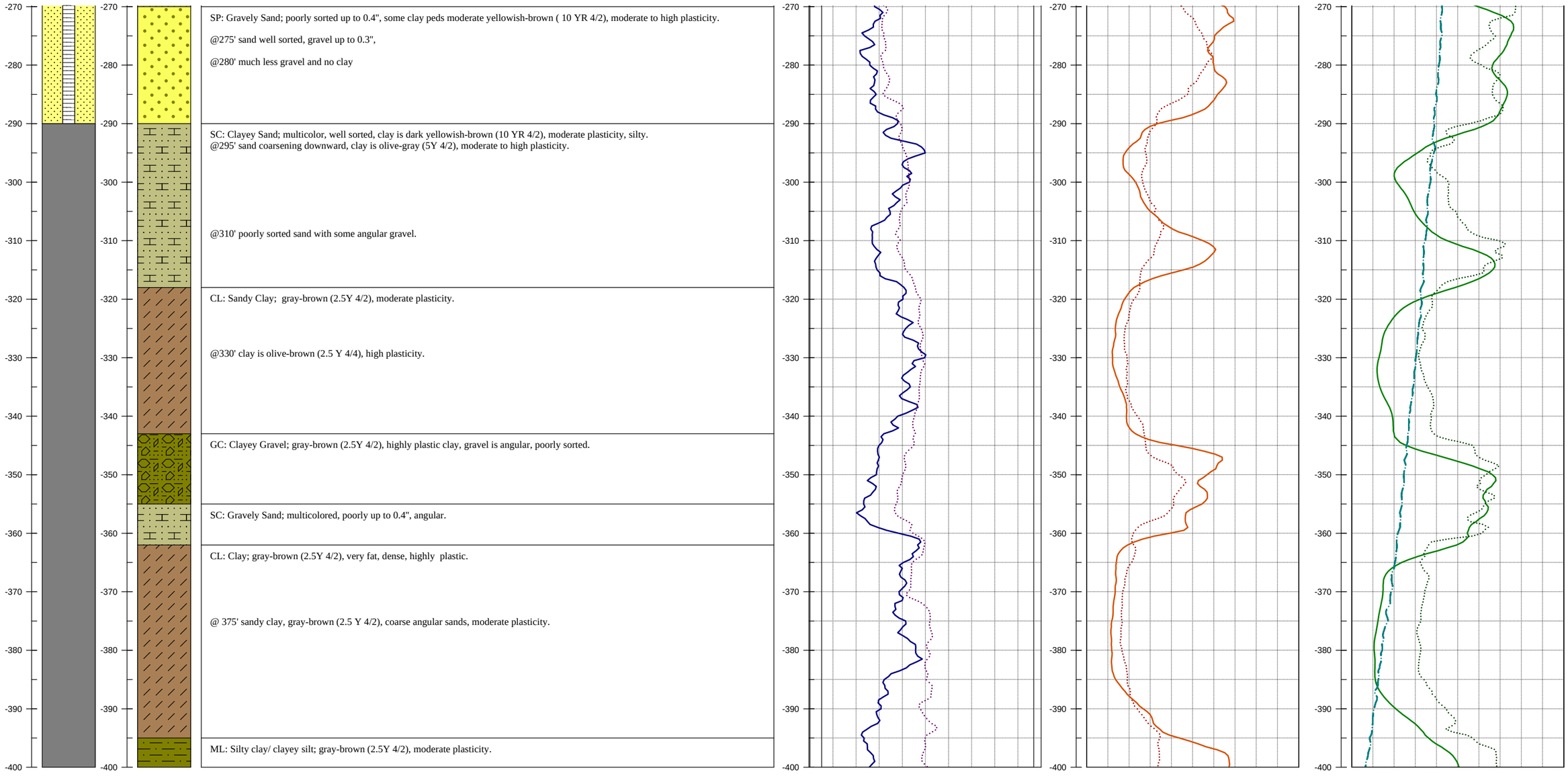
(0 **Point Resistivity (Ohm)** 50)



ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Margery Drive and Blanchard Street	**DATE:** 04/15/2009	**LOGGED BY:** Douglas Young and Brian Grace	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W-33R008
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary	**BORING** Margery-F
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 400 feet	**SHEET: 1 of 3**

Depth (in feet) | Well Construction | Lithologic Pattern | Geophysical Sample

LITHOLOGIC DESCRIPTION

TOPSOIL

CL: Silty Clay; dark yellowish-brown (10 YR 4/2), moderate to high plasticity, mottled dark brown
@10' Increasing fine sand, clay low placticity

@20' Decreasing silt/ sand content, moderate plasticity

@30' Low silt content, high plasticity

SP: Course Sand; well sorted, sub-rounded to sub-angular

SW: Gravelly Sand; gravel up to 0.3", poorly sorted, sub-rounded to angular/ fractured

@50' Gravel up to 0.4"

GW: Gravelly Sand; gravel up to 0.7", angular to sub-angular/ fractured, poorly sorted

@60' gravel up to 0.5"

@70' gravel fine downward

@85' gravel up to 0.3"

GP: Gravel; small amount of sand, gravel up to 0.7", angular/ fractured, moderatly sorted, some clay present.

GC: Clayey Gravel; gravel up to 0.4",gravel angular to sub-rounded, poorly sorted,some coarse sand

@105' gravel angular, moderatly sorted

CL: Clay; Gray (2.5 Y N5/) fat-high plasticity

GC: Sandy, Clayey, Gravel; olive gray clay (5Y 4/2), angular gravel up to 0.3", sand sub-rounded, poorly sorted

CL: Silty Clay; olive-gray (5Y-4/2), moderate to high plasticity

@125' gravely clay, moderate plasticity, gravel sub-angular up to 0.2"

@135' Increasing silt content

GEOPHYSICAL DATA

(0 **Gamma Ray (GAPI)** 200)

(- **Spontaneous Potential (mV)** +)

(0 **Short Normal (Ohm-m)** 100)

(0 **Long Normal (Ohm-m)** 100)

(60 **Temperature (Farenheit)** 70)

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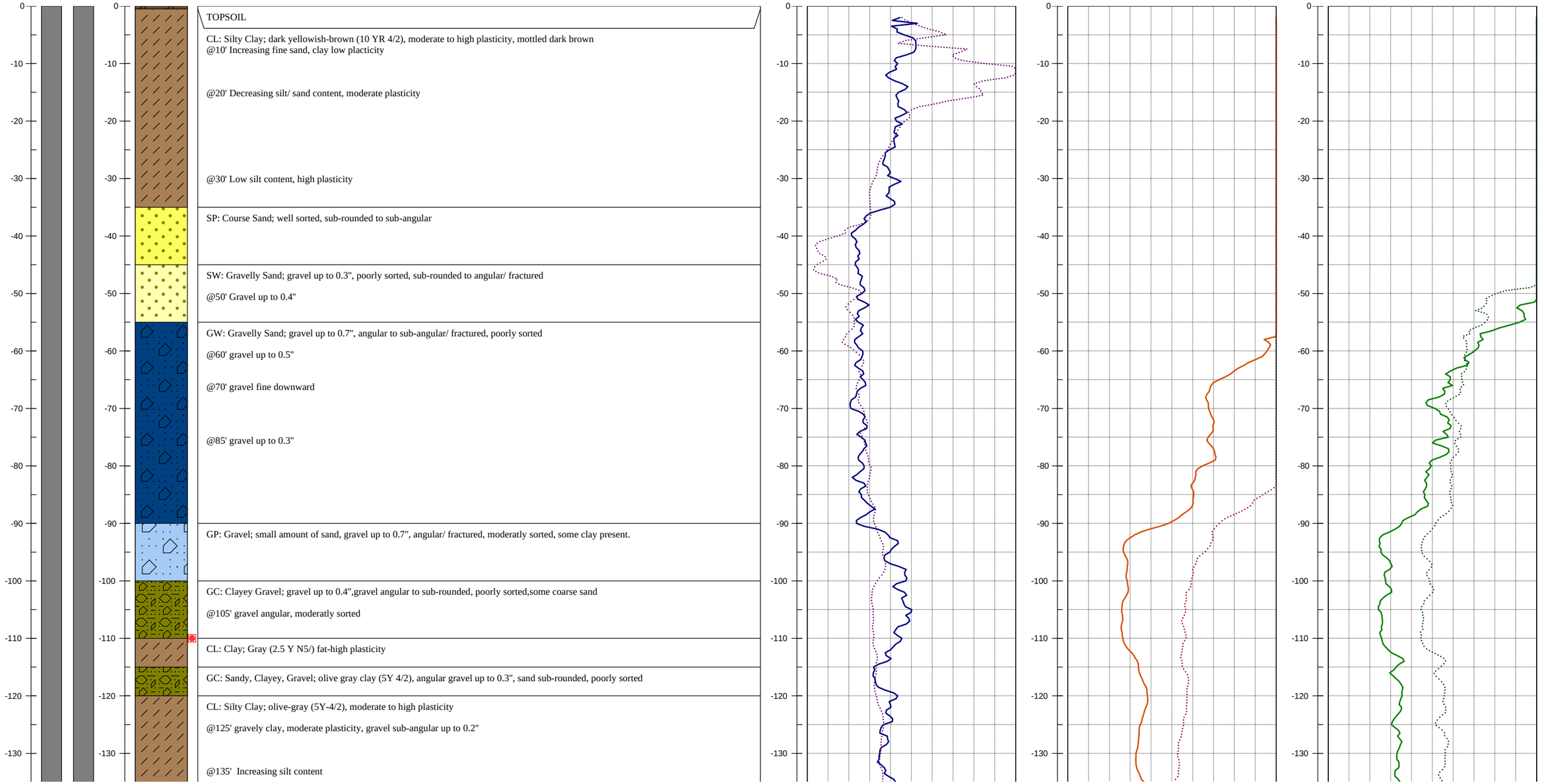
(0 **Point Resistivity (Ohm)** 50)



ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Margery Drive and Blanchard Street	**DATE:** 04/15/2009	**LOGGED BY:** Douglas Young and Brian Grace	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W-33R008
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary	**BORING** Margery-F
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 400 feet	**SHEET: 2 of 3**

Depth (in feet) | Well Construction | Lithologic Pattern | Geophysical Sample

LITHOLOGIC DESCRIPTION

SC: Gravelly Sand; gravel up to 0.2", gravel angular to sub-rounded, sand in angular, some silty clay sticking to the sand and gravel, poorly sorted
@138' gravel sub-rounded up to 0.1"

CL: Sandy Clay; olive-brown (2.5Y 4/4) to gray-brown (2.5Y 4/2), silty clay, medium plasticity, gravel rounded to angular (fractured) up to 0.1"

@155' clay, olive gray (5Y 4/2) to olive brown (2.5Y 4/4), high plasticity

@160' gravel fines downward, mid-to high plasticity

SM: Silty Sand; multi-color, well sorted, angular, medium sand

SP: Sand; Muti-color, well to moderatly sorted, coarse, angular

CL: Sandy Clay; gray-brown (2.5Y 4/2), low plasticty, sand is fine to coarse sand, angular, well sorted

@195' gray (2.5YR N5/), medium plasticty

@200' moderate yellowish brown (10YR 5/4), medium sand, angular

SC: Clayey Sand; gray (2.5YR N5/), medium sand, angular, well sorted

@210' sand with very little clay, coarse, angular, moderatly sorted

@215 sand angular, no clay

GW: Gravel; up to 0.3", sub-angular to angular, poorly sorted.

@230' sandy gravel, up to 0.5", angular

@235' angular gravel up to 0.7"

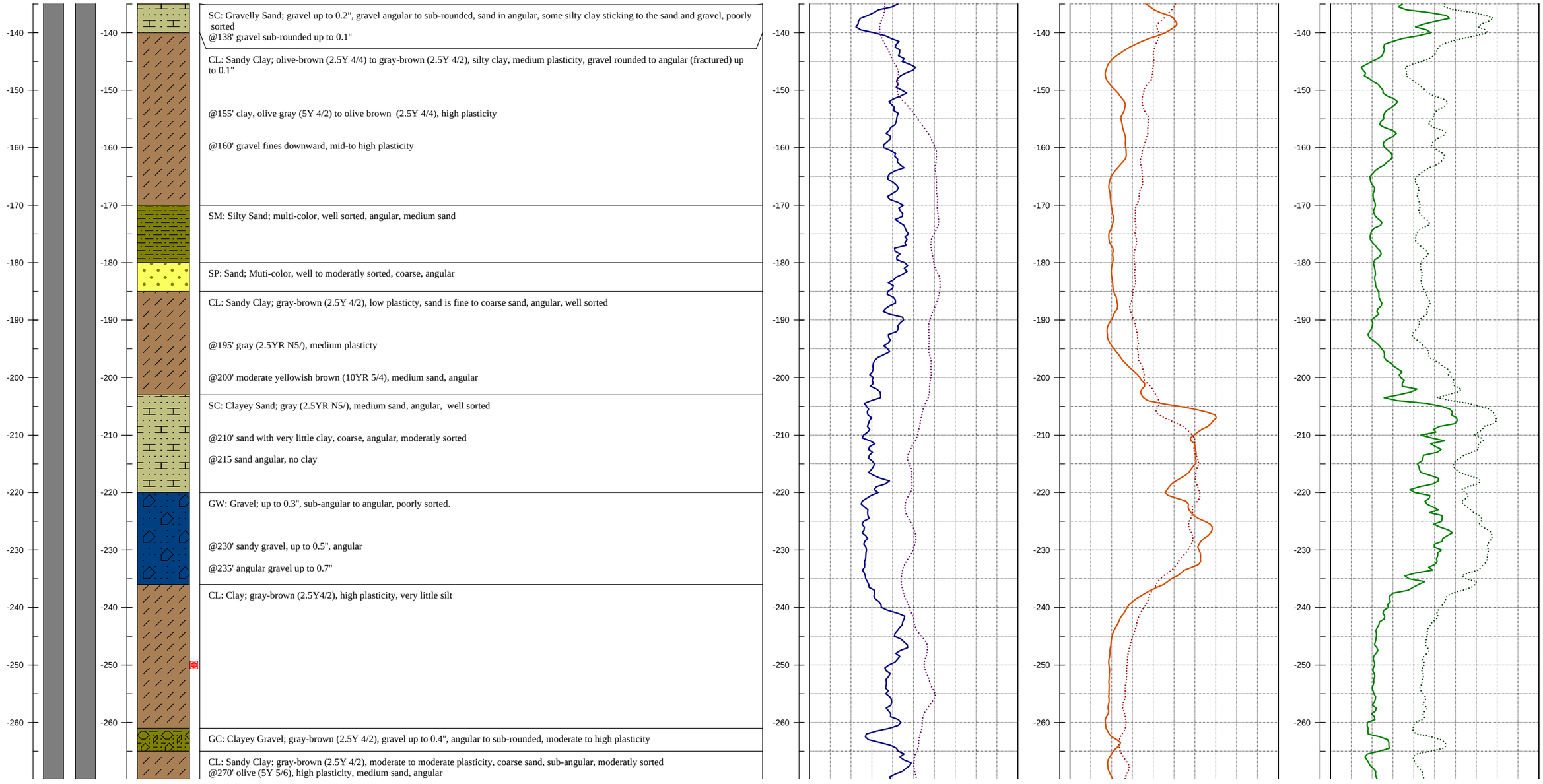
CL: Clay; gray-brown (2.5Y4/2), high plasticity, very little silt

GC: Clayey Gravel; gray-brown (2.5Y 4/2), gravel up to 0.4", angular to sub-rounded, moderate to high plasticity

CL: Sandy Clay; gray-brown (2.5Y 4/2), moderate to moderate plasticity, coarse sand, sub-angular, moderatly sorted
@270' olive (5Y 5/6), high plasticity, medium sand, angular

GEOPHYSICAL DATA

(0 **Gamma Ray (GAPI)** 200)
(- **Spontaneous Potential (mV)** +)
(0 **Short Normal (Ohm-m)** 100)
(0 **Long Normal (Ohm-m)** 100)
(60 **Temperature (Farenheit)** 70)
(0 **Guard (Ohm-m)** 100)
(0 **Point Resistivity (Ohm)** 50)



ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Margery Drive and Blanchard Street	**DATE:** 04/15/2009	**LOGGED BY:** Douglas Young and Brian Grace	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W-33R008
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary	**BORING** Margery-F
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 400 feet	**SHEET: 3 of 3**

Depth (in feet) | Well Construction | Lithologic Pattern | Geophysical Sample

LITHOLOGIC DESCRIPTION

@277' olive-brown (2.5Y 4/4), high plasticity, fine to coarse sand, angular

@300' color change to olive (5Y 5/6),

@305' color change to olive-brown (2.5Y 4/4) medium to high plasticity, some silt

SW: Gravelly Sand; poorly sorted, course, angular grains, up to 0.1"

@325' gravel sub-angular up to 0.2"

GW: Sandy, Clay; dark yellowish brown (10YR 4/2), clay peds have medium plasticity, gravel is sub-rounded, up to 0.5", coarse sand, sub-angular

SW: Clayey Sand; dark yellowish brown (10YR 4/2), fine to coarse, angular sand, gravel is sub-angular to sub-rounded up to 0.4", moderatly sorted

CL: Silty Clay; olive-gray (5Y 4/2), medium to high placticty

SW: Gravely Sand; multi-color sand, Increasing gravel content up to 0.5", sub-rounded to sub-angular

SP: Sand; sub-angular, well sorted sand

CL: Sandy Clay; gray-brown (2.5Y 4/2), medium to high plasticity,sub-angular, well sorted sand

@390' gray (2.5Y N5/) highly plastic, very little sand and silt

GEOPHYSICAL DATA

(0 Gamma Ray (GAPI) 200)

(- Spontaneous Potential (mV) +)

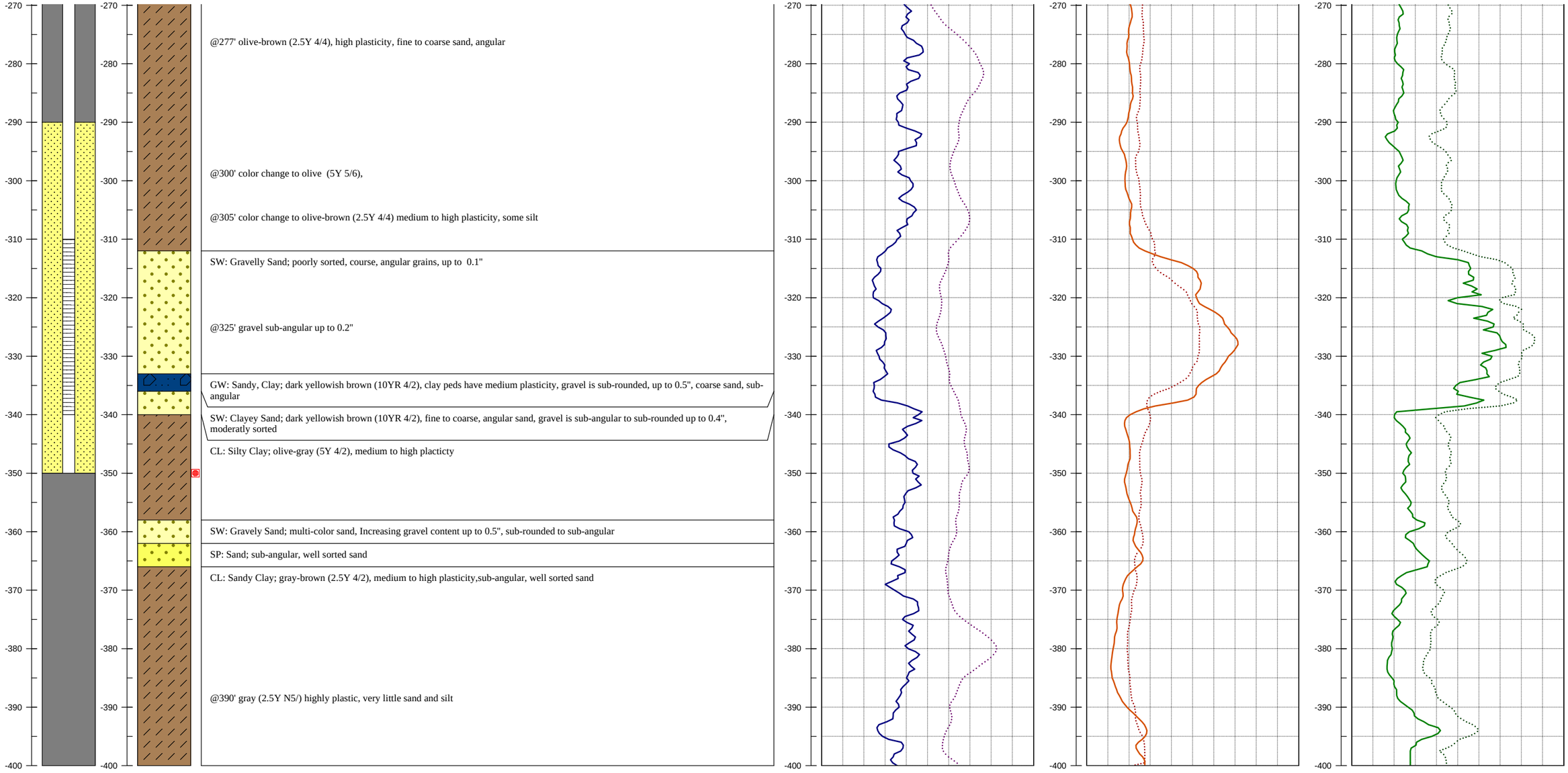
(0 Short Normal (Ohm-m) 100)

(0 Long Normal (Ohm-m) 100)

(60 Temperature (Farenheit) 70)

(0 Guard (Ohm-m) 100)

(0 Point Resistivity (Ohm) 50)



ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Margery Drive and Blanchard Street	**DATE:** 4/23/2009	**LOGGED BY:** Douglas Young and Brian Grace	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W-33R007
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary	**SHEET: 1 of 2**
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 250 feet	**BORING** Margery-C

Depth (in feet) | Well Construction | Lithologic Pattern | Geophysical Sample

LITHOLOGIC DESCRIPTION

TOPSOIL

CL: Silty Clay; dark yellowish-brown (10 YR 4/2), moderate to high plasticity, mottled dark brown
@10' Increasing fine sand, clay low placticity

@20' Decreasing silt/ sand content, moderate plasticity

@30' Low silt content, high plasticity

SP: Course Sand; well sorted, sub-rounded to sub-angular

SW: Gravelly Sand; gravel up to 0.3", poorly sorted, sub-rounded to angular/ fractured

@50' Gravel up to 0.4"

GW: Gravelly Sand; gravel up to 0.7", angular to sub-angular/ fractured, poorly sorted

@60' gravel up to 0.5"

@70' gravel fine downward

@85' gravel up to 0.3"

GP: Gravel; small amount of sand, gravel up to 0.7", angular/ fractured, moderatly sorted, some clay present.

GC: Clayey Gravel; gravel up to 0.4",gravel angular to sub-rounded, poorly sorted,some coarse sand

@105' gravel angular, moderatly sorted

CL: Clay; Gray (2.5 Y N5/) fat-high plasticity

GC: Sandy, Clayey, Gravel; olive gray clay (5Y 4/2), angular gravel up to 0.3", sand sub-rounded, poorly sorted

CL: Silty Clay; olive-gray (5Y-4/2), moderate to high plasticity

@125' gravely clay, moderate plasticity, gravel sub-angular up to 0.2"

@135' Increasing silt content

GEOPHYSICAL DATA

(0 **Gamma Ray (GAPI)** 200)

(- **Spontaneous Potential (mV)** +)

(0 **Short Normal (Ohm-m)** 100)

(0 **Long Normal (Ohm-m)** 100)

(60 **Temperature (Farenheit)** 70)

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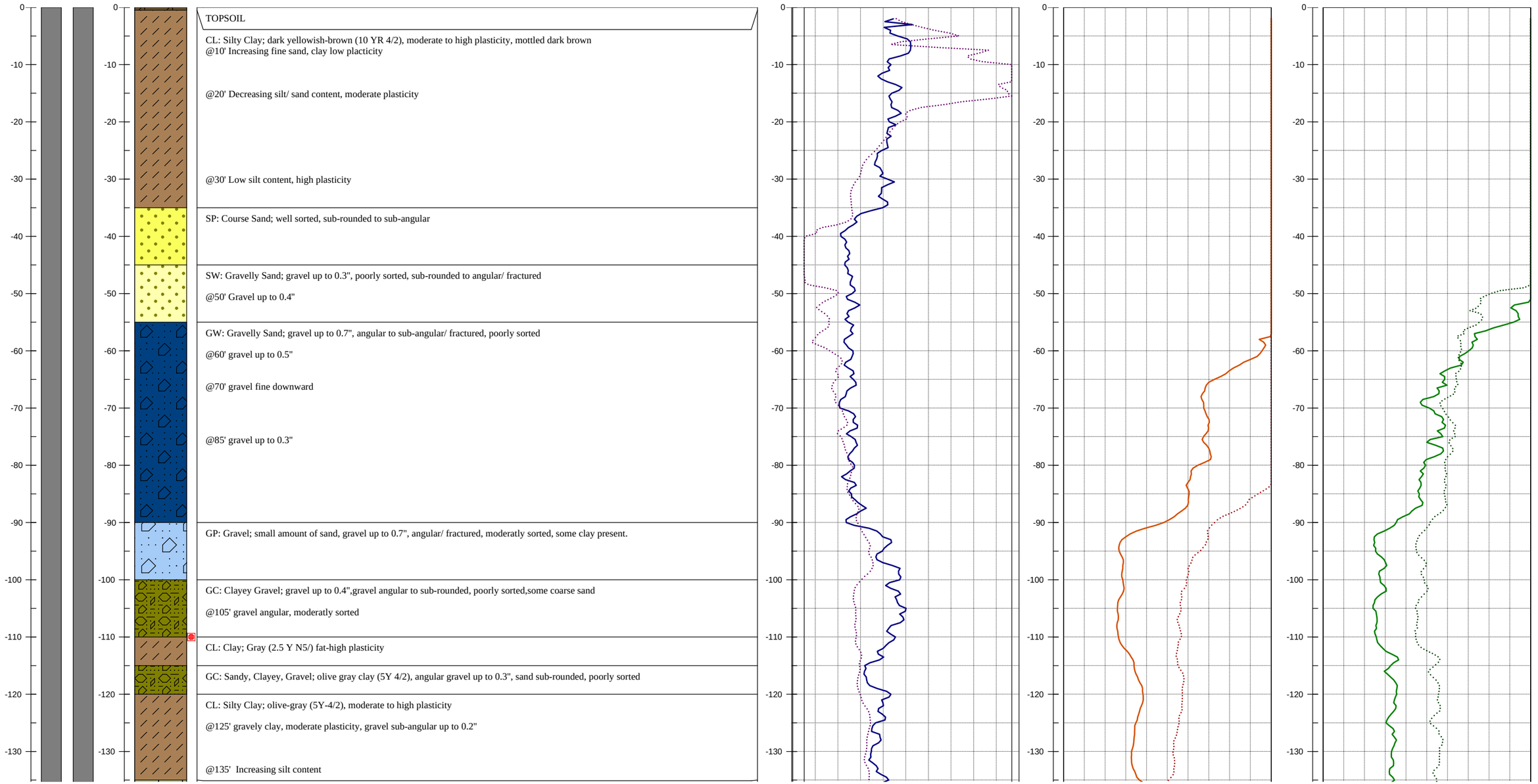
(0 **Point Resistivity (Ohm)** 50)



***Based on Log From: Margery-F**

ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Margery Drive and Blanchard Street	**DATE:** 4/23/2009	**LOGGED BY:** Douglas Young and Brian Grace	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W-33R007
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary	**BORING** Margery-C
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 250 feet	**SHEET: 2 of 2**

Depth (in feet)
Well Construction
Lithologic Pattern
Geophysical Sample

LITHOLOGIC DESCRIPTION

SC: Gravelly Sand; gravel up to 0.2", gravel angular to sub-rounded, sand in angular, some silty clay sticking to the sand and gravel, poorly sorted
@138' gravel sub-rounded up to 0.1"

CL: Sandy Clay; olive-brown (2.5Y 4/4) to gray-brown (2.5Y 4/2), silty clay, medium plasticity, gravel rounded to angular (fractured) up to 0.1"

@155' clay, olive gray (5Y 4/2) to olive brown (2.5Y 4/4), high plasticity

@160' gravel fines downward, mid-to high plasticity

SM: Silty Sand; multi-color, well sorted, angular, medium sand

SP: Sand; Muti-color, well to moderatly sorted, coarse, angular

CL: Sandy Clay; gray-brown (2.5Y 4/2), low plasticty, sand is fine to coarse sand, angular, well sorted

@195' gray (2.5YR N5/), medium plasticty

@200' moderate yellowish brown (10YR 5/4), medium sand, angular

SC: Clayey Sand; gray (2.5YR N5/), medium sand, angular, well sorted

@210' sand with very little clay, coarse, angular, moderatly sorted

@215 sand angular, no clay

GW: Gravel; up to 0.3", sub-angular to angular, poorly sorted.

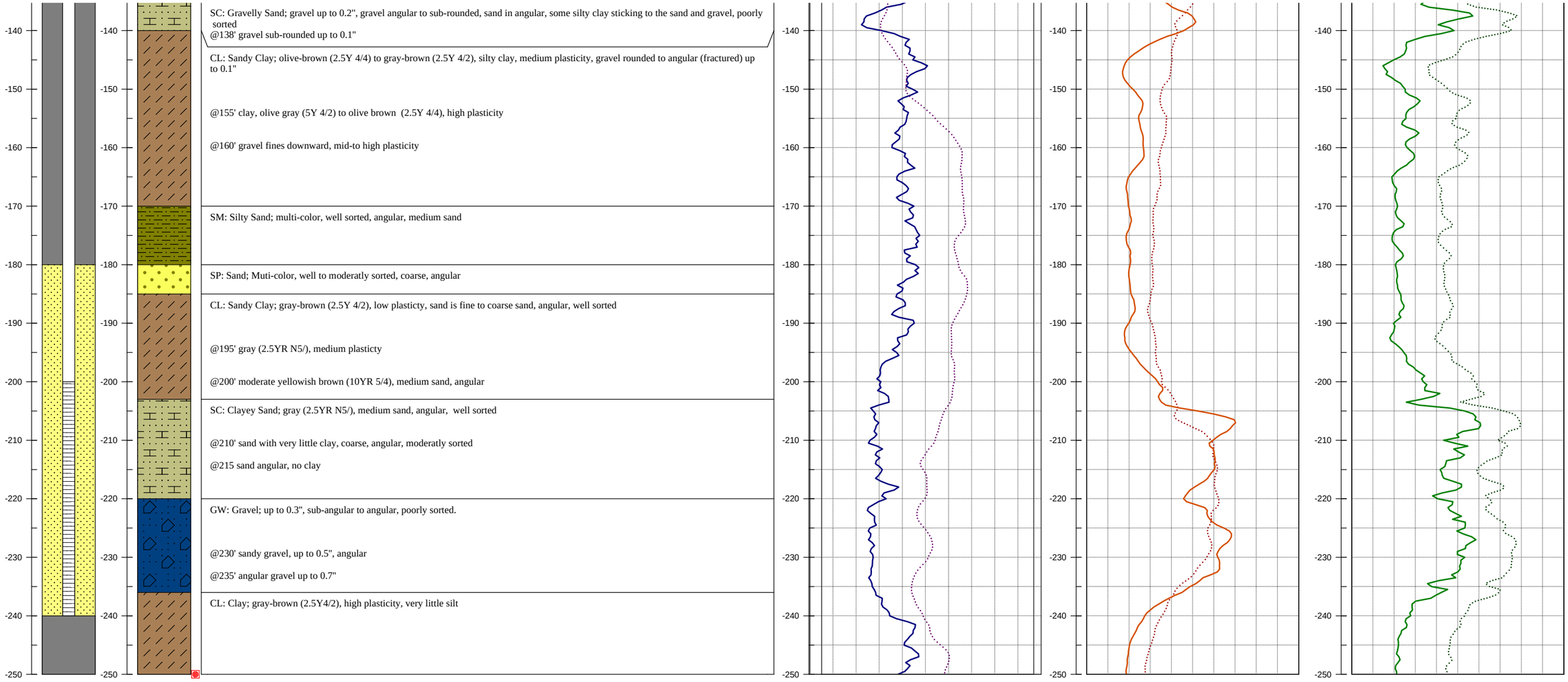
@230' sandy gravel, up to 0.5", angular

@235' angular gravel up to 0.7"

CL: Clay; gray-brown (2.5Y4/2), high plasticity, very little silt

GEOPHYSICAL DATA

(0 **Gamma Ray (GAPI)** 200)
(- **Spontaneous Potential (mV)** +)
(0 **Short Normal (Ohm-m)** 100)
(0 **Long Normal (Ohm-m)** 100)
(60 **Temperature (Farenheit)** 70)
(0 **Guard (Ohm-m)** 100)
(0 **Point Resistivity (Ohm)** 50)



***Based on Log From: Margery-F**

ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Eggers Drive and Glenmoor Drive	**DATE:** 3/9/2009	**LOGGED BY:** Douglas Young and Brad Buerer	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W-32E012	**BORING** MEYER PARK-F
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary		
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 400 feet	**SHEET: 1 of 3**	

Depth (in feet) | Well Construction | Lithologic Pattern | Geophysical Sample

LITHOLOGIC DESCRIPTION

TOPSOIL: Topsoil

CL: Clay; moderate yellowish brown (10YR 5/4), low plasticity, dry
@5' Silty Clay; light olive brown (5Y 5/6), low plasticity

@20' Sandy Clay; light olive brown (5Y 5/6), low plasticity

@25' color change to moderate olive brown (5Y 4/4)

SC: Clayey Sand; light olive brown (5Y 5/6), silty, moderate to high plasticity, coarse sand up to .2", poorly sorted

@35' increasing clay content, coarse sand and fine gravel up to .4", subangular

CL: Silty Clay; olive gray (5Y 4/2), low plasticity

@45' mottled moderate olive brown (5Y 4/4) silty clay, moderate to high plasticity, some coarse gravel up to .6"

@50' color change to moderate olive brown (5Y 4/4), increasing sand content

SW: Gravelly Sand; poorly sorted, well-rounded to subangular, generally .1" to .2", few gravels up to .5"

GW: Sandy Gravel; coarse gravel up to .8", well-rounded to subangular/fractured, very poorly sorted

@70' gravel fining down to .4", subrounded to subangular, poorly sorted

@75' gravel coarsening up to up to 1.3", well-rounded to subangular, poorly sorted

SW: Gravelly Sand; sand is well-sorted .1" diameter, with coarser fractured gravels

@85' light olive brown (5Y 5/6), some sandy clay, medium to coarse sand and fine gravel up to .6", well-rounded to subangular

GC: Clayey Gravel; light olive brown (5Y 5/6) sandy clay, gravel up to .5", subangular

CL: Gravelly Clay; light olive brown (5Y 5/6) silty clay, moderate plasticity, fine gravel up to .5", subangular/fragmented, poorly sorted

@103' small lens of hard clay
@105' Sandy Clay; color change to moderate olive brown (5Y 4/4), moderate to high plasticity, dry

@110' Gravelly Clay; color change to olive gray (5Y 3/2), well-rounded to subangular gravel up to .3", some subrounded to subangular coarse sand up to .2", poorly sorted

@115' Silty Clay; olive gray (5Y 3/2), mottled moderate olive brown (5Y 4/4), moderate plasticity

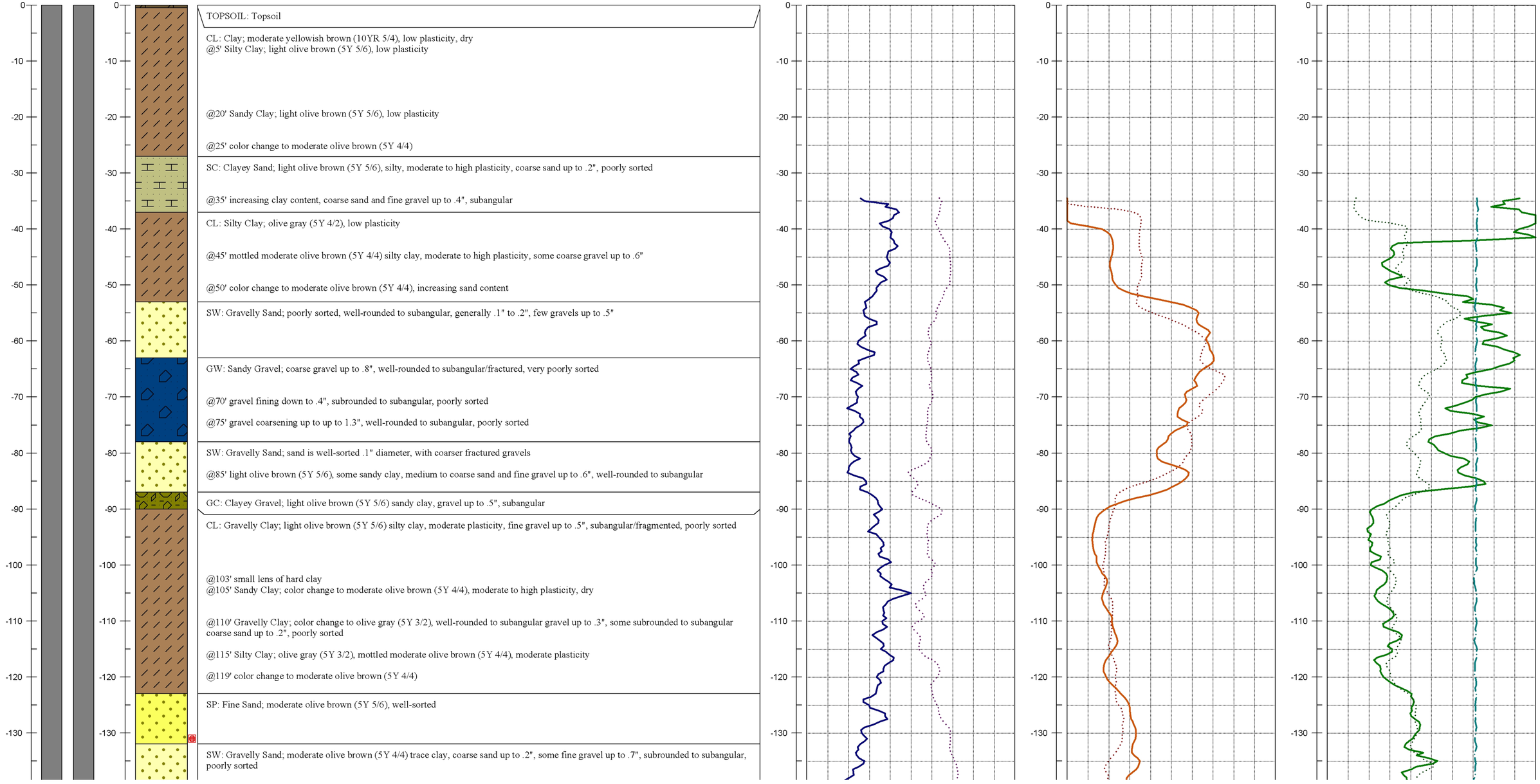
@119' color change to moderate olive brown (5Y 4/4)

SP: Fine Sand; moderate olive brown (5Y 5/6), well-sorted

SW: Gravelly Sand; moderate olive brown (5Y 4/4) trace clay, coarse sand up to .2", some fine gravel up to .7", subrounded to subangular, poorly sorted

GEOPHYSICAL DATA

(0 Gamma Ray (GAPI) 200)
(- Spontaneous Potential (mV) +)
(0 Short Normal (Ohm-m) 100)
(0 Long Normal (Ohm-m) 100)
(60 Temperature (Farenheit) 70)
(0 Guard (Ohm-m) 100)
(0 Point Resistivity (Ohm) 50)



ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Eggers Drive and Glenmoor Drive	**DATE:** 3/9/2009	**LOGGED BY:** Douglas Young and Brad Buerer	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W-32E012	**BORING** MEYER PARK-F
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary		
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 400 feet	**SHEET: 2 of 3**	

Depth (in feet) | Well Construction | Lithologic Pattern | Geophysical Sample

LITHOLOGIC DESCRIPTION

@145' color change to light olive brown (5Y 5/6), increasing clay content

CL: Silty Clay; olive gray (5Y 4/2), moderate plasticity, high silt content

@170' color change to moderate olive brown (5Y 4/4), coarse sand interbeds, sand is .1", subangular

@180' appearance of fine gravel, up to .5", subangular

SC: Clayey Sand; moderate olive brown (5Y 4/4), coarse sand up to .2", subrounded to subangular, poorly sorted

SW: Gravelly Sand; medium to coarse sand and fine gravel up to .3", subrounded to subangular, poorly sorted

GW: Sandy Gravel; coarse sand and fine gravel up to .7", well-rounded to subangular, poorly sorted

SW: Gravelly Sand; medium to coarse sand, some fine gravel up to .6", subrounded to subangular, poorly sorted

GW: Fine Gravel; up to .75", poorly sorted, subrounded to subangular
@215' Sandy Gravel; up to .75", very poorly sorted, well-rounded to subangular/fractured

@220' dusky yellow (5Y 6/4) silty clay peds, low plasticity, finer gravel up to .5",

SW: Gravelly Sand; light olive brown (5Y 5/6), silty clay peds, dry, coarse sand and fine gravel up to .6", poorly sorted

CL: Silty Clay; olive gray (5Y 4/2), low plasticity

@240' Gravelly Clay; light olive gray (5Y 5/2), high silt content, fine gravel up to .4"

SC: Clayey Sand; moderate olive brown (5Y 4/4), high silt content, medium to coarse sand, subrounded to subangular, poorly sorted

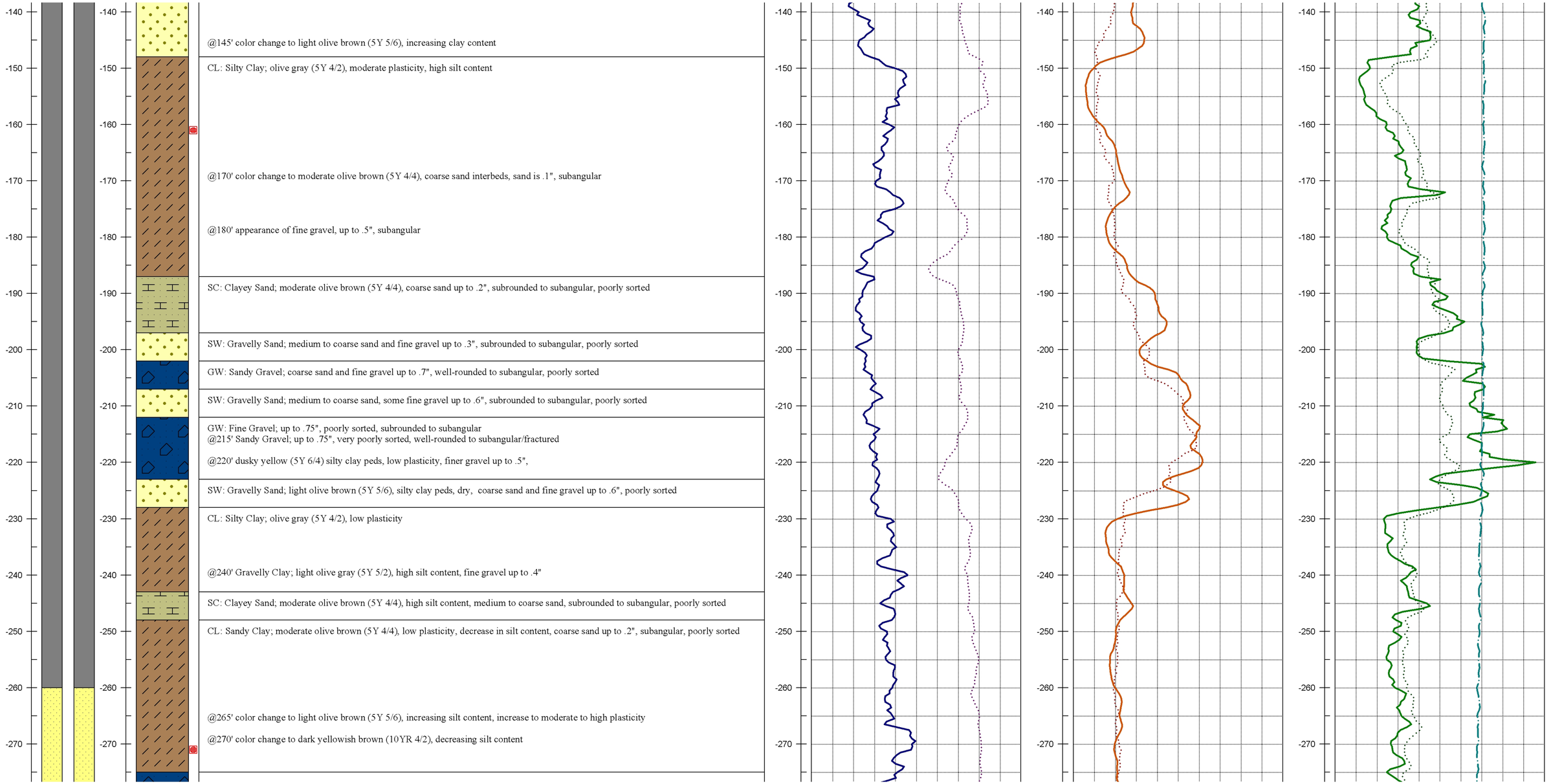
CL: Sandy Clay; moderate olive brown (5Y 4/4), low plasticity, decrease in silt content, coarse sand up to .2", subangular, poorly sorted

@265' color change to light olive brown (5Y 5/6), increasing silt content, increase to moderate to high plasticity

@270' color change to dark yellowish brown (10YR 4/2), decreasing silt content

GEOPHYSICAL DATA

(0 Gamma Ray (GAPI) 200)
(- Spontaneous Potential (mV) +)
(0 Short Normal (Ohm-m) 100)
(0 Long Normal (Ohm-m) 100)
(60 Temperature (Farenheit) 70)
(0 Guard (Ohm-m) 100)
(0 Point Resistivity (Ohm) 50)



ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Eggers Drive and Glenmoor Drive	**DATE:** 3/9/2009	**LOGGED BY:** Douglas Young and Brad Buerer	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W-32E012	**BORING** MEYER PARK-F
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary		
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 400 feet	**SHEET: 3 of 3**	

Depth (in feet) | Well Construction | Lithologic Pattern | Geophysical Sample

LITHOLOGIC DESCRIPTION

GW: Sand Gravel; coarse sand and fine gravel up to .4", subrounded sand, subangular to angular/fractured gravel, poorly sorted

CL: Sandy Clay; moderate olive brown (5Y 4/4), silty clay, moderate to high plasticity, coarse sand and fine gravel up to .4", subrounded to angular/fractured, poorly sorted

@290' color change to light olive brown (5Y 5/6), increasing clay content

SW: Gravelly Sand; coarse sand and fine gravel up to .4", well-rounded to subangular/fractured, poorly sorted

CL: Silty Clay; dark yellowish brown (10YR 4/2), high plasticity, some coarse sand and fine gravel up to .4", subangular/fractured, poorly sorted

@315' color change to moderate olive brown (5Y 4/4)

SC: Clayey Sand; moderate olive brown (5Y 4/4) mottled olive gray (5Y 3/2), low plasticity, generally coarse sand ~.1", well-sorted

@325' decrease in clay content

SW: Gravelly Sand, coarse sand and gravel up to .5", well-rounded to subangular, poorly sorted

CL: Sandy Clay; light olive brown (5Y 5/6), high sand content, moderate plasticity
@334' color change to moderate yellowish brown (10YR 5/4)

SW: Gravelly Sand; medium to coarse sand and some fine gravel up to .3", subrounded to subangular, poorly sorted

SC: Clayey Sand; dark yellowish brown (10YR 4/2), silty, low to moderate plasticity, medium to coarse sand up to .2", subrounded to subangular, poorly sorted
@345' grading to coarse sand and fine gravel up to .5", subrounded to subangular

CL: Sandy Clay; dark yellowish brown (10YR 4/2), moderate plasticity, fine to coarse sand and fine gravel up to .25", rounded to subrounded

SP: Medium Sand; up to .1", subrounded to subangular, well-sorted

CL: Silty Clay; dark yellowish brown (10YR 4/2), rust mottling, some fine sand, very stiff

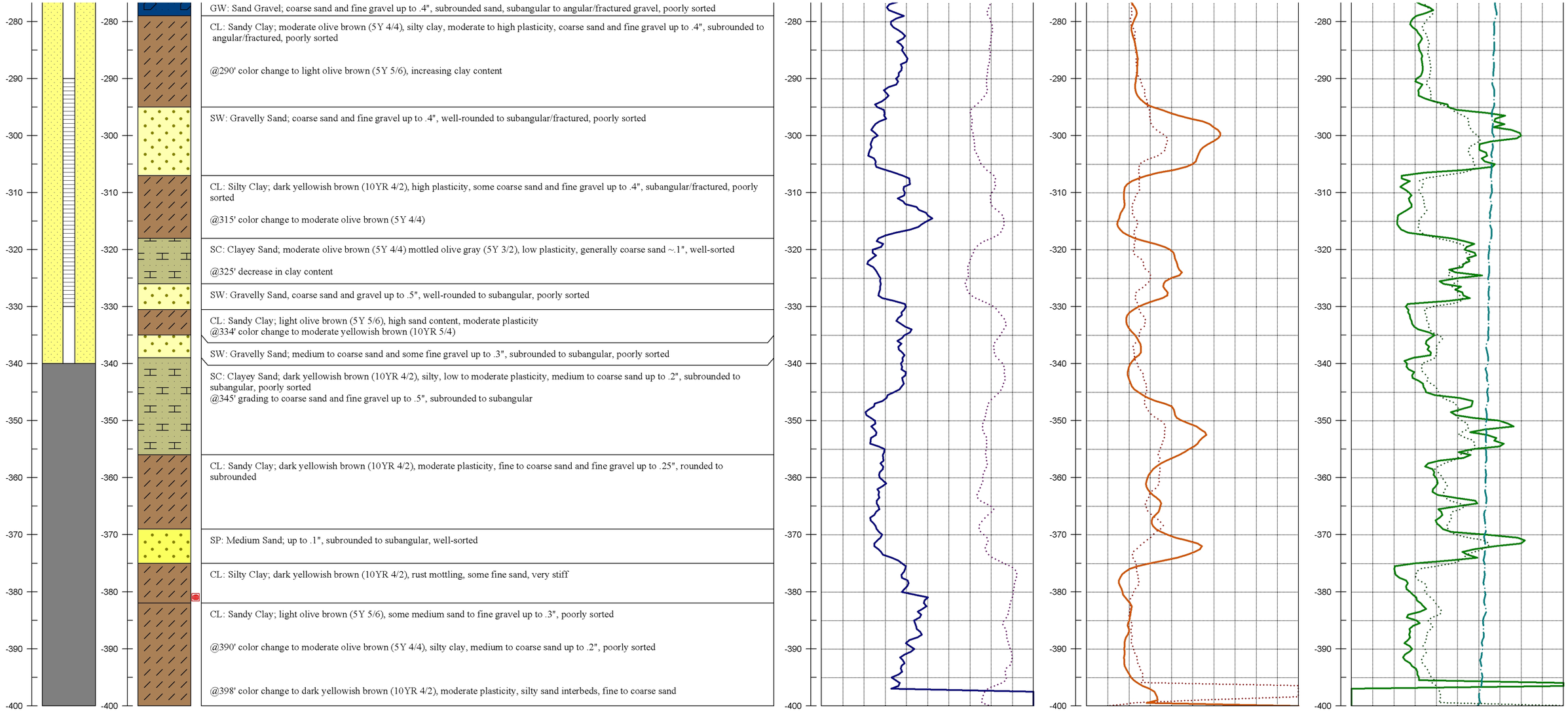
CL: Sandy Clay; light olive brown (5Y 5/6), some medium sand to fine gravel up to .3", poorly sorted

@390' color change to moderate olive brown (5Y 4/4), silty clay, medium to coarse sand up to .2", poorly sorted

@398' color change to dark yellowish brown (10YR 4/2), moderate plasticity, silty sand interbeds, fine to coarse sand

GEOPHYSICAL DATA

(0 Gamma Ray (GAPI) 200)
(- Spontaneous Potential (mV) +)
(0 Short Normal (Ohm-m) 100)
(0 Long Normal (Ohm-m) 100)
(60 Temperature (Farenheit) 70)
(0 Guard (Ohm-m) 100)
(0 Point Resistivity (Ohm) 50)



ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Eggers Drive and Glenmoor Drive	**DATE:** 3/12/2009	**LOGGED BY:** Douglas Young and Brad Buerer	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W-32E011	**BORING** MEYER PARK-C
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary		
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 240 feet	**SHEET: 1 of 2**	

Depth (in feet)
Well Construction
Lithologic Pattern
Geophysical Sample

LITHOLOGIC DESCRIPTION

TOPSOIL: Topsoil

CL: Clay; moderate yellowish brown (10YR 5/4), low plasticity, dry
@5' Silty Clay; light olive brown (5Y 5/6), low plasticity

@20' Sandy Clay; light olive brown (5Y 5/6), low plasticity

@25' color change to moderate olive brown (5Y 4/4)

SC: Clayey Sand; light olive brown (5Y 5/6), silty, moderate to high plasticity, coarse sand up to .2", poorly sorted

@35' increasing clay content, coarse sand and fine gravel up to .4", subangular

CL: Silty Clay; olive gray (5Y 4/2), low plasticity

@45' mottled moderate olive brown (5Y 4/4) silty clay, moderate to high plasticity, some coarse gravel up to .6"

@50' color change to moderate olive brown (5Y 4/4), increasing sand content

SW: Gravelly Sand; poorly sorted, well-rounded to subangular, generally .1" to .2", few gravels up to .5"

GW: Sandy Gravel; coarse gravel up to .8", well-rounded to subangular/fractured, very poorly sorted

@70' gravel fining down to .4", subrounded to subangular, poorly sorted

@75' gravel coarsening up to up to 1.3", well-rounded to subangular, poorly sorted

SW: Gravelly Sand; sand is well-sorted .1" diameter, with coarser fractured gravels

@85' light olive brown (5Y 5/6), some sandy clay, medium to coarse sand and fine gravel up to .6", well-rounded to subangular

GC: Clayey Gravel; light olive brown (5Y 5/6) sandy clay, gravel up to .5", subangular

CL: Gravelly Clay; light olive brown (5Y 5/6) silty clay, moderate plasticity, fine gravel up to .5", subangular/fragmented, poorly sorted

@103' small lens of hard clay
@105' Sandy Clay; color change to moderate olive brown (5Y 4/4), moderate to high plasticity, dry

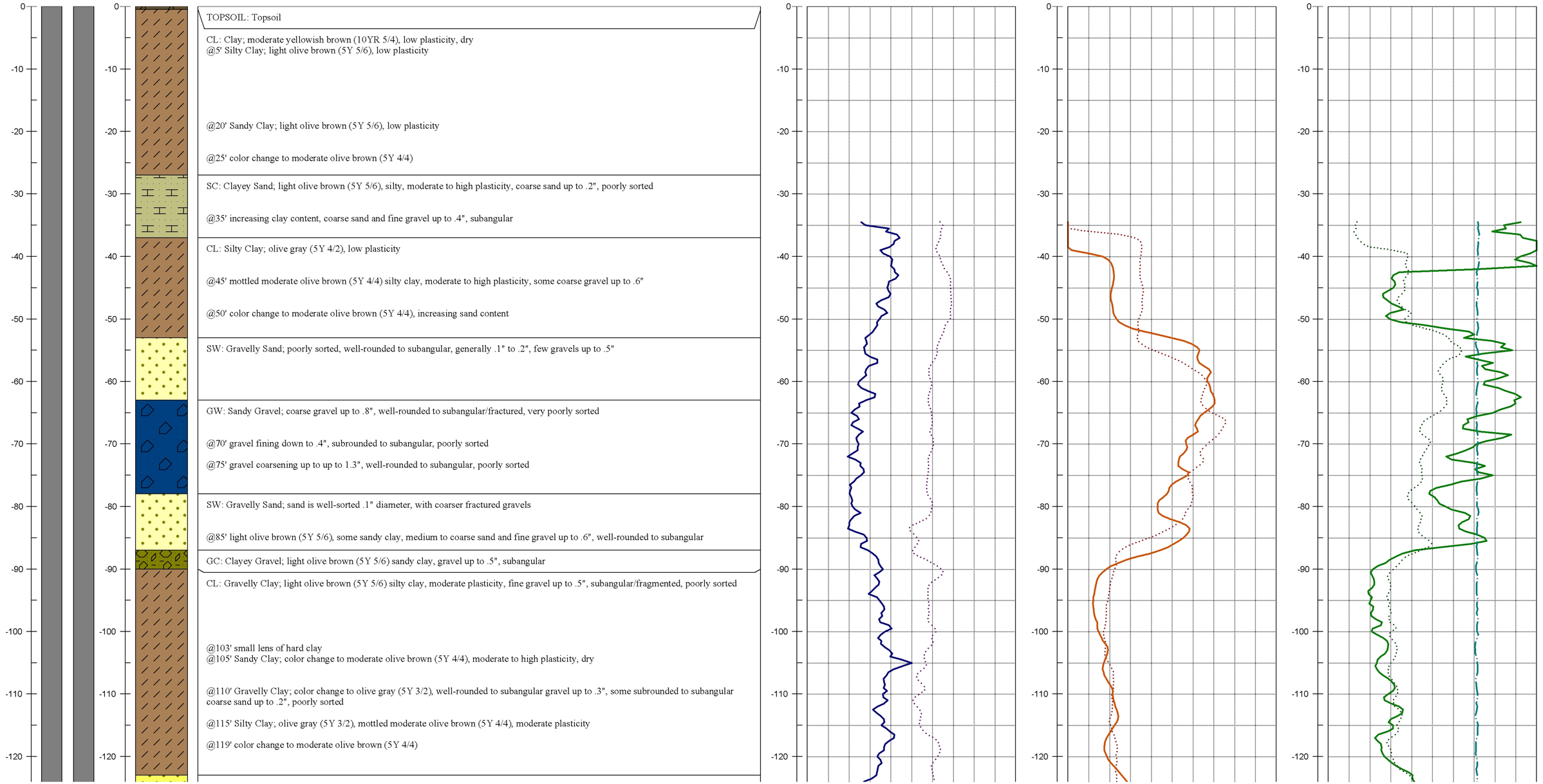
@110' Gravelly Clay; color change to olive gray (5Y 3/2), well-rounded to subangular gravel up to .3", some subrounded to subangular coarse sand up to .2", poorly sorted

@115' Silty Clay; olive gray (5Y 3/2), mottled moderate olive brown (5Y 4/4), moderate plasticity

@119' color change to moderate olive brown (5Y 4/4)

GEOPHYSICAL DATA

(0 Gamma Ray (GAPI) 200)
(- Spontaneous Potential (mV) +)
(0 Short Normal (Ohm-m) 100)
(0 Long Normal (Ohm-m) 100)
(60 Temperature (Farenheit) 70)
(0 Guard (Ohm-m) 100)
(0 Point Resistivity (Ohm) 50)



ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Eggers Drive and Glenmoor Drive	**DATE:** 3/12/2009	**LOGGED BY:** Douglas Young and Brad Buerer	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W-32E011
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary	**BORING** MEYER PARK-C
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 240 feet	**SHEET: 2 of 2**

Depth (in feet) | Well Construction | Lithologic Pattern | Geophysical Sample

LITHOLOGIC DESCRIPTION

SP: Fine Sand; moderate olive brown (5Y 5/6), well-sorted

SW: Gravelly Sand; moderate olive brown (5Y 4/4) trace clay, coarse sand up to .2", some fine gravel up to .7", subrounded to subangular, poorly sorted

@145' color change to light olive brown (5Y 5/6), increasing clay content

CL: Silty Clay; olive gray (5Y 4/2), moderate plasticity, high silt content

@170' color change to moderate olive brown (5Y 4/4), coarse sand interbeds, sand is .1", subangular

@180' appearance of fine gravel, up to .5", subangular

SC: Clayey Sand; moderate olive brown (5Y 4/4), coarse sand up to .2", subrounded to subangular, poorly sorted

SW: Gravelly Sand; medium to coarse sand and fine gravel up to .3", subrounded to subangular, poorly sorted

GW: Sandy Gravel; coarse sand and fine gravel up to .7", well-rounded to subangular, poorly sorted

SW: Gravelly Sand; medium to coarse sand, some fine gravel up to .6", subrounded to subangular, poorly sorted

GW: Fine Gravel; up to .75", poorly sorted, subrounded to subangular
@215' Sandy Gravel; up to .75", very poorly sorted, well-rounded to subangular/fractured

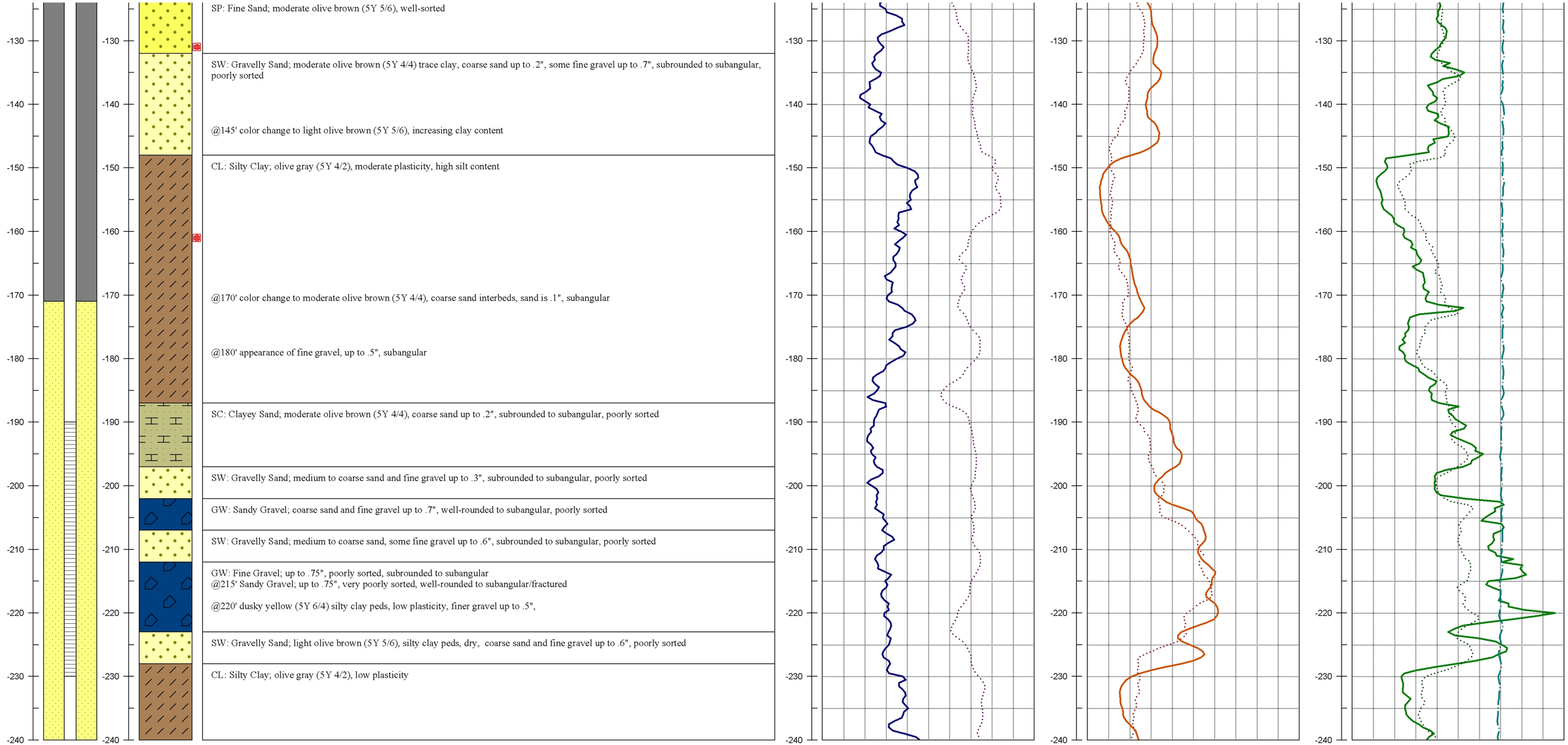
@220' dusky yellow (5Y 6/4) silty clay peds, low plasticity, finer gravel up to .5",

SW: Gravelly Sand; light olive brown (5Y 5/6), silty clay peds, dry, coarse sand and fine gravel up to .6", poorly sorted

CL: Silty Clay; olive gray (5Y 4/2), low plasticity

GEOPHYSICAL DATA

(0 Gamma Ray (GAPI) 200)
(- Spontaneous Potential (mV) +)
(0 Short Normal (Ohm-m) 100)
(0 Long Normal (Ohm-m) 100)
(60 Temperature (Farenheit) 70)
(0 Guard (Ohm-m) 100)
(0 Point Resistivity (Ohm) 50)



ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Noll Park on Logan Drive	**DATE:** 5/01/2009	**LOGGED BY:** Douglas Young and Stephanie Penn	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W-33N003	**BORING** NOLL PARK-F
			ELECTRIC LOG BY: Newman Well Surveys	**DRILLING METHOD:** Mud Rotary	**SHEET: 1 of 2**	
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 350 feet		

Depth (in feet) | Well Construction | Lithologic Pattern | Geophysical Sample

LITHOLOGIC DESCRIPTION*

GW: Gravel Road with compacted base fill

CL: Sandy Clay; Brownish Gray (5 Y 4/1); very fine to fine sand; low plasticity;

SC: Clayey Sand; Gray Brown (2.5 Y 4/2); medium to coarse sand; multicolor sands; some root matter

CL: Sandy Clay; Olive Gray (5 Y 4/2); coarse to fine sand; sand rounded to sub-rounded; low plasticity

SM: Silty Sand; Multicolored; coarse to fine sand; rounded to sub-angular

GP: Sandy Gravel; Multicolored; poorly sorted; angular to rounded; gravels to 1/2"

CL: Gravely Clay; Light Olive Gray;(5 y 5/2) coarse to fine sand, gravels to 1/2'; angular to sub-rounded; low plasticity

GP: Sandy Gravel; Multicolored; angular to rounded; gravels to 1' diameter; poorly sorted

CL: Sandy Clay; Olive Gray (5 Y 3/2) fine to coarse sand; gravels to 1/2" diameter; angular to-sub rounded; High sand content; low plasticity

GP: Clayey Gravel; Multicolored; sub-angular to rounded; poorly sorted; high clay content

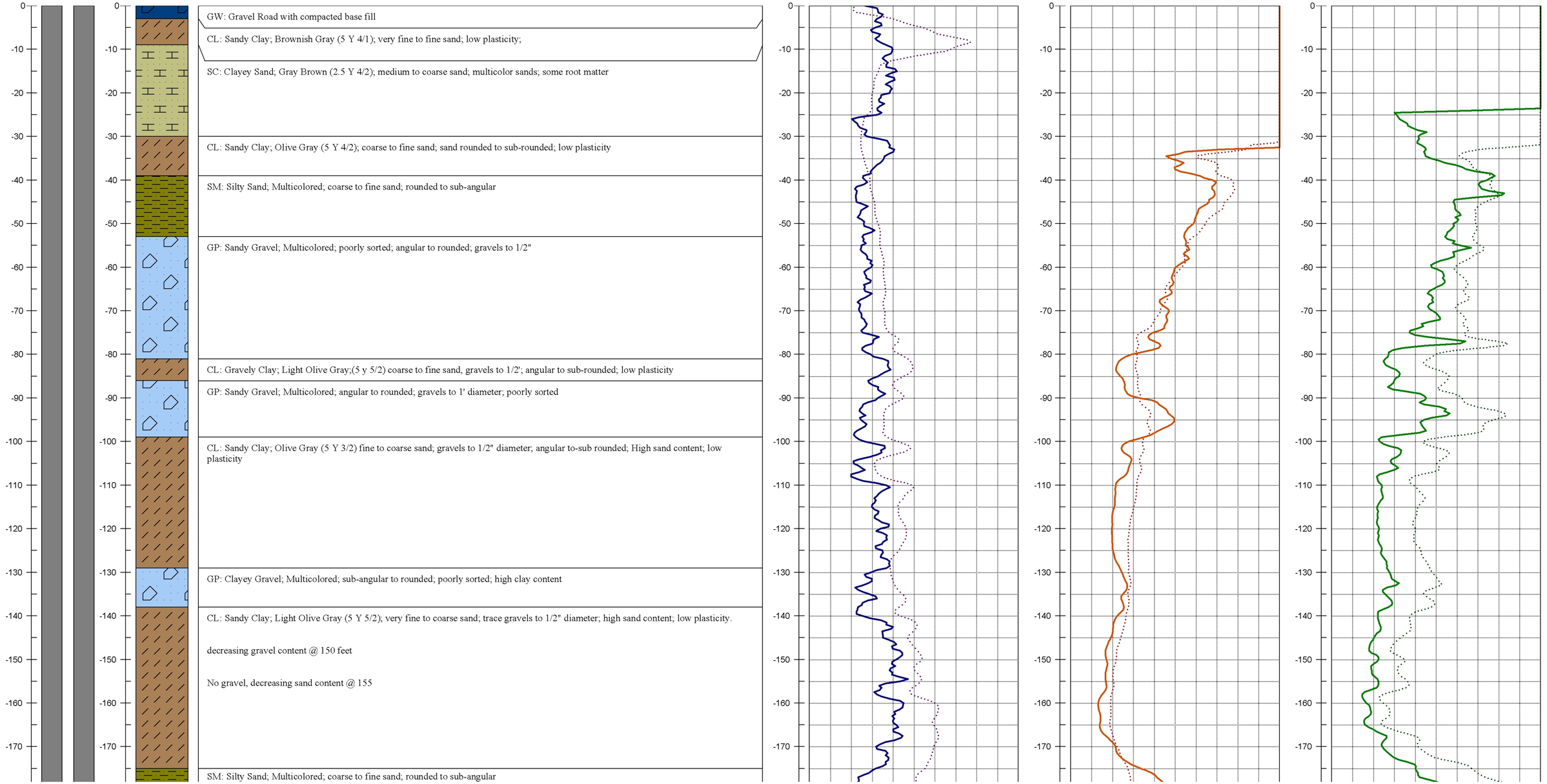
CL: Sandy Clay; Light Olive Gray (5 Y 5/2); very fine to coarse sand; trace gravels to 1/2" diameter; high sand content; low plasticity.

decreasing gravel content @ 150 feet

No gravel, decreasing sand content @ 155

SM: Silty Sand; Multicolored; coarse to fine sand; rounded to sub-angular

GEOPHYSICAL DATA



***BASED ON LOG FROM:** Noll Park-C

ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Noll Park on Logan Drive	**DATE:** 5/01/2009	**LOGGED BY:** Douglas Young and Stephanie Penn	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W-33N003	**BORING** NOLL PARK-F
			ELECTRIC LOG BY: Newman Well Surveys	**DRILLING METHOD:** Mud Rotary	**SHEET: 2 of 2**	
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 350 feet		

Depth (in feet) | Well Construction | Lithologic Pattern | Geophysical Sample

LITHOLOGIC DESCRIPTION*

CL: Sandy Clay; Dark Yellowish Green (SG Y 5/2); coarse to fine sand; rounded to sub-angular; low plasticity; moderate silt content

GP: Clayey Gravel; Multicolored; gravels to 1/4" diameter; rounded to sub-angular

CL: Sandy Clay; Olive Gray (5 Y 3/2) coarse to fine sand; sub-angular to rounded; moderate gravel content; gravels to 1/2" diameter; rounded to sub angular; low to moderate plasticity

SP: Gravelly Sand; Multicolored; coarse to fine sand; gravels to 1/4" diameter; angular to rounded; high gravel content

CL: Gravelly Clay; Light Olive Gray (5 Y 5/2); low to moderate plasticity

GP: Sandy Gravel; Multicolored; poorly sorted; gravels to 1/2" diameter; sand coarse to fine; rounded to angular; some broken pieces

Increasing fine sand to clay content @ 255 feet

CL: Sandy Clay; Light Olive Gray (5 Y 5/2); moderate to fine sand; trace gravels; moderate to high plasticity; trace oxidation

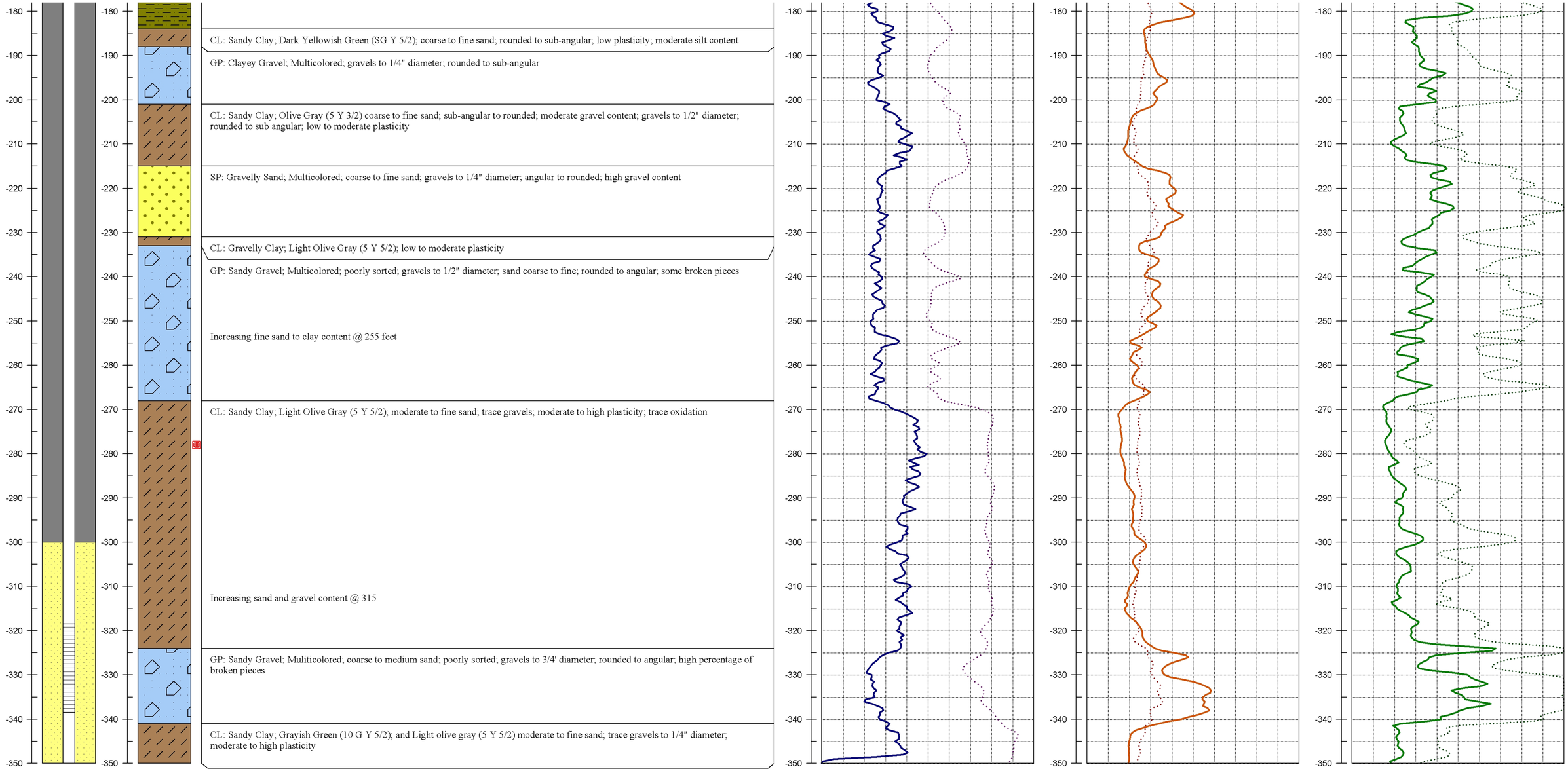
Increasing sand and gravel content @ 315

GP: Sandy Gravel; Muliticolored; coarse to medium sand; poorly sorted; gravels to 3/4' diameter; rounded to angular; high percentage of broken pieces

CL: Sandy Clay; Grayish Green (10 G Y 5/2); and Light olive gray (5 Y 5/2) moderate to fine sand; trace gravels to 1/4" diameter; moderate to high plasticity

GEOPHYSICAL DATA

(0 Gamma Ray (GAPI) 200)
(- Spontaneous Potential (mV) +)
(0 Short Normal (Ohm-m) 100)
(0 Long Normal (Ohm-m) 100)
(0 Guard (Ohm-m) 100)
(0 Point Resistivity (Ohm) 50)



***BASED ON LOG FROM:** Noll Park-C

ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Robin Street and Ladner Street	**DATE:** 3/25/2009	**LOGGED BY:** Douglas Young and Brad Buerer	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 5S/1W-4H005	**BORING** ROBIN-F
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary		
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 400 feet	**SHEET: 1 of 3**	

Depth (in feet)
Well Construction
Lithologic Pattern
Geophysical Sample

LITHOLOGIC DESCRIPTION

CL: Silty Clay; dark yellowish brown (10YR 4/2), moderate plasticity, dry

@20' increasing fine to medium sand, lower plasticity

SC: Clayey Sand; well-sorted medium sand, subangular to angular/fragmented

CL: Sandy Clay; light olive brown (5Y 5/6), low to moderate plasticity, fine to medium-grained sand

@35' color change to dark yellowish brown (10YR 4/2), increasing to moderate to high plasticity

GW: Sandy Gravel; poorly sorted, subrounded to subangular gravel fragments up to .3". Subrounded sands.

@45' increase in gravel size, up to .6"

@50' increase in coarse gravel size, up to 1"

@55' well-rounded to subangular gravel up to .7", increasing sand content

@60' fractured subrounded to subangular sand-sized clasts, generally less than .1".

@65' light olive brown (5Y 5/6), few very sandy clay peds, moderate plasticity, well-rounded to subangular gravels up to .6"

@70' coarse gravel up to 1", well-rounded to angular fragments indicative of gravel greater than 1", poorly sorted, some sand present.

SW: Gravelly Sand; poorly sorted, mostly subangular sand less than .1", well-rounded to subangular/fractured gravels up to .6"

GW: Sandy Gravel; poorly sorted fine gravel and coarse sand, few coarse gravels up to .8", gravels are well-rounded to subangular/fractured.

SW: Gravelly Sand; multicolored, poorly sorted, subrounded fine gravel up to .3", coarse sand up to .2", subrounded to subangular

CL: Sandy Clay; light olive brown (5Y 5/6), high sand content, moderate plasticity.

GC: Clayey Gravel; moderate olive brown (5Y 4/4), moderate plasticity, fine gravel up to .6", subrounded to subangular

@100' gravel is finer than above, increase in coarse sand

SW: Gravelly Sand; light olive brown (5Y 5/6), silty clay, moderate plasticity, coarse sand, gravel fragments up to .6", subrounded to subangular, poorly sorted

GC: Clayey Gravel; light olive brown (5Y 5/6), sandy clay, moderate plasticity, poorly sorted fine gravel and coarse sand up to .3", subrounded
@115' color change to moderate olive brown (5Y 4/4), mottled with olive gray (5Y 4/2) blue silty clay, gravel fragments up to .4"

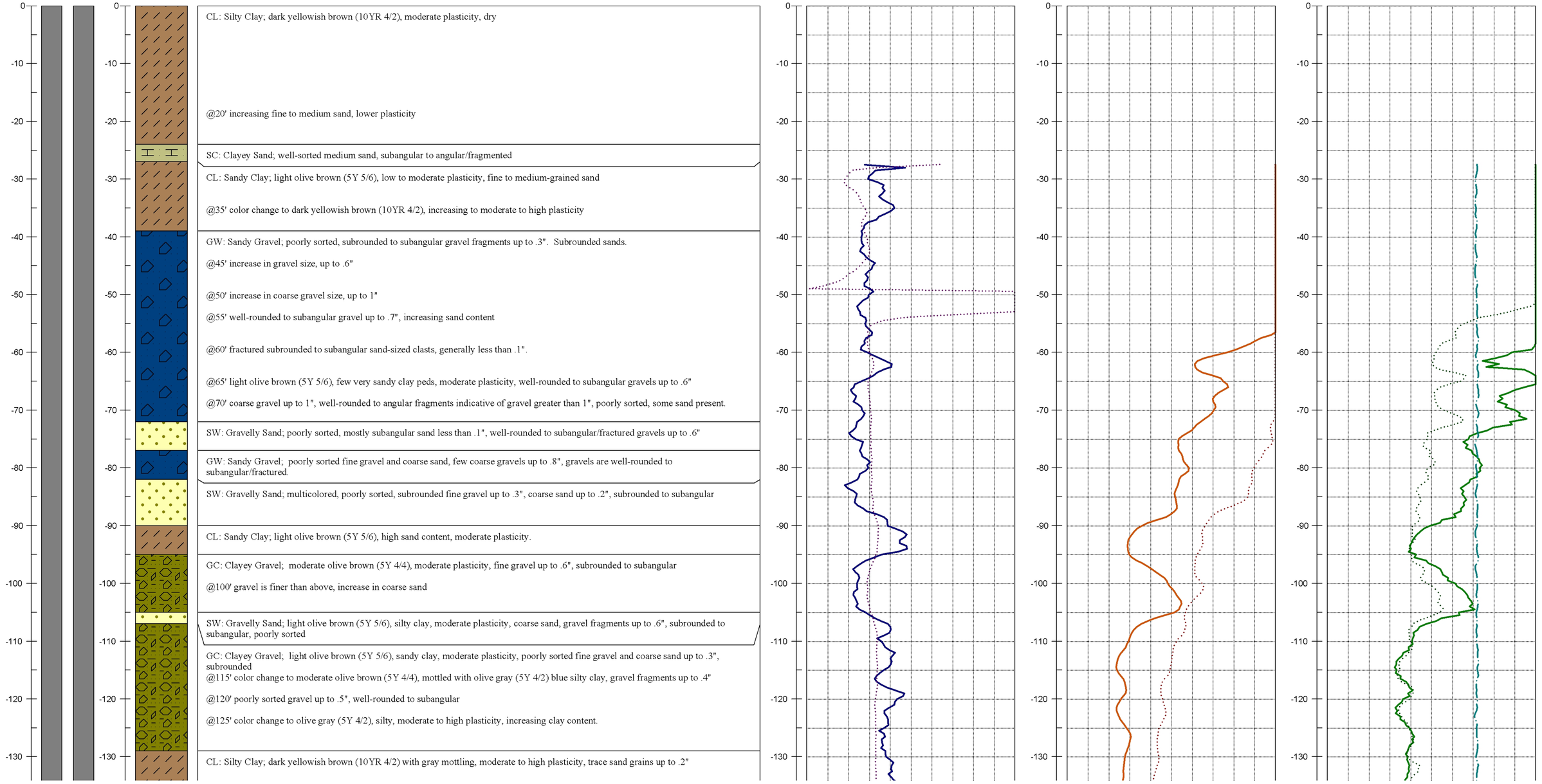
@120' poorly sorted gravel up to .5", well-rounded to subangular

@125' color change to olive gray (5Y 4/2), silty, moderate to high plasticity, increasing clay content.

CL: Silty Clay; dark yellowish brown (10YR 4/2) with gray mottling, moderate to high plasticity, trace sand grains up to .2"

GEOPHYSICAL DATA

(0 Gamma Ray (GAPI) 200)
(- Spontaneous Potential (mV) +)
(0 Short Normal (Ohm-m) 100)
(0 Long Normal (Ohm-m) 100)
(60 Temperature (Farenheit) 70)
(0 Guard (Ohm-m) 100)
(0 Point Resistivity (Ohm) 50)



ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Robin Street and Ladner Street	**DATE:** 3/25/2009	**LOGGED BY:** Douglas Young and Brad Buerer	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 5S/1W-4H005	**BORING** ROBIN-F
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary		
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 400 feet	**SHEET: 2 of 3**	

Depth (in feet) | Well Construction | Lithologic Pattern | Geophysical Sample

LITHOLOGIC DESCRIPTION

@145' lower plasticity, coarse sand/fine gravel interbeds

@155' color change to light olive gray (5Y 5/2), poorly sorted fine gravel and coarse sand

@160' increasing to moderate to high plasticity

@170' color change to olive gray (5Y 3/2), mottled light olive brown (5Y 5/6), moderate plasticity

@185' color change to light olive gray (5Y 5/2), low to moderate plasticity.

SW: Coarse Sand; multicolored, poorly sorted, subrounded to subangular, fine gravel up to .3"

CL: Sandy Clay; medium dark gray (N 4), low plasticity

SW: Coarse Sand; multicolored, fine gravel, fine sand, subrounded to subangular/fragmented coarse sand, poorly sorted

@225' medium dark gray (N 4), trace sandy clay peds, low plasticity, subrounded to subangular/fragmented coarse sand, with fine gravel up to .5" and fine sand

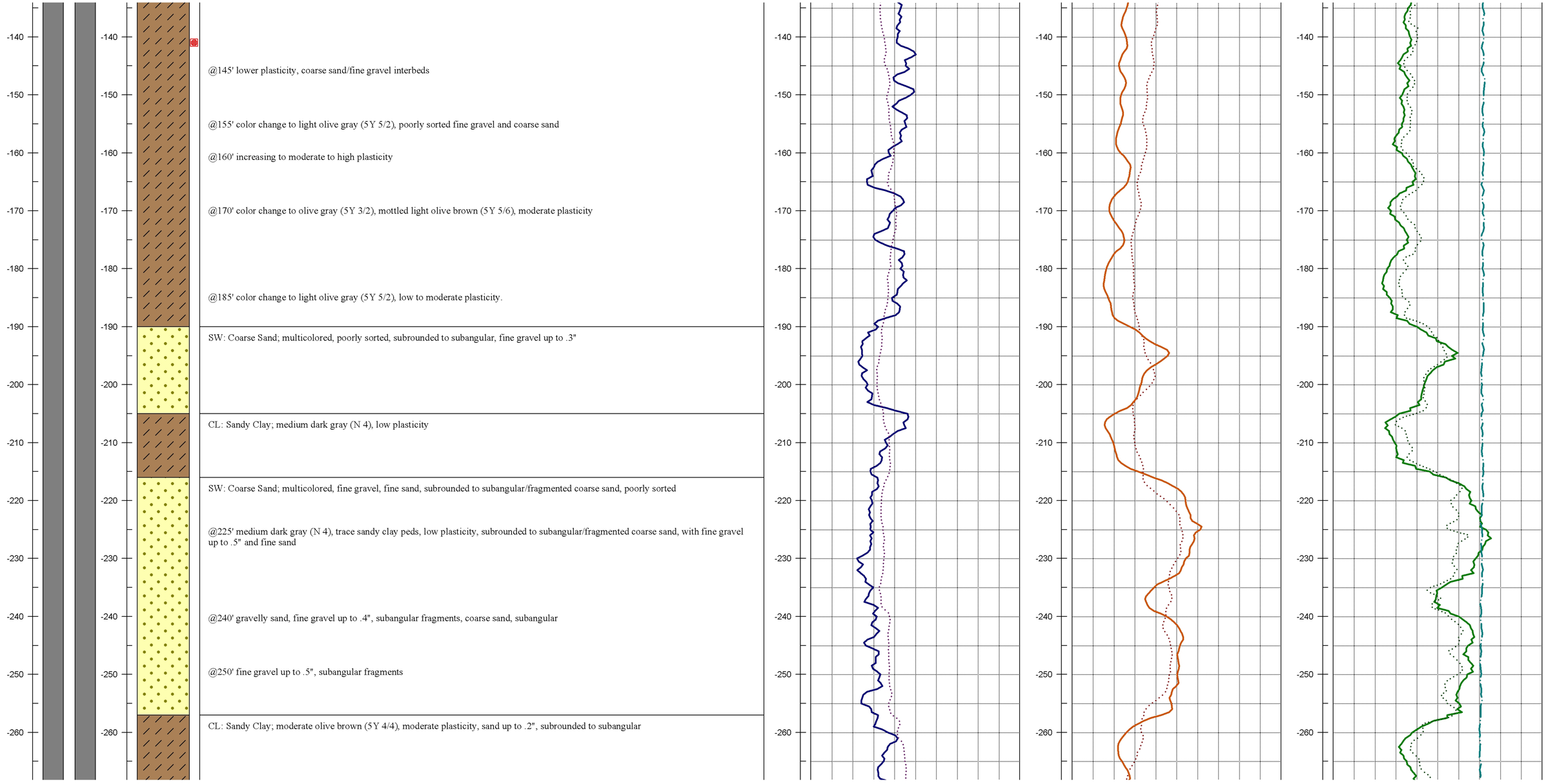
@240' gravelly sand, fine gravel up to .4", subangular fragments, coarse sand, subangular

@250' fine gravel up to .5", subangular fragments

CL: Sandy Clay; moderate olive brown (5Y 4/4), moderate plasticity, sand up to .2", subrounded to subangular

GEOPHYSICAL DATA

(0 Gamma Ray (GAPI) 200)
(- Spontaneous Potential (mV) +)
(0 Short Normal (Ohm-m) 100)
(0 Long Normal (Ohm-m) 100)
(60 Temperature (Farenheit) 70)
(0 Guard (Ohm-m) 100)
(0 Point Resistivity (Ohm) 50)



ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Robin Street and Ladner Street	**DATE:** 3/25/2009	**LOGGED BY:** Douglas Young and Brad Buerer	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 5S/1W-4H005
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary	**SHEET: 3 of 3**
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 400 feet	**BORING** ROBIN-F

Depth (in feet) | Well Construction | Lithologic Pattern | Geophysical Sample

LITHOLOGIC DESCRIPTION

@275' color change to light olive gray (5Y 5/2), increasing silt content

@280' color change to moderate olive brown (5Y 4/4), low to moderate plasticity, dry

@305' color change to light olive gray (5Y 6/2)

SC: Clayey Sand; moderate olive brown (5Y 4/4), silty, moderate to high plasticity, coarse sand up to .2", well-rounded to subangular, poorly sorted

CL: Silty Clay; light olive gray (5Y 5/2), moderate to high plasticity

GW: Fine Gravel; multicolored, up to .5", subrounded to subangular

SC: Clayey Sand; moderate olive brown (5Y 4/4), high sand content of clay, moderate plasticity, coarse sand is .1" to .2", subangular/fractured

SW: Gravelly Sand; sand is .1" to .2", fine gravel up to .3", subangular, poorly sorted, clay stringers

CL: Silty Clay; light olive gray (5Y 5/2), moderate plasticity

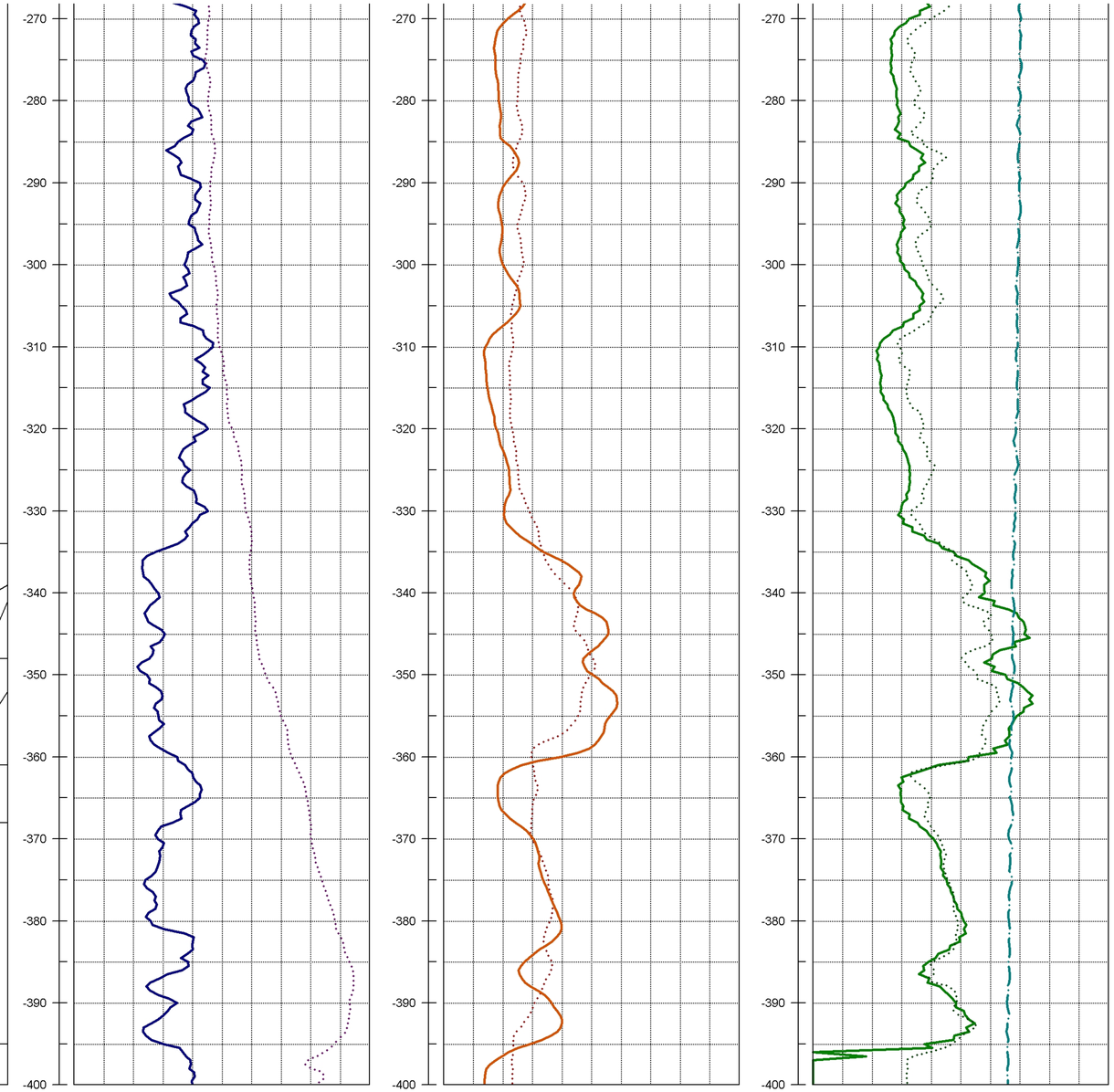
SM: Silty Sand; light olive gray (5Y 5/2), fine to medium sand, poorly sorted

@385' to 398' Interbedded clay lenses

CL: Sandy Clay; olive gray (5Y 3/2), fine sand and silt, stiff, moderate plasticity, damp

GEOPHYSICAL DATA

(0 Gamma Ray (GAPI) 200)
(- Spontaneous Potential (mV) +)
(0 Short Normal (Ohm-m) 100)
(0 Long Normal (Ohm-m) 100)
(60 Temperature (Farenheit) 70)
(0 Guard (Ohm-m) 100)
(0 Point Resistivity (Ohm) 50)



ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Robin Street and Ladner Street	**DATE:** 3/31/2009	**LOGGED BY:** Douglas Young and Brad Buerer	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 5S/1W-4H004	**BORING** ROBIN-C
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary		
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 260 feet	**SHEET: 1 of 2**	

Depth (in feet) / Well Construction / Lithologic Pattern / Geophysical Sample

LITHOLOGIC DESCRIPTION*

CL: Silty Clay; dark yellowish brown (10YR 4/2), moderate plasticity, dry

@20' increasing fine to medium sand, lower plasticity

SC: Clayey Sand; well-sorted medium sand, subangular to angular/fragmented

CL: Sandy Clay; light olive brown (5Y 5/6), low to moderate plasticity, fine to medium-grained sand

@35' color change to dark yellowish brown (10YR 4/2), increasing to moderate to high plasticity

GW: Sandy Gravel; poorly sorted, subrounded to subangular gravel fragments up to .3". Subrounded sands.

@45' increase in gravel size, up to .6"

@50' increase in coarse gravel size, up to 1"

@55' well-rounded to subangular gravel up to .7", increasing sand content

@60' fractured subrounded to subangular sand-sized clasts, generally less than .1".

@65' light olive brown (5Y 5/6), few very sandy clay peds, moderate plasticity, well-rounded to subangular gravels up to .6"

@70' coarse gravel up to 1", well-rounded to angular fragments indicative of gravel greater than 1", poorly sorted, some sand present.

SW: Gravelly Sand; poorly sorted, mostly subangular sand less than .1", well-rounded to subangular/fractured gravels up to .6"

GW: Sandy Gravel; poorly sorted fine gravel and coarse sand, few coarse gravels up to .8", gravels are well-rounded to subangular/fractured.

SW: Gravelly Sand; multicolored, poorly sorted, subrounded fine gravel up to .3", coarse sand up to .2", subrounded to subangular

CL: Sandy Clay; light olive brown (5Y 5/6), high sand content, moderate plasticity.

GC: Clayey Gravel; moderate olive brown (5Y 4/4), moderate plasticity, fine gravel up to .6", subrounded to subangular

@100' gravel is finer than above, increase in coarse sand

SW: Gravelly Sand; light olive brown (5Y 5/6), silty clay, moderate plasticity, coarse sand, gravel fragments up to .6", subrounded to subangular, poorly sorted

GC: Clayey Gravel; light olive brown (5Y 5/6), sandy clay, moderate plasticity, poorly sorted fine gravel and coarse sand up to .3", subrounded
@115' color change to moderate olive brown (5Y 4/4), mottled with olive gray (5Y 4/2) blue silty clay, gravel fragments up to .4"

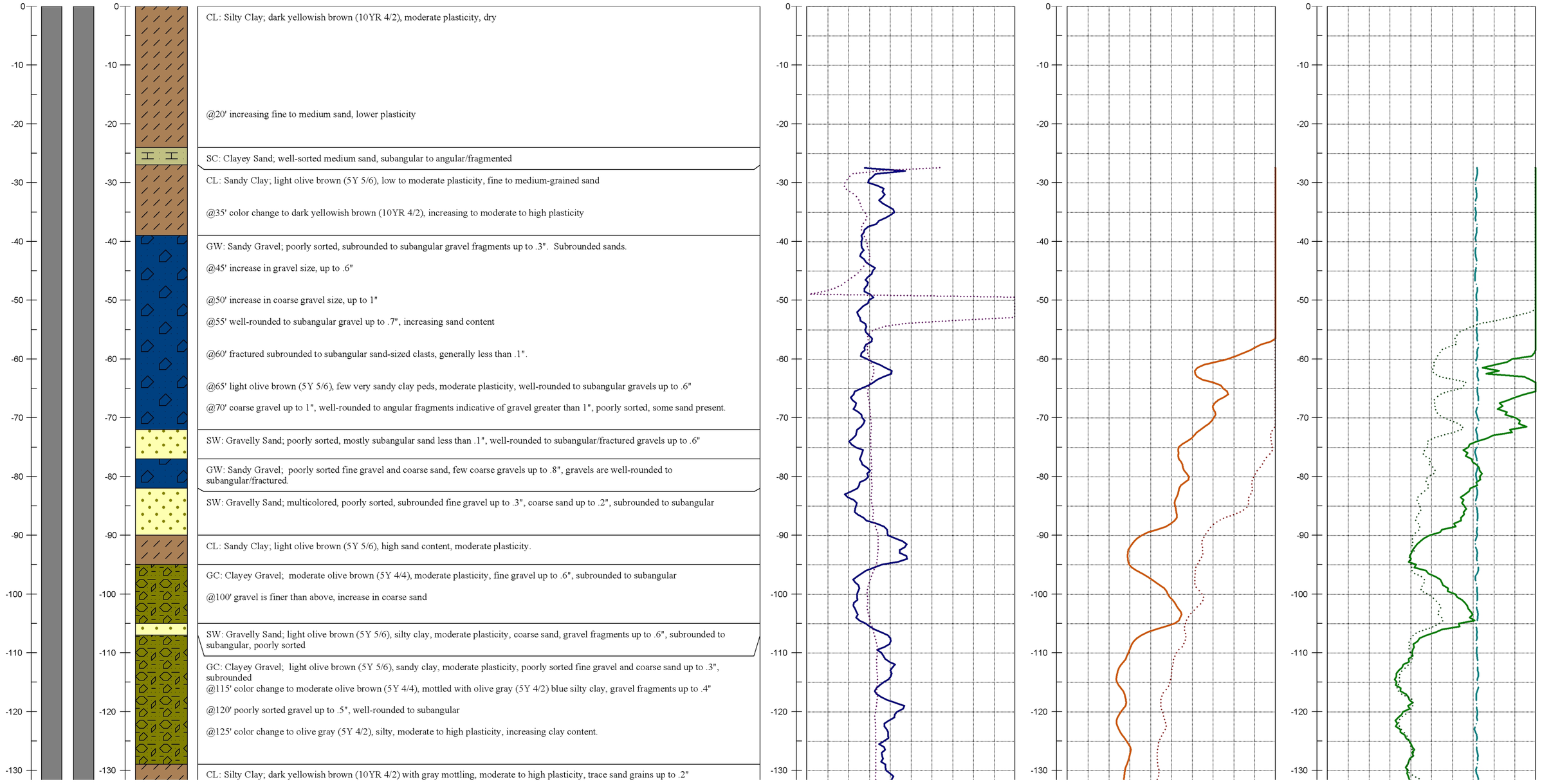
@120' poorly sorted gravel up to .5", well-rounded to subangular

@125' color change to olive gray (5Y 4/2), silty, moderate to high plasticity, increasing clay content.

CL: Silty Clay; dark yellowish brown (10YR 4/2) with gray mottling, moderate to high plasticity, trace sand grains up to .2"

GEOPHYSICAL DATA

(0 Gamma Ray (GAPI) 200)
(- Spontaneous Potential (mV) +)
(0 Short Normal (Ohm-m) 100)
(0 Long Normal (Ohm-m) 100)
(60 Temperature (Farenheit) 70)
(0 Guard (Ohm-m) 100)
(0 Point Resistivity (Ohm) 50)



***BASED ON LOG FROM:** Robin-F

ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Robin Street and Ladner Street	**DATE:** 3/31/2009	**LOGGED BY:** Douglas Young and Brad Buerer	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 5S/1W-4H004	**BORING** ROBIN-C
			ELECTRIC LOG BY: Welenco, Inc.	**DRILLING METHOD:** Mud Rotary		
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 260 feet	**SHEET: 2 of 2**	

Depth (in feet) | Well Construction | Lithologic Pattern | Geophysical Sample

LITHOLOGIC DESCRIPTION*

@145' lower plasticity, coarse sand/fine gravel interbeds

@155' color change to light olive gray (5Y 5/2), poorly sorted fine gravel and coarse sand

@160' increasing to moderate to high plasticity

@170' color change to olive gray (5Y 3/2), mottled light olive brown (5Y 5/6), moderate plasticity

@185' color change to light olive gray (5Y 5/2), low to moderate plasticity.

SW: Coarse Sand; multicolored, poorly sorted, subrounded to subangular, fine gravel up to .3"

CL: Sandy Clay; medium dark gray (N 4), low plasticity

SW: Coarse Sand; multicolored, fine gravel, fine sand, subrounded to subangular/fragmented coarse sand, poorly sorted

@225' medium dark gray (N 4), trace sandy clay peds, low plasticity, subrounded to subangular/fragmented coarse sand, with fine gravel up to .5" and fine sand

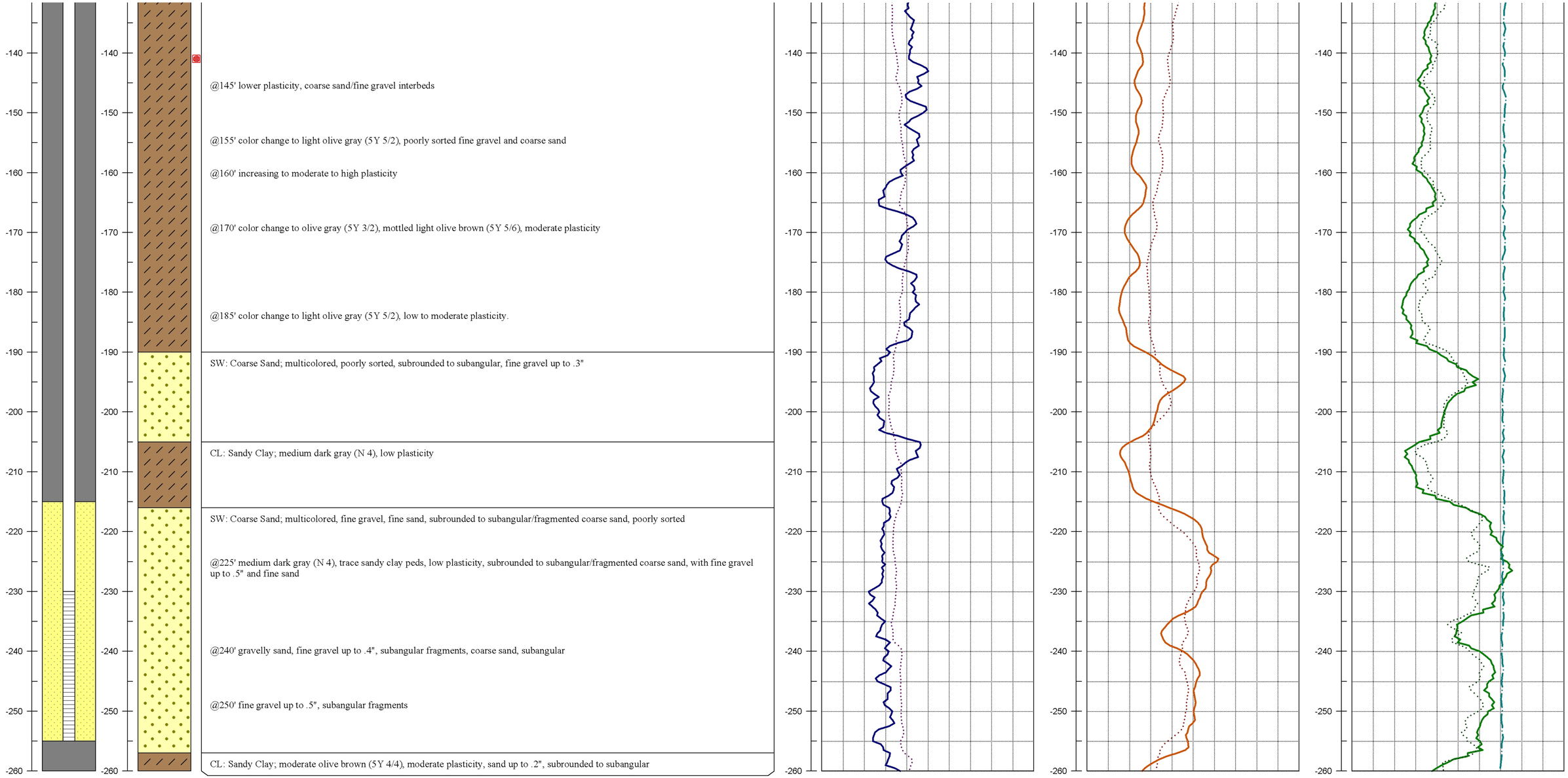
@240' gravelly sand, fine gravel up to .4", subangular fragments, coarse sand, subangular

@250' fine gravel up to .5", subangular fragments

CL: Sandy Clay; moderate olive brown (5Y 4/4), moderate plasticity, sand up to .2", subrounded to subangular

GEOPHYSICAL DATA

(0 Gamma Ray (GAPI) 200)
(- Spontaneous Potential (mV) +)
(0 Short Normal (Ohm-m) 100)
(0 Long Normal (Ohm-m) 100)
(60 Temperature (Farenheit) 70)
(0 Guard (Ohm-m) 100)
(0 Point Resistivity (Ohm) 50)



***BASED ON LOG FROM:** Robin-F

ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Serra Place	**DATE:** 1/23/2009	**LOGGED BY:** Douglas Young & Stephanie Penn	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W-32K014	**BORING** SERRA PLACE-C
			ELECTRIC LOG BY: Newman Well Surveys	**DRILLING METHOD:** Mud Rotary		
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 250 feet	**SHEET: 1 of 2**	

Depth (in feet) | Well Construction | Lithologic Pattern | Geophysical Sample

LITHOLOGIC DESCRIPTION*

SM: Silty Sand; Light Olive Brown (5 Y 5/6); fine sand and silt; well graded

CL: Sandy Clay; Light Olive Brown (5 Y 5/6); medium to fine sand; silt; trace organic material; moderate plasticity

increasing sand content @35 feet

SM: Clayey Sand; Multicolored; contains fine to coarse sand; some silt

CL: Sandy Clay; Medium Dark Gray (N4); fine to medium sand; low to moderate plasticity
Color change to Light olive gray (5 Y 5/2) @ 50 feet

SP: Sand; Multicolored; fine to coarse; poorly sorted
decreasing fine sand, some fine gravels @ 60 feet

increasing fine sand @ 65 feet

GP: Sandy Gravel; Multicolored; gravels to 3/10"; medium to coarse sand; sub-angular to rounded

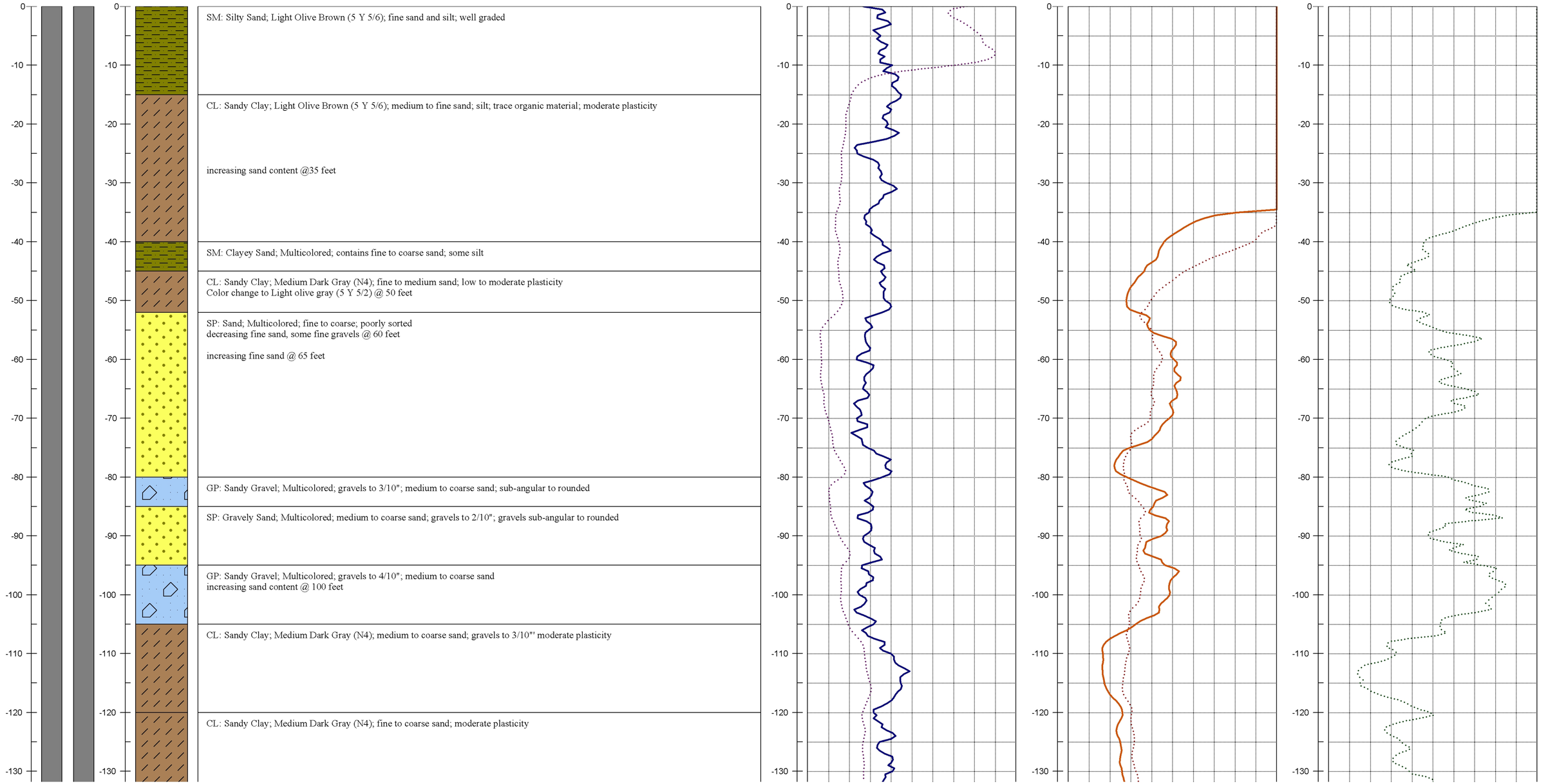
SP: Gravely Sand; Multicolored; medium to coarse sand; gravels to 2/10"; gravels sub-angular to rounded

GP: Sandy Gravel; Multicolored; gravels to 4/10"; medium to coarse sand
increasing sand content @ 100 feet

CL: Sandy Clay; Medium Dark Gray (N4); medium to coarse sand; gravels to 3/10"' moderate plasticity

CL: Sandy Clay; Medium Dark Gray (N4); fine to coarse sand; moderate plasticity

GEOPHYSICAL DATA



***BASED ON LOG FROM:** Serra Place-F

ALAMEDA COUNTY WATER DISTRICT

Inland Saltwater Intrusion Monitoring Wells Project

JOB NUMBER: 6367	**LOCATION:** Serra Place	**DATE:** 1/23/2009	**LOGGED BY:** Douglas Young & Stephanie Penn	**DRILLER:** Precision Sampling, Inc.	**STATE ID:** 4S/1W-32K014
			ELECTRIC LOG BY: Newman Well Surveys	**DRILLING METHOD:** Mud Rotary	**BORING** SERRA PLACE-C
			HOLE DIAMETER: 8.75"	**TOTAL DEPTH:** 250 feet	**SHEET: 2 of 2**

Depth (in feet) | Well Construction | Lithologic Pattern | Geophysical Sample

LITHOLOGIC DESCRIPTION*

GP: Sandy Gravel; Multicolored; gravels to 3/10"; medium to coarse sand; poorly graded; poorly sorted; angular to rounded gravels

increasing clay content @ 150

CL: Sandy Clay; Medium Dark Gray (N4); medium sand; moderate plasticity

decreasing sand content@170 feet

GP: Sandy Gravel; Multicolored; gravels to 3/10"; medium to coarse sand; poorly sorted; angular to rounded gravels

increasing sand content @ 215 feet

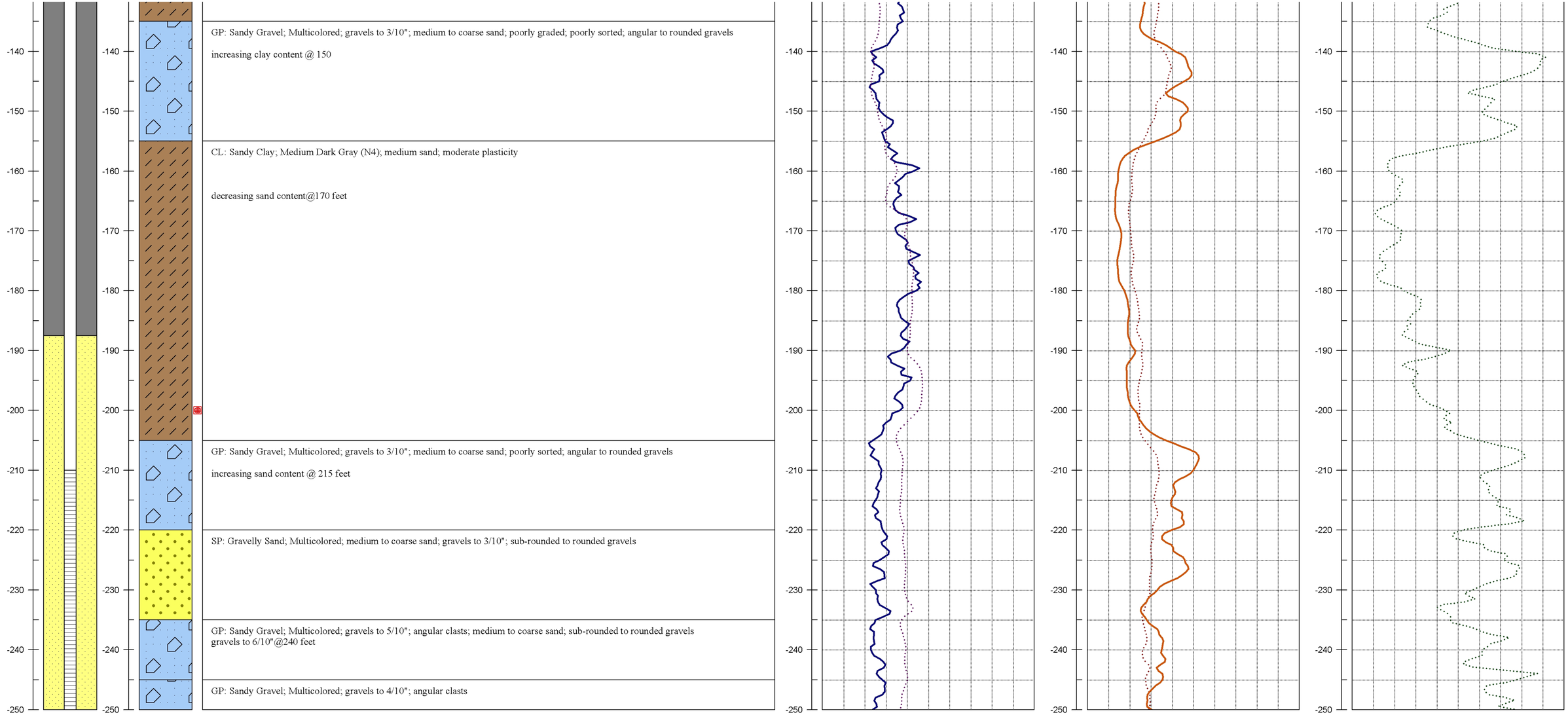
SP: Gravelly Sand; Multicolored; medium to coarse sand; gravels to 3/10"; sub-rounded to rounded gravels

GP: Sandy Gravel; Multicolored; gravels to 5/10"; angular clasts; medium to coarse sand; sub-rounded to rounded gravels
gravels to 6/10"@240 feet

GP: Sandy Gravel; Multicolored; gravels to 4/10"; angular clasts

GEOPHYSICAL DATA

(0 Gamma Ray (GAPI) 200)
(- Spontaneous Potential (mV) +)
(0 Short Normal (Ohm-m) 100)
(0 Long Normal (Ohm-m) 100)
(0 Point Resistivity (Ohm) 50)



***BASED ON LOG FROM:** Serra Place-F

ALAMEDA COUNTY WATER DISTRICT

Appendix E
Well Development Logs

ALAMEDA COUNTY WATER DISTRICT

MONITORING WELL SAMPLING RECORD

WELL ID: 4S/1W-28R003 (Fremont Library) DEPTH TO WATER: _____
PROJECT NO: Salt TOTAL DEPTH OF WELL: 295'
PROJECT NAME: Saltwater Intrusion Wells WELL DIAMETER: 2.0"
DATE: 05/22/09 CASING VOLUME: _____
SAMPLED BY: Jeremy Bautista / Greer Gozo METHOD OF PURGING: Air Lift

TIME	CUMULATIVE VOL. REMOVED (GALLONS)	TEMPERATURE (°C)	pH (UNITS)	SPECIFIC CONDUCTANCE (UMHOS/CM)	REMARKS (COLOR, TURBIDITY & SEDIMENT)
1415	1500	21.5	8.16	1440	35 NTU.
1435	1700	21.6	8.00	1430	36.3 NTU
1500	2000	23.6	7.95	1430	43.7 NTU

NOTES: _____

ALAMEDA COUNTY WATER DISTRICT

MONITORING WELL SAMPLING RECORD

WELL ID: 4S/1W-32E011 — DEPTH TO WATER: 41.5'
PROJECT NO: Saltwater Intrusion Projects — TOTAL DEPTH OF WELL:
PROJECT NAME: K — WELL DIAMETER: 2.0"
DATE: 04/14/09 — CASING VOLUME:
SAMPLED BY: J. Bautista — METHOD OF PURGING: Air Lift

TIME	CUMULATIVE VOL. REMOVED (GALLONS)	TEMPERATURE (°C)	pH (UNITS)	SPECIFIC CONDUCTANCE (UMHOS/CM)	REMARKS (COLOR, TURBIDITY & SEDIMENT)
1345	1000				still very muddy
1400	1150				still very muddy
1435	1500	15.2	8.04	1400	still too turbid; 60.1 NTU
1545	1700 (38)				
1605	1800	17.1	8.28	1310	still muddy, 974 NTU
1615	2000	17.2	8.26	1350	still muddy, 670 NTU

NOTES: Drillers on site @ 0900.

ALAMEDA COUNTY WATER DISTRICT

MONITORING WELL SAMPLING RECORD

WELL ID: 4S/1W-32K014 (Serra P.-C) DEPTH TO WATER: 48.3 *
PROJECT NO: TOTAL DEPTH OF WELL:
PROJECT NAME: WELL DIAMETER:
DATE: Tuesday March 10, 2009 CASING VOLUME:
SAMPLED BY: Bill & Chad - Precision Sampling METHOD OF PURGING:

TIME	CUMULATIVE VOL. REMOVED (GALLONS)	TEMPERATURE (°C)	pH (UNITS)	SPECIFIC CONDUCTANCE (UMHOS/CM)	REMARKS (COLOR, TURBIDITY & SEDIMENT)
1040	1500	13.8	8.14	out of range	15 gpm 184 NTU
1105	1750	15.1	8.14	out of range	15 gpm 200 NTU
1250	2000	18.0	8.07	out of range	15 gpm, collected sample 40 NTU

NOTES: * DTW is as accurate as I could get. Probe got into some mud & does not turn off. Bill measures mud depth @ approx. 55'. Bill measured well depth @ 160'. Mud too thick to get well depth.

ALAMEDA COUNTY WATER DISTRICT

MONITORING WELL SAMPLING RECORD

WELL ID: 4S/1W-32N001
PROJECT NO:
PROJECT NAME:
DATE: Wednesday, March 11, 2009
SAMPLED BY: J. Bautista

DEPTH TO WATER: 44.7'
TOTAL DEPTH OF WELL: 250'
WELL DIAMETER: 2.0"
CASING VOLUME:
METHOD OF PURGING: Air Lift

TIME	CUMULATIVE VOL. REMOVED (GALLONS)	TEMPERATURE (°C)	pH (UNITS)	SPECIFIC CONDUCTANCE (UMHOS/CM)	REMARKS (COLOR, TURBIDITY & SEDIMENT)
0940	1000	14.4	8.38	1320	25 NTU, 15GPM
0955	1150	15.4	8.28	1240	19 NTU, 15gpm
1140	1300 1400	18.1	8.23	1240	26 NTU 15 gpm
1215	1700	18.2	8.20	1190	32 29 NTU, 15 gpm
1800	2000	18.6	8.18	1220	15 NTU, 10 gpm

NOTES: Started dropping in 1.0" PVC tremie @ 1535 on 3/11. (240.0' of tremie)

ALAMEDA COUNTY WATER DISTRICT

MONITORING WELL SAMPLING RECORD

WELL ID: 1S/1W-32N002 — DEPTH TO WATER: 40.6'
PROJECT NO: — TOTAL DEPTH OF WELL: 350'
PROJECT NAME: — WELL DIAMETER: 2.0"
DATE: 03/12/09 — CASING VOLUME:
SAMPLED BY: Jeremy Bautista/Greer Goza — METHOD OF PURGING: Air Lifting

TIME	CUMULATIVE VOL. REMOVED (GALLONS)	TEMPERATURE (°C)	pH (UNITS)	SPECIFIC CONDUCTANCE (UMHOS/CM)	REMARKS (COLOR, TURBIDITY & SEDIMENT)
~~0930~~ 0900 SB	1100	15.4	8.42	Out of range	10gpm, 9 NTU
0945	1300	15.3	8.3	Out of rang	10gpm, 45 NTU (sample taken after compressor off, remnant air)
1055	1600	17.1	8.24	"	10gpm, 15.5 NTU
1100	1800	17.6	8.16	"	10gpm, 13 NTU
1130	2000	17.6	8.14	"	10gpm 9 NTU

NOTES:

ALAMEDA COUNTY WATER DISTRICT

MONITORING WELL SAMPLING RECORD

Acwd Meter Start read today 00528.0

WELL ID: 4S/1W-33R007
PROJECT NO:
PROJECT NAME: Saltwater Intrusion
DATE: Wednesday May 27, 2009
SAMPLED BY: Precision Sampling (Brian, Mac)

DEPTH TO WATER: 52.7'
TOTAL DEPTH OF WELL:
WELL DIAMETER: 2"
CASING VOLUME:
METHOD OF PURGING: airlifting

TIME	CUMULATIVE VOL REMOVED (GALLONS)	TEMPERATURE (°C)	pH (UNITS)	SPECIFIC CONDUCTANCE (UMHOS/CM)	REMARKS (COLOR, TURBIDITY & SEDIMENT)
1215	~~500~~ 500	20.6	8.19	1350	very cloudy
1310	750	21.1	8.19	1350	dirty (no silt)
1350	1000	21.1	8.17	1350	very cloudy 99.9 flashing
1520	1250	20.5	8.13	1360	looks clear 26.4
1545	1500	21.6	8.13	1360	7.6 NTU - looks clear
1623	1750	20.4	8.13	1360	5.0 NTU water clear
1654	2000	20.9	8.13	1370	3.4 NTU water clear

NOTES: 500-1,000 GAL @ 240' below surface
1,000-2,000 GAL @ 250' below surface.

Brian calculated this well produced 5-7½ Gal. per Minute

ALAMEDA COUNTY WATER DISTRICT

MONITORING WELL SAMPLING RECORD

WELL ID: 4S/1W-3M8008
PROJECT NO:
PROJECT NAME: Saltwater Intrusion Proj
DATE: Thursday May 28, 2009
SAMPLED BY: Precision Sampling (Brian & Mike)

DEPTH TO WATER: 53.1
TOTAL DEPTH OF WELL:
WELL DIAMETER: 2"
CASING VOLUME:
METHOD OF PURGING: AIRLIFTING

TIME	CUMULATIVE VOL REMOVED (GALLONS)	TEMPERATURE (°C)	pH (UNITS)	SPECIFIC CONDUCTANCE (UMHOS/CM)	REMARKS (COLOR, TURBIDITY & SEDIMENT)
1120	500	20.5	8.30	1340	41.0 NTU, water clear
1145	750	19.7	8.23	1360	21.1 NTU water clear
1205	1000	20.4	8.20	1350	~~1220~~ 13 NTU water clear
1330	1250	20.7	8.19	1320	99.9 flashing NTU Dirty water
1355	1500	21.3	8.18	1330	99.9 flashing NTU dirty w/ lot silt
1425	1750	20.3	8.19	1350	72.7 NTU 1/2 cloudy
1440	2000	20.6	~~8.31~~ 8.18	1360	67.5 NTU "1/2" cloudy

NOTES: 0032310 is the water meter start read today!
Brian calculates this well is producing 10.8 GPM
Brian calculated the last 250 gal. @ 16 GPM (He turned the air down).

ALAMEDA COUNTY WATER DISTRICT

MONITORING WELL SAMPLING RECORD

WELL ID: Robin/Landler (c) 5S/1W-04H04
PROJECT NO:
PROJECT NAME: Saltwater Intrusion Wells
DATE: Monday 4/20/09
SAMPLED BY: PM

DEPTH TO WATER: 47'
TOTAL DEPTH OF WELL:
WELL DIAMETER: 2.0
CASING VOLUME:
METHOD OF PURGING: Air lifting

TIME	CUMULATIVE VOL REMOVED (GALLONS)	TEMPERATURE (°C)	pH (UNITS)	SPECIFIC CONDUCTANCE (UMHOS/CM)	REMARKS (COLOR, TURBIDITY & SEDIMENT)
1215	600	20.8	8.12	1670	clear, 15 NTU
1400	700	22.4	8.21	1880	light brown, 1000 NTU
1440	900	22.0	8.13	1770	144 NTU (lil cloudy)
1500	1075	22.3	8.11	1800	89 NTU (lil cloudy)
1545	1300	23.6	8.09	1800	53 NTU (clear)
~~1600~~					
1630	1600	22.5	8.02	1800	35 NTU (clear)
		Tuesday 4/21/09			
Begin development @				0855	HRS
0935	1900	21.4	8.24	1830	clear (very lil cloudiness) 72 NTU
0950	2000	21.1	8.19	1830	clear 55 NTU
	Shut off @		0952	Hours	- Development complete

NOTES: Well (air) was shutdown from 1215 to 1345 (Dumping tanks full of GW & lunch).
1630 - Shut down air. Will clean up, secure site & dump both full tanks.

ACWD
ALAMEDA COUNTY WATER DISTRICT

MONITORING WELL SAMPLING RECORD

WELL ID: 5S/1W-04N05
PROJECT NO:
PROJECT NAME: Saltwater Intrusion Wells
DATE: Tuesday 4/21/09
SAMPLED BY: PM

DEPTH TO WATER: 32'
TOTAL DEPTH OF WELL:
WELL DIAMETER: 2.0
CASING VOLUME:
METHOD OF PURGING: Air lifting

TIME	CUMULATIVE VOL. REMOVED (GALLONS)	TEMPERATURE (°C)	pH (UNITS)	SPECIFIC CONDUCTANCE (UMHOS/CM)	REMARKS (COLOR, TURBIDITY & SEDIMENT)
1358	600	22.8	8.78	1200	clear, 11 NTU
1405	700	22.4	8.71	1210	clear 12 NTU
1422	800	22.3	8.61	1230	clear 12 NTU
1430	900	22.3	8.56	1220	clear 12 NTU
1608	1200	24.0	8.34	1290	clear 40 NTU
1615	1300	22.6	8.30	1280	clear 36 NTU
1640	1575	26.4	8.23	1290	clean 19 NTU
1656	1800	24.5	8.24	1170	clear 15 NTU
1700	1900	23.8	8.25	1300	clear 13 NTU

NOTES: 1300 - Begin air lifting.
1437 - I cave to empty water tanks.

ALAMEDA COUNTY WATER DISTRICT

MONITORING WELL SAMPLING RECORD

WELL ID: Noll Park
PROJECT NO:
PROJECT NAME: Saltwater Intrusion Wells
DATE: Tuesday May 26, 2009
SAMPLED BY: Precision Sampling (Brian/Mac)
DEPTH TO WATER:
TOTAL DEPTH OF WELL:
WELL DIAMETER: 2.0"
CASING VOLUME:
METHOD OF PURGING: air lift

TIME	CUMULATIVE VOL. REMOVED (GALLONS)	TEMPERATURE (°C)	pH (UNITS)	SPECIFIC CONDUCTANCE (UMHOS/CM)	REMARKS (COLOR, TURBIDITY & SEDIMENT)
1145	500	20.6	~~8.24~~ 8.24	1420	NTu too high - flashing 99.9
1235	1000	20.3	~~22.8~~ 8.13	1450	22.0 NTu. looks clear
1358	1250	20.8	8.15	1450	22.0 NTu looks clear
1420	1500	20.6	8.13	1460	7.7 NTu looks clear
1450	1750	20.8	8.09	1460	5.1 NTu looks clear
1515	2000	21.2	8.09	1460	6.2 NTu looks clear

NOTES: Tom Ringot (C.O.F. Construction inspector) stopped by & inspected sidewalks @ Noll Park. He saw no damaged sidewalks caused by Precision Drilling @ this site. He said he'd relay this to Yong Young.

Appendix F
Groundwater Sample
Laboratory Results

Alameda County Water District

Laboratory Analysis Report

ID NUMERIC	SAMPLING_POINT	Well Identification	SAMPLED DATE	NAME	TEXT	UNITS
195634	4S1W-28R03	Fremont Library-F	8/17/2009 10:18	Cl	147.5	mg/L
195634	4S1W-28R03	Fremont Library-F	8/17/2009 10:18	TDS	842	mg/L
195634	4S1W-28R03	Fremont Library-F	8/17/2009 10:18	THARD	540	mg/L
196697	4S1W-32E11	Meyer Park-C	9/9/2009 13:50	Cl	375	mg/L
196697	4S1W-32E11	Meyer Park-C	9/9/2009 13:50	TDS	910	mg/L
196697	4S1W-32E11	Meyer Park-C	9/9/2009 13:50	THARD	502	mg/L
196698	4S1W-32E12	Meyer Park-F	9/9/2009 13:51	Cl	445	mg/L
196698	4S1W-32E12	Meyer Park-F	9/9/2009 13:51	TDS	1145	mg/L
196698	4S1W-32E12	Meyer Park-F	9/9/2009 13:51	THARD	614	mg/L
195964	4S1W-32K11	Serra Place-F	8/25/2009 14:36	Cl	795	mg/L
195964	4S1W-32K11	Serra Place-F	8/25/2009 14:36	TDS	1655	mg/L
195963	4S1W-32K14	Serra Place-C	8/25/2009 14:35	Cl	660	mg/L
195963	4S1W-32K14	Serra Place-C	8/25/2009 14:35	TDS	1565	mg/L
195963	4S1W-32K14	Serra Place-C	8/25/2009 14:35	THARD	980	mg/L
195800	4S1W-32N01	Blacow-C	8/20/2009 14:28	Cl	152.5	mg/L
195800	4S1W-32N01	Blacow-C	8/20/2009 14:28	TDS	674	mg/L
195800	4S1W-32N01	Blacow-C	8/20/2009 14:28	THARD	380	mg/L
195801	4S1W-32N02	Blacow-F	8/20/2009 14:29	Cl	1331.3	mg/L
195801	4S1W-32N02	Blacow-F	8/20/2009 14:29	TDS	2460	mg/L
195801	4S1W-32N02	Blacow-F	8/20/2009 14:29	THARD	1400	mg/L
196012	4S1W-33N02	Noll Park-C	8/26/2009 13:45	Cl	1137.5	mg/L
196012	4S1W-33N02	Noll Park-C	8/26/2009 13:45	TDS	2540	mg/L
196013	4S1W-33N03	Noll Park-F	8/26/2009 13:43	Cl	290	mg/L
196013	4S1W-33N03	Noll Park-F	8/26/2009 13:43	TDS	820	mg/L
196013	4S1W-33N03	Noll Park-F	8/26/2009 13:43	THARD	580	mg/L
195635	4S1W-33R07	Margery-C	8/17/2009 11:32	Cl	133.8	mg/L
195635	4S1W-33R07	Margery-C	8/17/2009 11:32	TDS	826	mg/L
195635	4S1W-33R07	Margery-C	8/17/2009 11:32	THARD	510	mg/L
195636	4S1W-33R08	Margery-F	8/17/2009 11:34	Cl	192.5	mg/L
195636	4S1W-33R08	Margery-F	8/17/2009 11:34	TDS	804	mg/L
195636	4S1W-33R08	Margery-F	8/17/2009 11:34	THARD	500	mg/L
196076	5S1W-04H04	Robin-C	8/27/2009 14:32	Cl	350	mg/L
196076	5S1W-04H04	Robin-C	8/27/2009 14:32	TDS	992	mg/L
196076	5S1W-04H04	Robin-C	8/27/2009 14:32	THARD	670	mg/L
196075	5S1W-04H05	Robin-F	8/27/2009 14:31	Cl	232.5	mg/L
196075	5S1W-04H05	Robin-F	8/27/2009 14:31	TDS	708	mg/L
196075	5S1W-04H05	Robin-F	8/27/2009 14:31	THARD	220	mg/L

10.20.2009

Water Quality Laboratory Supervisor J.V.Kelley
Alameda County Water District

Appendix G
Permeability Laboratory Reports

PERMEABILITY TEST (ASTM D5084-90, method C)

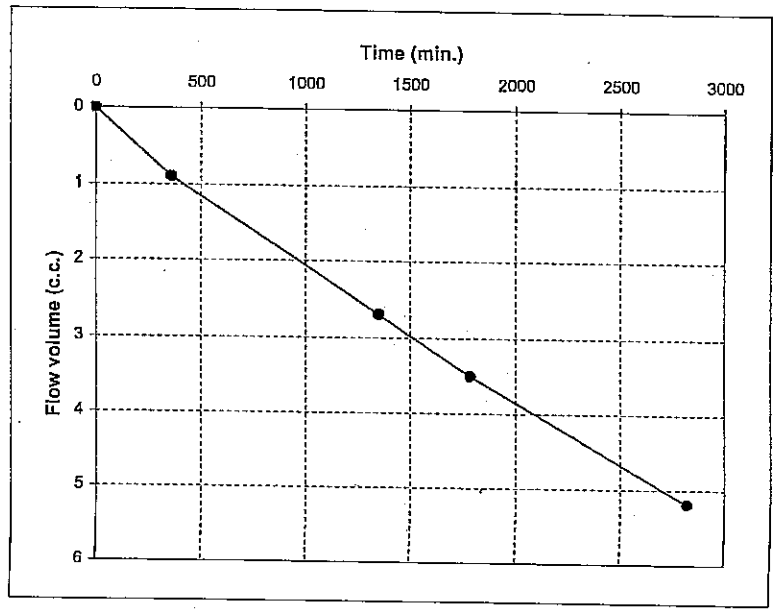
Client : Alameda County
Project : Inland SW Intrusion Study
Job # : 31055
Boring # : Blacow
Sample # : F
Depth (ft) : 121.5
Date setup for test : 02/04/09
Soil type : Olive brown clay

Specimen:

		Initial	Final	
Total wt.	=	528.6	527.3	gms
Ht.	=	3.280	3.276	in
Ave dia.	=	2.430		in
Area	=	4.640	4.627	sq.in
Volume	=	249.4	248.4	c.c.
Moisture	=	20.3	20.0	%
Total density	=	132.3	132.5	pcf
Dry density	=	109.9	110.4	pcf
Gs (Assumed)	=	2.70		
Void ratio	=	0.532	0.526	
% Saturation	=	103.0	102.6	

		Head	Tail	
Area of pipettes	=	0.885	0.885	sq. cm.

Sig3 = 20



Data reductions:

Elapsed Time (min)	Inflow (c.c.)	Outflow (c.c.)	Inflow / Outflow	h1 (cm)	h2 (cm)	Ln(h1/h2)	Rt	Gradient	K20 (cm/sec)
360.0	1.00	0.90	1.11	717.0	714.8	0.00300	0.935	86.0	1.60E-08
990.0	2.50	1.80	1.39	714.7	709.8	0.00682	0.932	85.6	1.32E-08
435.0	0.80	0.80	1.00	709.8	708.0	0.00255	0.935	85.2	1.13E-08
1035.0	2.40	1.70	1.41	708.0	703.4	0.00657	0.936	84.8	1.22E-08
315.0	0.70	0.70	1.00	703.4	701.8	0.00225	0.949	84.4	1.39E-08

Overall average: 1.33E-08

PERMEABILITY TEST (ASTM D5084-90, method C)

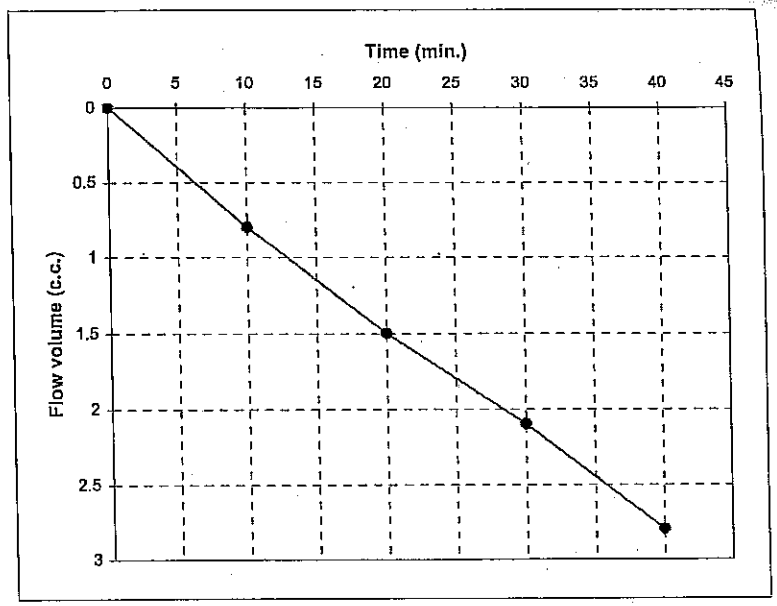
Client : Alameda County
Project : Inland SW Intrusion Study
Job # : 31055
Boring # : Blacow
Sample # : F
Depth (ft) : 261.5
Date setup for test : 02/19/09
Soil type : Olive gray sandy silt

Specimen:

	Initial	Final	
Total wt. =	497.4	494.4	gms
Ht. =	3.210	3.206	in
Ave dia. =	2.410		in
Area =	4.564	4.551	sq.in
Volume =	240.1	239.1	c.c.
Moisture =	21.7	21.0	%
Total density =	129.3	129.0	pcf
Dry density =	106.2	106.7	pcf
Gs (Assumed) =	2.70		
Void ratio =	0.586	0.579	
% Saturation =	100.0	97.7	

	Head	Tail	
Area of pipettes =	0.869	0.865	sq. cm.

Sig3 = 20



Data reductions:

Elapsed Time (min)	Inflow (c.c.)	Outflow (c.c.)	Inflow / Outflow	h1 (cm)	h2 (cm)	Ln(h1/h2)	Rt	Gradient	K20 (cm/sec)
10.0	0.80	0.80	1.00	725.4	723.5	0.00255	0.941	89.0	4.80E-07
10.0	0.70	0.70	1.00	723.5	721.9	0.00223	0.941	88.8	4.21E-07
10.0	0.60	0.60	1.00	721.9	720.5	0.00192	0.941	88.6	3.62E-07
10.0	0.70	0.70	1.00	720.5	718.9	0.00224	0.941	88.4	4.23E-07
10.0	0.70	0.70	1.00	718.9	717.3	0.00225	0.941	88.2	4.24E-07

Overall average: 4.22E-07

PERMEABILITY TEST (ASTM D5084-90, method C)

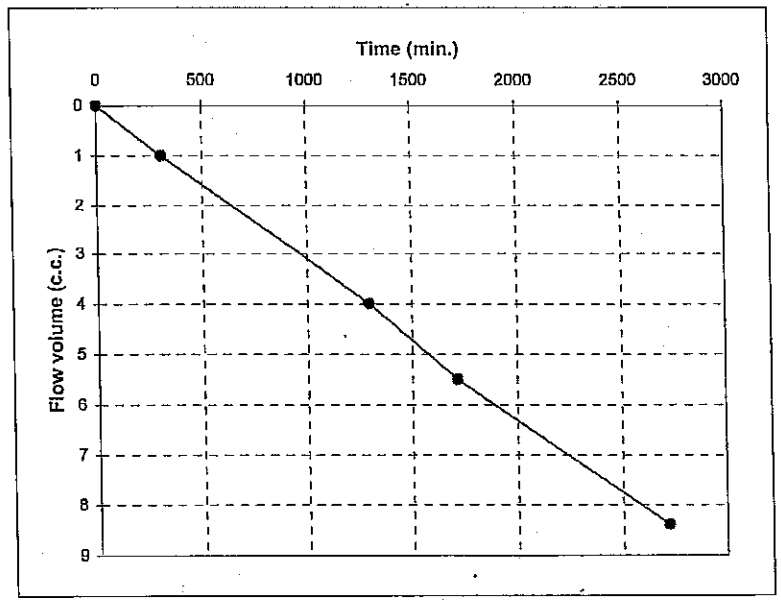
Client : Alameda County
Project : Inland SW Intrusion Study
Job # : 31055
Boring # : Blacow
Sample # : F
Depth (ft) : 391
Date setup for test : 02/19/09
Soil type : Light olive gray clay

Specimen:

	Initial	Final	
Total wt. =	489.5	486.8	gms
Ht. =	3.060	3.056	in
Ave dia. =	2.410		in
Area =	4.564	4.550	sq.in
Volume =	228.8	227.8	c.c.
Moisture =	18.8	18.1	%
Total density =	133.5	133.3	pcf
Dry density =	112.4	112.9	pcf
Gs (Assumed) =	2.70		
Void ratio =	0.499	0.493	
% Saturation =	101.5	99.2	

	Head	Tail	
Area of pipettes =	0.858	0.869	sq. cm.

Sig3 = 20



Data reductions:

Elapsed Time (min)	Inflow (c.c.)	Outflow (c.c.)	Inflow / Outflow	h1 (cm)	h2 (cm)	Ln(h1/h2)	Rt	Gradient	K20 (cm/sec)
305.0	1.30	1.00	1.30	720.6	717.9	0.00371	0.933	92.7	2.16E-08
990.0	3.20	3.00	1.07	717.9	710.7	0.01006	0.943	92.0	1.82E-08
420.0	1.30	1.50	0.87	710.7	707.5	0.00457	0.951	91.4	1.97E-08
1005.0	3.10	2.90	1.07	707.5	700.5	0.00987	0.952	90.7	1.78E-08
435.0	1.40	1.30	1.08	700.5	697.4	0.00448	0.956	90.1	1.87E-08

Overall average: 1.92E-08

PERMEABILITY TEST (ASTM D5084-90, method C)

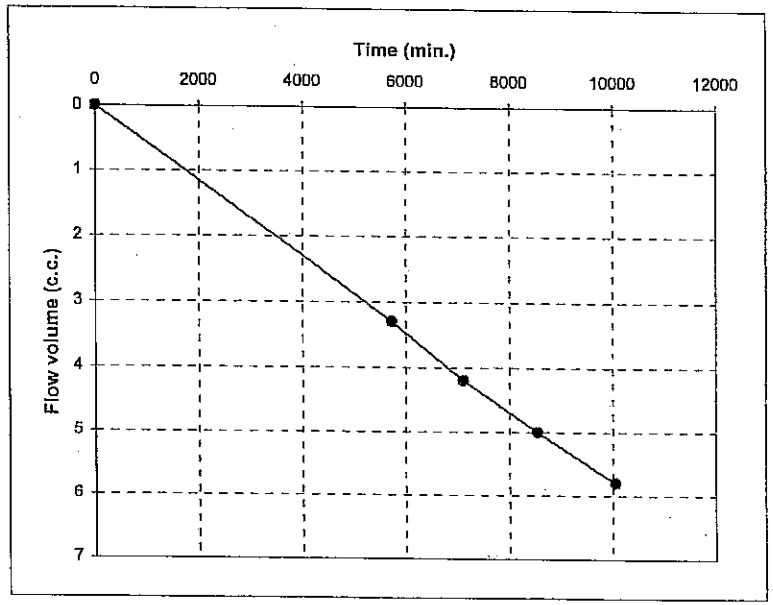
Client : Alameda County
Project : Inland Saltwater Intrusion Project
Job # : 31055
Boring # : Fremont Library
Sample # :
Depth (ft) : 161
Date setup for test : 05/19/09
Soil type : Olive gray clayey silt

Specimen:

		Initial	Final	
Total wt.	=	491.6	491.4	gms
Ht.	=	3.000	2.995	in
Ave dia.	=	2.390		in
Area	=	4.488	4.474	sq.in
Volume	=	220.6	219.6	c.c.
Moisture	=	17.9	17.9	%
Total density	=	139.0	139.6	pcf
Dry density	=	117.9	118.4	pcf
Gs (Assumed)	=	2.70		
Void ratio	=	0.429	0.423	
% Saturation	=	112.7	114.2	

		Head	Tail	
Area of pipettes	=	0.875	0.879	sq. cm.

Sig3 = 20



Data reductions:

Elapsed Time (min)	Inflow (c.c.)	Outflow (c.c.)	Inflow / Outflow	h1 (cm)	h2 (cm)	Ln(h1/h2)	Rt	Gradient	K20 (cm/sec)
5730.0	3.90	3.30	1.18	89.7	81.5	0.09607	0.952	11.2	3.07E-08
1375.0	0.90	0.90	1.00	81.5	79.4	0.02553	0.962	10.6	3.44E-08
1435.0	0.90	0.80	1.13	79.4	77.5	0.02472	0.957	10.3	3.17E-08
1510.0	0.90	0.80	1.13	77.5	75.5	0.02535	0.953	10.1	3.08E-08
1440.0	0.80	0.70	1.14	75.5	73.8	0.02292	0.949	9.8	2.91E-08

Overall average: 3.14E-08

PERMEABILITY TEST (ASTM D5084-90, method C)

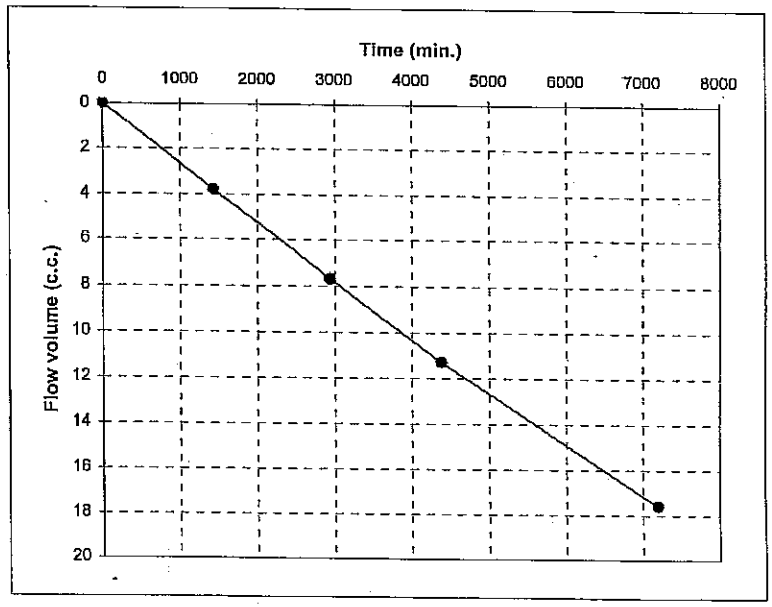
Client : Alameda County
Project : Inland Saltwater Intrusion Study
Job # : 31055
Boring # : Fremont Library
Sample # :
Depth (ft) : 241
Date setup for test : 05/19/09
Soil type : Grayish brown clay

Specimen:

		Initial	Final	
Total wt.	=	222.9	220.4	gms
Ht.	=	1.370	1.366	in
Ave dia.	=	2.400		in
Area	=	4.526	4.496	sq.in
Volume	=	101.6	100.6	c.c.
Moisture	=	17.5	16.2	%
Total density	=	136.9	136.7	pcf
Dry density	=	116.5	117.7	pcf
Gs (Assumed)	=	2.70		
Void ratio	=	0.446	0.432	
% Saturation	=	106.0	101.2	

		Head	Tail	
Area of pipettes	=	0.873	0.863	sq. cm.

Sig3 = 20



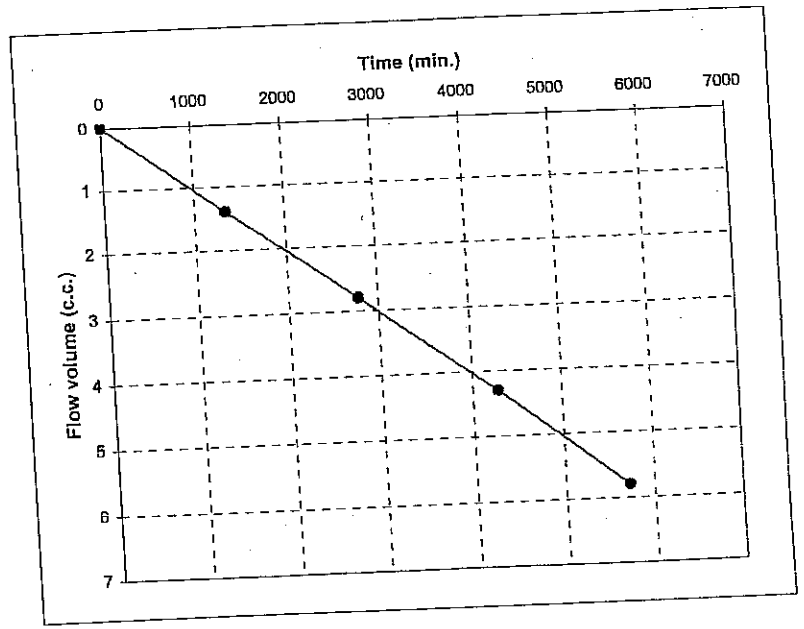
Data reductions:

Elapsed Time (min)	Inflow (c.c.)	Outflow (c.c.)	Inflow / Outflow	h1 (cm)	h2 (cm)	Ln(h1/h2)	Rt	Gradient	K20 (cm/sec)
1430.0	4.00	3.80	1.05	90.7	81.7	0.10436	0.957	24.8	6.04E-08
1510.0	3.50	3.90	0.90	81.7	73.1	0.11026	0.953	22.3	6.02E-08
1440.0	4.20	3.60	1.17	73.1	64.2	0.13100	0.949	19.8	7.47E-08
2815.0	6.40	6.30	1.02	64.2	49.5	0.25876	0.953	16.4	7.58E-08
1440.0	3.00	2.90	1.03	49.5	42.7	0.14756	0.953	13.3	8.45E-08

Overall average: 7.11E-08

PERMEABILITY TEST (ASTM D5084-90, method C)

Client : Alameda County
Project : Inland Saltwater Intrusion Study
Job # : 31055
Boring # : Fremont Library
Sample # :
Depth (ft) : 300
Date setup for test : 05/19/09
Soil type : Grayish brown clay



Specimen:

	Initial	Final	
Total wt. =	287.9	286.7	gms
Ht. =	1.790	1.785	in
Ave dia. =	2.370		in
Area =	4.413	4.390	sq.in
Volume =	129.5	128.5	c.c.
Moisture =	17.1	16.6	%
Total density =	138.8	139.3	pcf
Dry density =	118.5	119.5	pcf
Gs (Assumed) =	2.70		
Void ratio =	0.421	0.410	
% Saturation =	109.4	109.2	

	Head	Tail	
Area of pipettes =	0.856	0.873	sq. cm.

Sig3 = 20

Data reductions:

Elapsed Time (min)	Inflow (c.c.)	Outflow (c.c.)	Inflow / Outflow	h1 (cm)	h2 (cm)	Ln(h1/h2)	Rt	Gradient	K20 (cm/sec)
1340.0	1.40	1.40	1.00	90.9	87.6	0.03630	0.959	19.7	3.00E-08
1435.0	1.60	1.40	1.14	87.6	84.2	0.04044	0.957	18.9	3.11E-08
1510.0	1.50	1.50	1.00	84.2	80.7	0.04212	0.953	18.2	3.07E-08
1440.0	1.50	1.50	1.00	80.7	77.2	0.04397	0.949	17.4	3.34E-08
2815.0	2.70	2.70	1.00	77.2	71.0	0.08438	0.953	16.3	3.29E-08

Overall average: 3.16E-08

PERMEABILITY TEST (ASTM D5084-90, method C)

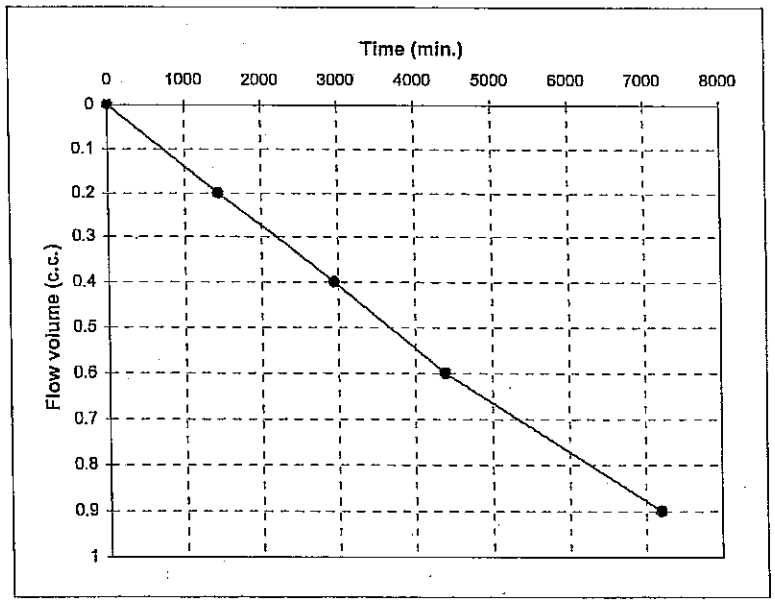
Client : Alameda County
Project : Inland Saltwater Intrusion Study
Job # : 31055
Boring # : Fremont Library
Sample # :
Depth (ft) : 370
Date setup for test : 05/19/09
Soil type : Grayish brown clay

Specimen:

		Initial	Final	
Total wt.	=	493.7	497.6	gms
Ht.	=	2.990	2.986	in
Ave dia.	=	2.400		in
Area	=	4.526	4.512	sq.in
Volume	=	221.7	220.7	c.c.
Moisture	=	17.2	18.1	%
Total density	=	138.9	140.7	pcf
Dry density	=	118.5	119.1	pcf
Gs (Assumed)	=	2.70		
Void ratio	=	0.422	0.415	
% Saturation	=	110.2	118.0	

		Head	Tail	
Area of pipettes	=	0.867	0.856	sq. cm.

Sig3 = 20



Data reductions:

Elapsed Time (min)	Inflow (c.c.)	Outflow (c.c.)	Inflow / Outflow	h1 (cm)	h2 (cm)	Ln(h1/h2)	Rt	Gradient	K20 (cm/sec)
1435.0	0.20	0.20	1.00	90.7	90.3	0.00513	0.957	11.9	6.40E-09
1510.0	0.20	0.20	1.00	90.3	89.8	0.00516	0.953	11.9	6.09E-09
1440.0	0.20	0.20	1.00	89.8	89.3	0.00518	0.949	11.8	6.39E-09
2815.0	0.50	0.30	1.67	89.3	88.4	0.01043	0.953	11.7	6.60E-09
1440.0	0.20	0.20	1.00	88.4	88.0	0.00527	0.953	11.6	6.52E-09

Overall average: 6.40E-09

PERMEABILITY TEST (ASTM D5084-90, method C)

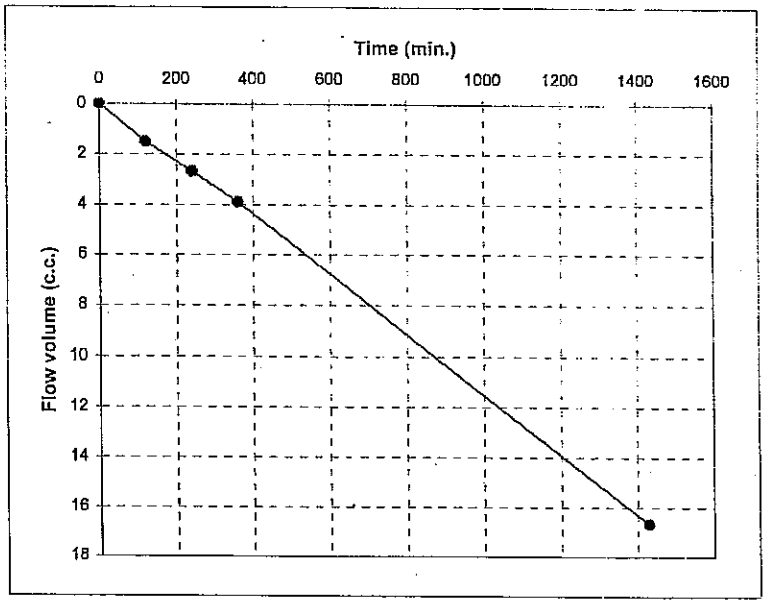
Client : Alameda County
Project : Inland Saltwater Intrusion
Job # : 31055
Boring # : Margery & Blanchard
Sample # :
Depth (ft) : 110
Date setup for test : 04/20/09
Soil type : Olive gray clay

Specimen:

		Initial	Final	
Total wt.	=	526.0	523.1	gms
Ht.	=	3.300	3.296	in
Ave dia.	=	2.430		in
Area	=	4.640	4.627	sq.in
Volume	=	250.9	249.9	c.c.
Moisture	=	20.5	19.9	%
Total density	=	130.8	130.6	pcf
Dry density	=	108.5	109.0	pcf
Gs (Assumed)	=	2.70		
Void ratio	=	0.552	0.546	
% Saturation	=	100.4	98.2	

		Head	Tail	
Area of pipettes	=	0.873	0.863	sq. cm.

Sig3 = 20



Data reductions:

Elapsed Time (min)	Inflow (c.c.)	Outflow (c.c.)	Inflow / Outflow	h1 (cm)	h2 (cm)	Ln(h1/h2)	Rt	Gradient	K20 (cm/sec)
120.0	2.00	1.50	1.33	722.0	718.0	0.00560	0.952	86.0	9.00E-08
120.0	1.70	1.20	1.42	718.0	714.6	0.00466	0.949	85.6	7.48E-08
120.0	1.40	1.20	1.17	714.6	711.6	0.00420	0.940	85.2	6.67E-08
1070.0	14.50	12.80	1.13	711.6	680.2	0.04518	0.941	83.1	8.06E-08
60.0	1.00	0.80	1.25	680.2	678.1	0.00305	0.947	81.1	9.77E-08

Overall average: 8.20E-08

PERMEABILITY TEST (ASTM D5084-90, method C)

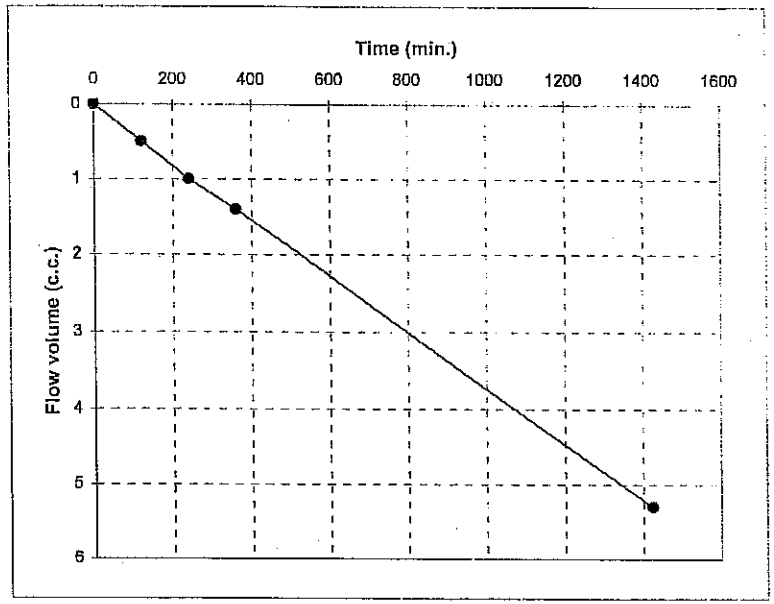
Client : Alameda County
Project : Inland Saltwater Intrusion
Job # : 31055
Boring # : Margery & Blanchard
Sample # :
Depth (ft) : 250
Date setup for test : 04/20/09
Soil type : Grayish brown clay

Specimen:

		Initial	Final	
Total wt.	=	534.7	531.2	gms
Ht.	=	3.300	3.296	in
Ave dia.	=	2.430		in
Area	=	4.640	4.627	sq.in
Volume	=	250.9	249.9	c.c.
Moisture	=	18.2	17.5	%
Total density	=	133.0	132.6	pcf
Dry density	=	112.5	112.9	pcf
Gs (Assumed)	=	2.70		
Void ratio	=	0.498	0.492	
% Saturation	=	98.9	95.8	

		Head	Tail	
Area of pipettes	=	0.856	0.873	sq. cm.

Sig3 = 20



Data reductions:

Elapsed Time (min)	Inflow (c.c.)	Outflow (c.c.)	Inflow / Outflow	h1 (cm)	h2 (cm)	Ln(h1/h2)	Rt	Gradient	K20 (cm/sec)
120.0	0.70	0.50	1.40	721.6	720.2	0.00193	0.952	86.1	3.09E-08
120.0	0.50	0.50	1.00	720.2	719.1	0.00161	0.949	86.0	2.57E-08
120.0	0.40	0.40	1.00	719.1	718.2	0.00129	0.940	85.8	2.04E-08
1065.0	4.10	3.90	1.05	718.2	708.9	0.01298	0.941	85.2	2.32E-08
60.0	0.30	0.20	1.50	708.9	708.3	0.00082	0.947	84.7	2.61E-08

Overall average: 2.52E-08

PERMEABILITY TEST (ASTM D5084-90, method C)

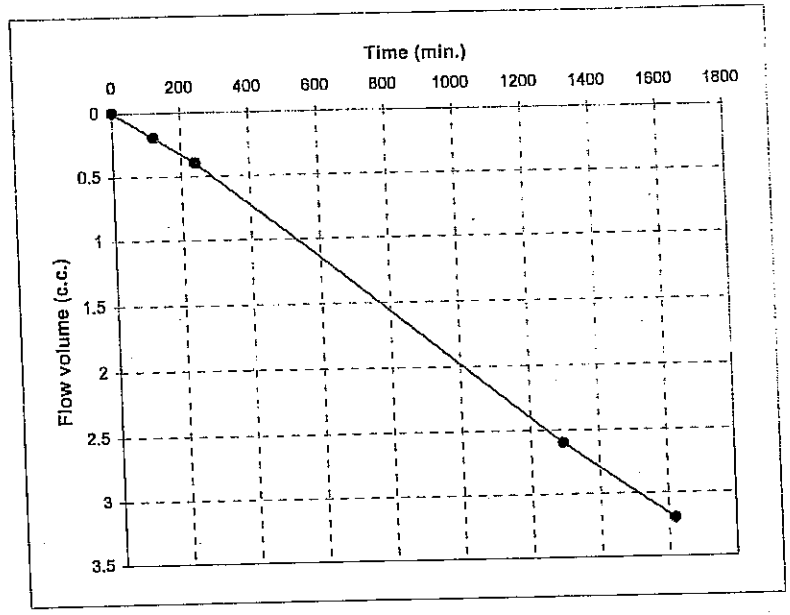
Client : Alameda County
Project : Inland Saltwater Intrusion
Job # : 31055
Boring # : Margery & Blanchard
Sample # :
Depth (ft) : 350
Date setup for test : 04/20/09
Soil type : Olive brown clay

Specimen:

	Initial	Final	
Total wt. =	541.2	541.5	gms
Ht. =	3.300	3.296	in
Ave dia. =	2.430		in
Area =	4.640	4.627	sq.in
Volume =	250.9	249.9	c.c.
Moisture =	17.3	17.4	%
Total density =	134.6	135.2	pcf
Dry density =	114.7	115.2	pcf
Gs (Assumed) =	2.70		
Void ratio =	0.469	0.463	
% Saturation =	99.8	101.5	

	Head	Tail	
Area of pipettes =	0.867	0.856	sq. cm.

Sig3 = 20



Data reductions:

Elapsed Time (min)	Inflow (c.c.)	Outflow (c.c.)	Inflow / Outflow	h1 (cm)	h2 (cm)	Ln(h1/h2)	Rt	Gradient	K20 (cm/sec)
120.0	0.20	0.20	1.00	720.1	719.6	0.00065	0.943	86.0	1.02E-08
120.0	0.20	0.20	1.00	719.6	719.2	0.00065	0.936	85.9	1.01E-08
1055.0	2.10	2.20	0.95	719.2	714.2	0.00697	0.937	85.6	1.25E-08
325.0	0.60	0.60	1.00	714.2	712.8	0.00195	0.935	85.2	1.13E-08
187.0	0.50	0.40	1.25	712.8	711.7	0.00147	0.925	85.1	1.46E-08

Overall average: 1.17E-08

PERMEABILITY TEST (ASTM D5084-90, method C)

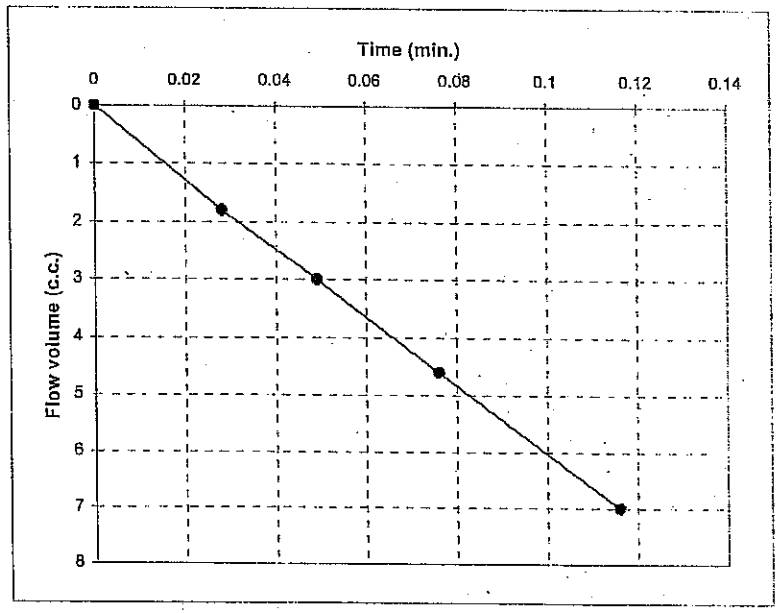
Client : Alameda County
Project : Inland Saltwater Intrusion
Job # : 31055
Boring # : Meyer Park
Sample # : F
Depth (ft) : 131
Date setup for test : 03/06/09
Soil type : Grayish brown sand

Specimen:

		Initial	Final	
Total wt.	=	666.1	656.7	gms
Ht.	=	4.510	4.505	in
Ave dia.	=	2.390		in
Area	=	4.488	4.479	sq.in
Volume	=	331.7	330.7	c.c.
Moisture	=	27.4	25.6	%
Total density	=	125.3	123.9	pcf
Dry density	=	98.3	98.6	pcf
Gs (Assumed)	=	2.70		
Void ratio	=	0.713	0.708	
% Saturation	=	103.8	97.7	

		Head	Tail	
Area of pipettes	=	0.869	0.865	sq. cm.

Sig3 = 20



Data reductions:

Elapsed Time (min)	Inflow (c.c.)	Outflow (c.c.)	Inflow / Outflow	h1 (cm)	h2 (cm)	Ln(h1/h2)	Rt	Gradient	K20 (cm/sec)
0.0	1.80	1.80	1.00	723.1	718.9	0.00576	0.970	63.0	5.71E-04
0.0	1.20	1.20	1.00	718.9	716.2	0.00386	0.970	62.7	5.10E-04
0.0	1.70	1.60	1.06	716.2	712.3	0.00533	0.970	62.4	5.48E-04
0.0	2.30	2.40	0.96	712.3	706.9	0.00764	0.970	62.0	5.30E-04
0.0	2.00	2.00	1.00	706.9	702.3	0.00655	0.970	61.6	5.19E-04

Overall average: 5.36E-04

PERMEABILITY TEST (ASTM D5084-90, method C)

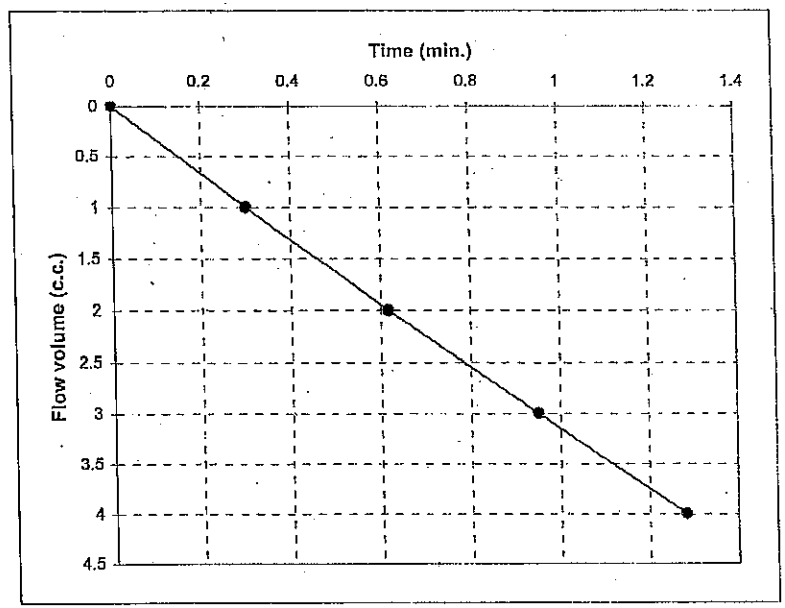
Client : Alameda County
Project : Inland Saltwater Intrusion
Job # : 31055
Boring # : Meyer Park
Sample # : F
Depth (ft) : 161
Date setup for test : 03/06/09
Soil type : Olive gray sandy silt

Specimen:

	Initial	Final	
Total wt. =	557.2	561.3	gms
Ht. =	3.510	3.505	in
Ave dia. =	2.390		in
Area =	4.488	4.476	sq.in
Volume =	258.1	257.1	c.c.
Moisture =	17.6	18.5	%
Total density =	134.7	136.2	pcf
Dry density =	114.5	115.0	pcf
Gs (Assumed) =	2.70		
Void ratio =	0.471	0.466	
% Saturation =	100.9	107.2	

	Head	Tail	
Area of pipettes =	0.871	0.877	sq. cm.

Sig3 = 20



Data reductions:

Elapsed Time (min)	Inflow (c.c.)	Outflow (c.c.)	Inflow / Outflow	h1 (cm)	h2 (cm)	Ln(h1/h2)	Rt	Gradient	K20 (cm/sec)
0.3	1.00	1.00	1.00	722.7	720.5	0.00317	0.946	81.0	2.24E-05
0.3	1.00	1.00	1.00	720.5	718.2	0.00318	0.946	80.8	2.13E-05
0.3	1.00	1.00	1.00	718.2	715.9	0.00319	0.946	80.5	2.04E-05
0.3	1.00	1.00	1.00	715.9	713.6	0.00320	0.946	80.3	2.04E-05
0.4	1.00	1.00	1.00	713.6	711.3	0.00321	0.946	80.0	1.95E-05

Overall average: 2.08E-05

PERMEABILITY TEST (ASTM D5084-90, method C)

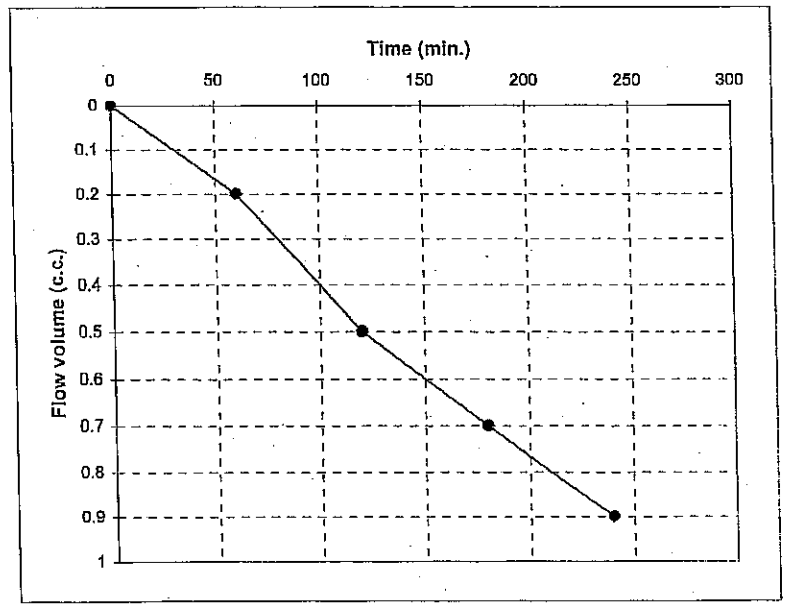
Client : Alameda County
Project : Inland Saltwater Intrusion
Job # : 31055
Boring # : Meyer Park
Sample # : F
Depth (ft) : 271
Date setup for test : 03/06/09
Soil type :

Specimen:

	Initial	Final	
Total wt. =	564.2	563.2	gms
Ht. =	3.510	3.506	in
Ave dia. =	2.410		in
Area =	4.564	4.552	sq.in
Volume =	262.5	261.5	c.c.
Moisture =	20.1	19.9	%
Total density =	134.1	134.4	pcf
Dry density =	111.7	112.1	pcf
Gs (Assumed) =	2.70		
Void ratio =	0.508	0.503	
% Saturation =	106.7	106.8	

	Head	Tail	
Area of pipettes =	0.885	0.885	sq. cm.

Sig3 = 20



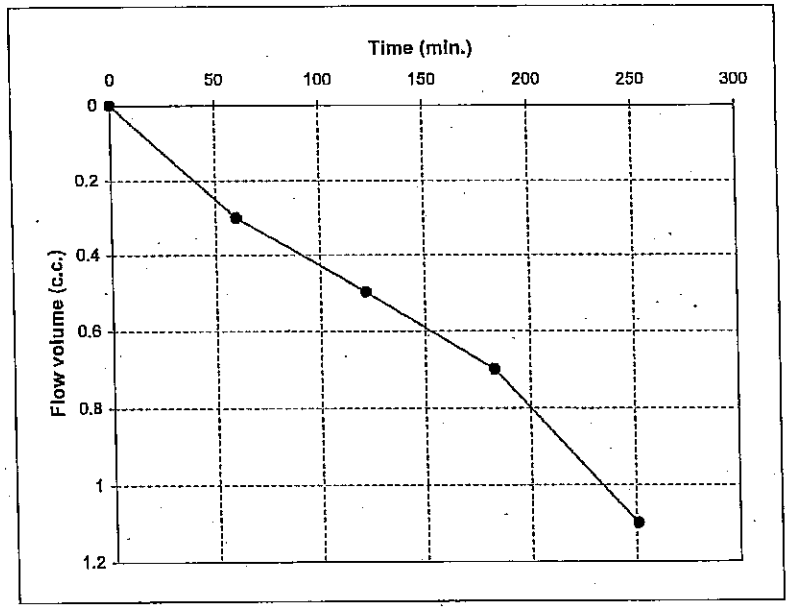
Data reductions:

Elapsed Time (min)	Inflow (c.c.)	Outflow (c.c.)	Inflow / Outflow	h1 (cm)	h2 (cm)	Ln(h1/h2)	Rt	Gradient	K20 (cm/sec)
60.0	0.40	0.20	2.00	718.1	717.4	0.00094	0.964	80.6	3.39E-08
60.0	0.30	0.30	1.00	717.4	716.7	0.00095	0.970	80.5	3.42E-08
60.0	0.20	0.20	1.00	716.7	716.3	0.00063	0.974	80.5	2.29E-08
60.0	0.20	0.20	1.00	716.3	715.8	0.00063	0.978	80.4	2.30E-08
1095.0	3.80	3.40	1.12	715.8	707.7	0.01143	0.968	79.9	2.26E-08

Overall average: 2.73E-08

PERMEABILITY TEST (ASTM D5084-90, method C)

Client : Alameda County
Project : Inland Saltwater Intrusion
Job # : 31055
Boring # : Meyer Park
Sample # : F
Depth (ft) : 381
Date setup for test : 03/06/09
Soil type :



Specimen:

		Initial	Final	
Total wt.	=	559.4	560.8	gms
Ht.	=	3.570	3.566	in
Ave dia.	=	2.400		in
Area	=	4.526	4.514	sq.in
Volume	=	264.8	263.8	c.c.
Moisture	=	18.6	18.9	%
Total density	=	131.8	132.7	pcf
Dry density	=	111.2	111.6	pcf
Gs (Assumed)	=	2.70		
Void ratio	=	0.515	0.509	
% Saturation	=	97.3	99.9	

		Head	Tail	
Area of pipettes	=	0.885	0.885	sq. cm.

Sig3 = 20

Data reductions:

Elapsed Time (min)	Inflow (c.c.)	Outflow (c.c.)	Inflow / Outflow	h1 (cm)	h2 (cm)	Ln(h1/h2)	Rt	Gradient	K20 (cm/sec)
60.0	0.30	0.30	1.00	719.7	719.0	0.00094	0.932	79.4	3.36E-08
62.0	0.30	0.20	1.50	719.0	718.4	0.00079	0.927	79.4	2.70E-08
61.0	0.30	0.20	1.50	718.4	717.9	0.00079	0.921	79.3	2.72E-08
68.0	0.30	0.40	0.75	717.9	717.1	0.00110	0.926	79.2	3.44E-08
784.0	3.50	3.50	1.00	717.1	709.2	0.01110	0.938	78.7	3.04E-08

Overall average: 3.05E-08

PERMEABILITY TEST (ASTM D5084-90, method C)

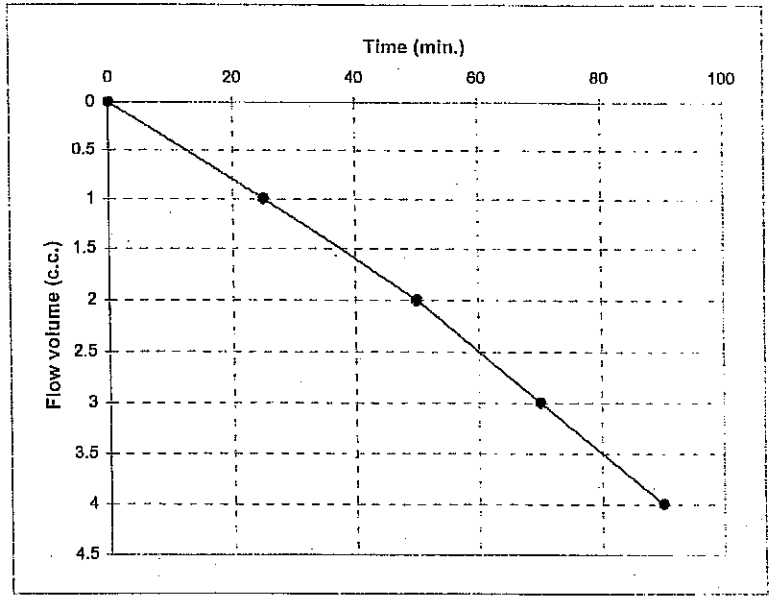
Client : Alameda County
Project : Inland Saltwater Intrusion
Job # : 31055
Boring # : Robin
Sample # : F
Depth (ft) : 141
Date setup for test : 03/25/09
Soil type : Olive gray silt with clay

Specimen:

		Initial	Final	
Total wt.	=	605.3	592.4	gms
Ht.	=	4.000	3.996	in
Ave dia.	=	2.410		in
Area	=	4.564	4.553	sq.in
Volume	=	299.1	298.1	c.c.
Moisture	=	26.0	23.3	%
Total density	=	126.3	124.0	pcf
Dry density	=	100.2	100.5	pcf
Gs (Assumed)	=	2.70		
Void ratio	=	0.681	0.676	
% Saturation	=	103.1	93.2	

		Head	Tail	
Area of pipettes	=	0.867	0.856	sq. cm.

Sig3 = 20



Data reductions:

Elapsed Time (min)	Inflow (c.c.)	Outflow (c.c.)	Inflow / Outflow	h1 (cm)	h2 (cm)	Ln(h1/h2)	Rt	Gradient	K20 (cm/sec)
25.0	1.00	1.00	1.00	721.4	719.0	0.00322	0.947	71.0	3.03E-07
25.0	1.00	1.00	1.00	719.0	716.7	0.00323	0.948	70.7	3.04E-07
20.0	1.00	1.00	1.00	716.7	714.4	0.00324	0.948	70.5	3.82E-07
20.0	1.00	1.00	1.00	714.4	712.1	0.00326	0.949	70.3	3.83E-07
20.0	1.00	1.00	1.00	712.1	709.7	0.00327	0.951	70.0	3.85E-07

Overall average: 3.51E-07

PERMEABILITY TEST (ASTM D5084-90, method C)

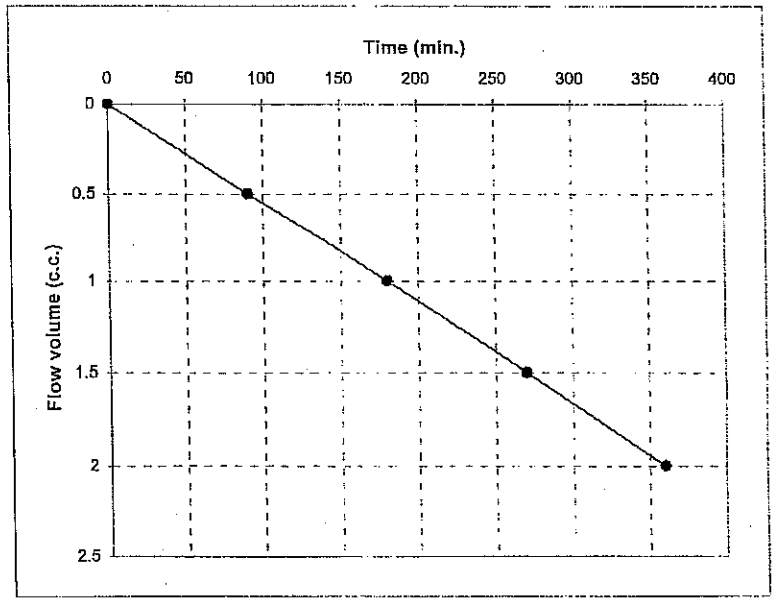
Client : Alameda County
Project : Inland Saltwater Intrusion
Job # : 31055
Boring # : Robin
Sample # : F
Depth (ft) : 281
Date setup for test : 03/25/09
Soil type : Olive brown clay

Specimen:

	Initial	Final	
Total wt. =	601.6	600.6	gms
Ht. =	3.740	3.736	in
Ave dia. =	2.410		in
Area =	4.564	4.553	sq.in
Volume =	279.7	278.7	c.c.
Moisture =	18.4	18.2	%
Total density =	134.2	134.5	pcf
Dry density =	113.3	113.7	pcf
Gs (Assumed) =	2.70		
Void ratio =	0.487	0.481	
% Saturation =	102.2	102.3	

	Head	Tail	
Area of pipettes =	0.856	0.873	sq. cm.

Sig3 = 20



Data reductions:

Elapsed Time (min)	Inflow (c.c.)	Outflow (c.c.)	Inflow / Outflow	h1 (cm)	h2 (cm)	Ln(h1/h2)	Rt	Gradient	K20 (cm/sec)
90.0	0.50	0.50	1.00	720.4	719.3	0.00161	0.973	75.9	4.04E-08
90.0	0.50	0.50	1.00	719.3	718.1	0.00161	0.971	75.7	4.04E-08
90.0	0.50	0.50	1.00	718.1	717.0	0.00161	0.964	75.6	4.02E-08
90.0	0.50	0.50	1.00	717.0	715.8	0.00162	0.954	75.5	3.98E-08
90.0	0.50	0.50	1.00	715.8	714.6	0.00162	0.949	75.4	3.97E-08

Overall average: 4.01E-08

PERMEABILITY TEST (ASTM D5084-90, method C)

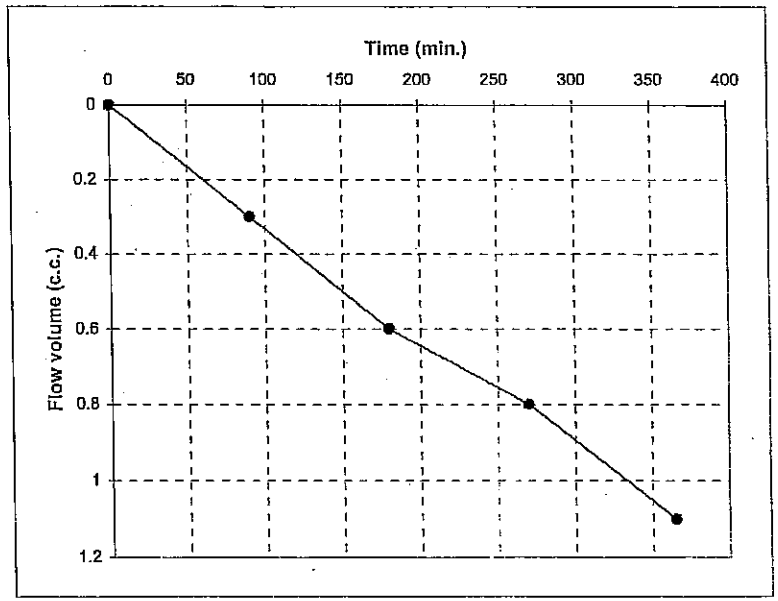
Client : Alameda County
Project : Inland Saltwater Intrusion
Job # : 31055
Boring # : Robin
Sample # : F
Depth (ft) : 400
Date setup for test : 03/25/09
Soil type : Olive gray clayey silt

Specimen:

		Initial	Final	
Total wt.	=	590.4	580.7	gms
Ht.	=	3.730	3.726	in
Ave dia.	=	2.410		in
Area	=	4.564	4.553	sq.in
Volume	=	278.9	277.9	c.c.
Moisture	=	20.8	18.8	%
Total density	=	132.1	130.4	pcf
Dry density	=	109.4	109.8	pcf
Gs (Assumed)	=	2.70		
Void ratio	=	0.540	0.535	
% Saturation	=	103.7	94.7	

		Head	Tail	
Area of pipettes	=	0.885	0.885	sq. cm.

Sig3 = 20



Data reductions:

Elapsed Time (min)	Inflow (c.c.)	Outflow (c.c.)	Inflow / Outflow	h1 (cm)	h2 (cm)	Ln(h1/h2)	Rt	Gradient	K20 (cm/sec)
90.0	0.30	0.30	1.00	713.6	712.9	0.00095	0.962	75.4	2.41E-08
90.0	0.30	0.30	1.00	712.9	712.2	0.00095	0.953	75.3	2.39E-08
90.0	0.30	0.20	1.50	712.2	711.7	0.00079	0.940	75.2	1.97E-08
95.0	0.20	0.30	0.67	711.7	711.1	0.00079	0.922	75.2	1.83E-08
85.0	0.30	0.30	1.00	711.1	710.4	0.00095	0.911	75.1	2.43E-08

Overall average: 2.21E-08