

*Alameda
County
Water
District*

**Final Report
SOUTHWEST NILES CONE
MONITORING WELLS PROJECT**

ACWD
ALAMEDA COUNTY WATER DISTRICT

SOUTHWEST NILES CONE MONITORING WELLS PROJECT

DWR Agreement 4600004071

Prepared for
State of California
Department of Water Resources
Conjunctive Water Management Branch
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May 7, 2007

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SOUTHWEST NILES CONE MONITORING WELLS PROJECT

1.0 EXECUTIVE SUMMARY

This report presents the results of the assessment of the geologic and hydrogeologic conditions in the southwest portion of the Niles Cone Groundwater Basin (NCGB). Key goals of this project were to: 1) collect geologic and hydrogeologic data, 2) characterize existing groundwater quality and evaluate the potential for saltwater intrusion within the water-bearing zones encountered, and 3) establish long-term groundwater monitoring points.

On June 1, 2005, the Alameda County Water District (ACWD) entered into an agreement with the State of California Department of Water Resources (DWR) for the installation of eight monitoring wells at two sites in the southwestern portion of ACWD's service area. The two proposed drilling sites were located within the Don Edwards National Wildlife Refuge operated by the U.S. Fish and Wildlife Service. The wells were proposed in these areas due to the lack of geologic and hydrogeologic information in this region and the need for long-term groundwater monitoring points to establish groundwater quality.

Field activities at the first drill site, DE1, were conducted between September 2006 and January 2007. Due to the discovery of an additional deep aquifer zone, an additional monitoring well was completed at this location. During implementation of field activities, ACWD was made aware that the second drill site, DE2, historically became submerged during extreme high tide conditions. Subsequently, drill site DE2 was abandoned. Based on project goals, site availability, and site access, an alternate drilling location was identified at the end of AutoMall Parkway along the southern side of the road within the City of Fremont right-of-way (identified as the AutoMall drill site). The location of this alternate drilling site satisfied the requirements of the well installation project since it is in the southwest portion of the Niles Cone Groundwater Basin where there is a lack of geologic and hydrogeologic data. Due to the existence of an upper aquifer monitoring well (Newark Aquifer) in the vicinity of the drill site, the proposed upper aquifer monitoring well originally proposed for the second drill site was eliminated. Therefore, the total number of wells in the project (8) remained unchanged. Drilling at the alternate location was conducted between December 2006 and February 2007.

Detailed lithologic characterizations and electric logs were conducted at each of the two drill sites. The locations of the drill sites were selected based on their proximity to inferred major depositional channels identified in DWR's Bulletin No. 118-1. Significant amounts of sands and gravels were encountered in both logged borings at depths comparable to the Newark, Centerville, and Fremont Aquifers. In the boring at the DE1 drill site, a thick Fremont Aquifer zone was encountered (105 feet thick) separated by relatively low permeable silt (20 feet thick) indicating a potential sub-division of the

aquifer. In addition to the relatively high permeable sand and gravel zones encountered above, moderately permeable sands and gravels were encountered at depths at both of the drilling sites which correspond to the Deep 1 and Deep 2 Aquifers. The thickness of the sands and gravels encountered and the observed high permeability of the zones indicate the project was successful in intercepting the targeted inferred depositional channels.

Nine samples of fine grained material (aquitards) between water-bearing zones that are equivalent in elevation to the Newark, Centerville, Fremont, and Deep Aquifers were collected for permeability testing. Results of the testing ranged from 1.85×10^{-9} centimeters/second (cm/sec) to 2.26×10^{-7} cm/sec. The results indicate a low vertical transmission rate between aquifers.

Groundwater samples collected from the monitoring wells were analyzed for chloride, hardness, and total dissolved solids. The three samples collected from the Deep Aquifers documented chloride, hardness, and total dissolved solids concentrations ranging from 12.5 parts per million (ppm) to 113.6 ppm, 26 ppm to 80.62 ppm, and 370 ppm to 548 ppm, respectively. The two samples collected from the Centerville Aquifer documented chloride, hardness, and total dissolved solids concentrations ranging from 81.44 ppm to 494.38 ppm, 105.49 ppm to 1,440 ppm, and 417 ppm to 1,791 ppm, respectively. The two samples collected from the Fremont Aquifer documented chloride, hardness, and total dissolved solids concentrations ranging from 13.0 ppm to 113.6 ppm, 209.58 ppm to 386 ppm, and 74 ppm to 627 ppm, respectively. The single sample collected from the Newark Aquifer documented chloride, hardness, and total dissolved solids concentrations of 37,000 ppm, 14,600 ppm, and 64,046 ppm, respectively.

The data collected during this study made a significant contribution to the understanding of the southwest portion of the NCGB. On-going monitoring of the wells will 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 Southwest Niles Cone Monitoring Wells Project were accomplished.

2.0 INTRODUCTION

The purpose of this project was to collect geologic data, supplement the existing groundwater monitoring network, and evaluate groundwater quality. To obtain these goals, ACWD installed eight groundwater monitoring wells in locations where there is a lack of geologic and hydrogeologic information in the southwest region of the NCGB (Figure 1).

The original proposal called for the installation of eight monitoring wells at two sites, each consisting of a cluster of four wells (Figure 2). One pilot boring was to be drilled at each site to a total depth of 800 feet below ground surface or to bedrock to obtain a detailed geologic profile of the alluvial material. Each of the pilot borings would then be converted into monitoring wells screened within the aquifers encountered above 600 feet. Each cluster would consist of monitoring wells completed in four separate water-bearing zones.

2.1 Background

On June 1, 2005, ACWD was awarded a DWR Local Groundwater Management Assistance Program Grant for implementation of the Southwest Niles Cone Monitoring Wells Project. A Notice of Commitment from DWR was received by ACWD on July 30, 2005 along with the grant agreement (4600004071). DWR's grant agreement was approved by ACWD's Board of Directors on August 18, 2005.

2.2 Project Goals and Objectives

The primary goals of this project were to drill and install eight groundwater monitoring wells in the southwest portion of ACWD's service area and to obtain geologic and hydrogeologic information in this critical area. The specific objectives of the project as stated in ACWD's proposal are summarized below:

- Drill two 800 foot exploratory borings and install monitoring wells completed in the lowermost water-bearing zone above depths of 600 feet below ground surface (bgs) in two locations as identified in Figure 2.
- Install an additional three monitoring wells in separate water-bearing zones above 400 feet bgs at each proposed well cluster location in Figure 2.
- 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 eight wells.
- Collect aquifer specific groundwater quality data from the eight wells.

- Gain understanding of the geology and hydrogeology of the southwest region of the NCGB.
- 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 with stakeholders.
- Share information with other interested parties by including the results in ACWD's annual Groundwater Monitoring Report.

2.3 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, water quality conditions, and to provide 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 the discovery of an additional deep aquifer zone and relocation of one of the drilling sites due to occasional flooding during the highest tide conditions. Subsequently, an additional monitoring well was added to the first drill site, DE1, and the second drill site, DE2, was relocated and the new drill site identified as AutoMall (Figure 3). The alternate drilling location was identified at the end of AutoMall Parkway along the southern side of the road within the City of Fremont right-of-way. The location of this drilling site satisfies the requirements of the well installation project in that it is in the southwest portion of the Niles Cone Groundwater Basin where there is a lack of geologic and hydrogeologic data. Additionally, there exists an upper aquifer monitoring well near the AutoMall drill site, making it unnecessary to complete the proposed upper aquifer monitoring well for this cluster.

As a result, the final overall project scope remained unchanged with the installation of eight wells at two sites, five monitoring wells in a cluster at one site, and three monitoring wells in a cluster at the other site. The locations for the well sites and well identifications are presented in Figure 3.

Monitoring Well Drill Site DE1

A single boring was drilled to bedrock which was encountered at 635 feet 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, 5S/2W-14E009 (DE1-D2), was installed to a depth of 565 feet bgs. Additional monitoring wells 5S/2W-14E005 (DE1-D1), 5S/2W-14E006 (DE1-F), 5S/2W-14E007 (DE1-C), and 5S/2W-14E008 (DE1-N) were completed to depths of 450 feet below ground surface (bgs), 300 feet bgs, 210 feet bgs, and 85 bgs respectively. These depths generally correspond to the Deep 2, Deep1, Fremont, Centerville and Newark Aquifers identified regionally throughout much of the NCGB.

Monitoring Well Drill Site AutoMall

A single boring was drilled to 800 feet bgs. Bedrock was not encountered with the depth explored. The boring was sampled and geophysically logged for the purpose of creating a geologic record for the site. Upon completion of drilling and logging of the exploratory boring, a monitoring well 5S/1W-16M008 (AutoMall-D1), was installed to a depth of 500 feet bgs. Two additional monitoring wells, 5S/1W-16M007 (AutoMall-F) and 5S/1W-16M006 (AutoMall-C) were installed at this site in water-bearing zones identified by the geologic log created from the exploratory boring. The monitoring wells were installed to depths of 320 feet and 250 feet, respectively. These depths generally correspond to the Deep 1, Fremont, and Centerville Aquifers identified regionally throughout much of the NCGB.

The installation of the well clusters allows long term monitoring of all the aquifers and determination of trends in vertical flow between aquifers over time.

2.4 Geology and Hydrogeology

The project area is underlain by sediments of the Niles Cone (Figure 4). The Niles Cone is an alluvial fan formed by Alameda Creek and by interfingering sediments of San Francisco Bay. Water-bearing deposits are composed of Quaternary alluvium comprised of varying mixtures of gravel, sand, silt and clay. The NCGB beneath the study area is composed of gently westward-dipping aquifers separated by clay aquitards. The aquifers are gravels and sands from Alameda Creek (fluvial and alluvial). Aquitards are silts and clays from distal fan deposits and the Bay. Primary aquifers in the Niles Cone Groundwater Basin include the Newark Aquifer (between 40 to 140 feet bgs), Centerville Aquifer (between 180 and 280 feet bgs), Fremont Aquifer (between 300 and 390 feet bgs), and Deep Aquifers (between 400 and 600 feet bgs). Bedrock is encountered beneath the NCGB at depths of approximately 800 feet bgs (DWR, 1967).

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. There has been substantial improvement in water quality in all aquifers; 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 eight drilling permits from the Alameda County Water District. Copies of the permits are presented in Appendix A.

3.1.2 Access Agreements

ACWD obtained permits from the United States Fish and Wildlife Service and the City of Fremont for the installation of monitoring wells. Five of the monitoring wells were installed within the City of Newark at the Don Edwards National Wildlife Refuge and three monitoring wells were installed at the end of AutoMall Parkway within the City of Fremont right-of-way. Cargill Salt granted ACWD permission to use their property as an access to the Don Edwards drill site. Copies of the access agreements are presented in Appendix B.

3.1.3 Underground Utility Surveys

Prior to drilling activities, ACWD personnel visited the drilling locations to stake/mark the locations and met with the facility contacts to discuss the location of underground utilities. Underground Service Alert (USA) was contacted, after the field locations were staked/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 Maggiora Bros. Drilling, Inc. (Maggiora Bros.) of Watsonville, California. The borings were drilled with an Ingersoll Rand TH-60 mud rotary drilling rig with an 8.75-inch diameter drill bit. At each location, pilot holes were drilled to bedrock or a maximum depth of 800 feet bgs, whichever came first. 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 removed from the bottom of the boring. The ends of the bottom tube were covered with plastic end caps, identified by the orientation of the sample, and labeled with a unique identification number. Samples not retained for analytical testing were used for lithologic evaluation.

3.2.2 Well Installation

Eight new monitoring wells were installed as part of this project. Five of the wells (5S/2W-14E009 (DE1-D2), 5S/2W-14E005 (DE1-D1), 5S/2W-14E006 (DE1-F), 5S/2W-14E007 (DE1-C), 5S/2W-14E008 (DE1-N)) were installed within the Don Edwards National Wildlife Refuge property on levees used for salt production. Three new monitoring wells, (5S/1W-16M008 (AutoMall-D1), 5S/1W-16M007 (AutoMall-F), 5S/1W-16M006 (AutoMall-C)) were installed at the end of Automall Parkway within the City of Fremont right-of-way. 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 (5S/2W-14E009 (DE1-D2) and 5S/1W-16M008 (AutoMall-D1)) were done upon completion of geophysical logging (resistivity, spontaneous potential, conductivity, gamma, and temperature) of the wells by Newman Well Surveys of Prundale California. The borings were reamed with an 8.75-inch diameter drill bit to total depth to clean out the borehole. The driller then tremmied 11-sack sand-cement slurry from the bottom of the boring to within 10 feet of the designed bottom of the well. The sand-cement slurry was allowed to cure a minimum of 24-hours prior to installation of the monitoring well casing.
- 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 11-sack sand-cement slurry.

- Drilling mud displaced by the well installation activities was placed in a truck mounted storage tank and transported to ACWD's storage site.
- For wells installed at the Don Edwards National Wildlife Refuge, a traffic-rated well cover was installed flush to the existing grade with a 4-foot by 4-foot concrete pad surrounding the well cover.
- A 6-inch diameter marker post with the state well identification number was installed at the wells at the Don Edwards National Wildlife Refuge.
- For wells installed on City of Fremont right-a way, a traffic-rated well cover was installed flush to the existing street grade.

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. No detergents, soaps, acids, bleaches, or other additives were used to develop the monitoring wells. Development continued until turbidity was reduced to 5 nephelometric turbidity units (NTU) or less. The one exception to this procedure was monitoring well 5S/2W-14E008 (DE1-N). We were only able to develop the well to 85 NTU due to the high sediment content in the water bearing zone. Over 5,250 gallons of water were removed during development of 5S/2W-14E008 (DE1-N). 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 ± 0.2 and ± 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 Maggiora Bros. to prepare a Storm Water Protection (SWP) and an Emergency Response Plan for the project. The plans were prepared and in place prior to Maggiora Bros. implementing field activities. ACWD required the preparation of plans

to minimize the effects of 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 the hydraulics of 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

As outlined in the permit requirements for U.S. Fish and Wildlife Service, 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. In the eastern portion of the study area (AutoMall drill site), the lithologic data is fairly consistent with the general depth below ground surface (bgs) of the Newark (40 feet bgs) Fremont (290 feet bgs), and Deep 2 (500 feet bgs) Aquifer zones. The Centerville (235 feet bgs) and Deep 1 (470 feet bgs) Aquifer zones appear to be lower in depth than expected. In the western portion study area (DE1 drill site), the lithologic data is fairly consistent with the general depth below ground surface (bgs) of the Newark (50 feet bgs) Centerville (185 feet bgs), and Fremont (280 feet bgs) Aquifer zones. The Deep 1 (435 feet bgs) and Deep 2 (550 feet bgs) Aquifer zones appear to be lower in depth than expected. Bedrock in the boring for 5S/2W-14E009 (DE1-D2), which is closest to San Francisco Bay, consists of weathered Franciscan Graywacke material and was encountered at 635 feet. Bedrock was not encountered at a depth of 800 feet at the other location, boring 5S/1W-16M008 (AutoMall-D1). Geologic well logs presenting the lithologic log, geophysical log, and well completion are presented in Appendix D.

4.2 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 except wells DE1-N (86). 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 (Appendix F) for testing. One well was completed in the Newark Aquifer (5S/2W-14E008 (DE1-N)), two completed in the Centerville Aquifer (5S/2W-14E007 (DE1-C) and 5S/1W-16M006 (AutoMall -C)), two completed in the Fremont Aquifer (5S/2W-14E006 (DE1-F) and (5S/1W-16M007 (AutoMall-F)), two in the Deep 1 Aquifer (5S/2W-14E005 (DE1-D1) and 5S/1W-16M008 (AutoMall-D1)), and one in the Deep 2 Aquifer (5S/2W-14E009 (DE1-D2)). Laboratory results (Appendix F) document Total Dissolved Solids (TDS), hardness, and chloride concentrations in the Newark Aquifer were 64,046 parts per million (ppm), 14,600 ppm, and 37,000 ppm, respectively. TDS, hardness, and chloride concentrations in the Centerville Aquifer ranged from 417 ppm to 1,791 ppm, 105.49 ppm to 1,440 ppm, and 81.44 ppm to 494.38 ppm, respectively. TDS, hardness, and chloride values in the Fremont Aquifer were 74 ppm to 627 ppm, 209.58 ppm to 386 ppm, and 13 ppm to 113.6 ppm, respectively. TDS, hardness, and chloride values in the Deep 1 Aquifer were 370 ppm to 426 ppm, 26 ppm to 72.62 ppm, and 12.5 ppm to 68.13 ppm, respectively. (TDS), hardness, and chloride concentrations in the Deep 2 Aquifer were 548 parts per

million (ppm), 80.62 ppm, and 113.6 ppm, respectively. A summary of the results are presented in Table 3.

4.3 SOIL PERMIBILITY TESTING

A total of 9 soil samples were collected and tested for evaluation of vertical permeability. The single samples collected from the aquitards between the Newark and Centerville Aquifers and between the Centerville and Fremont Aquifers documented values of 2.76×10^{-8} cm/sec and 9.56×10^{-9} cm/sec, respectively. Two samples collected from the aquitards between the Fremont and Deep Aquifers documented of 2.52×10^{-8} cm/sec and 9.81×10^{-9} cm/sec. Five samples collected from the clay zone within the Deep Aquifers documented values ranging from 1.85×10^{-9} cm/sec to 2.26×10^{-7} cm/sec. Laboratory reports are presented in Appendix G and a summary of the results of the testing are presented in Table 4.

5.0 CONCLUSIONS

The two original locations were selected based on work previously conducted by DWR that was documented in DWR Bulletin No. 118-1, Evaluation of Ground Water Resources South Bay, Appendix A: Geology, August 1967. The locations were selected to confirm the inferred major depositional channels in those vicinities and to evaluate water quality. Although one of the drill sites was relocated (DE2 to AutoMall), the new location 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 both logged borings at depths comparable to the Newark, Centerville, and Fremont Aquifers. In the boring at the DE1 drill site, a thick Fremont Aquifer zone was encountered (105 feet thick) separated by relatively low permeable silt (20 feet thick) indicating a potential sub-division of the aquifer. In addition to the relatively high permeable sand and gravel zones encountered above 400 feet bgs, moderately permeable sands and gravels were encountered at depths at both of the drilling sites which correspond to the Deep 1 and Deep 2 Aquifers. The thickness of the sands and gravels encountered and the observed high permeability of the zones indicate the project was successful in intercepting the targeted inferred depositional channels.

Additionally, bedrock was encountered in the boring at drill site DE1 at 635 feet bgs and not encountered at a depth of 800 feet in the boring at the AutoMall drill site. This data appears to correspond with the aerial geology subsurface bedrock interpretation map presented in DWR Bulletin 118-1. The DE1 drill site is located west of the inferred Silver Creek Fault and the AutoMall drill site is located on the east side of the fault. DWR Bulletin 118-1 interpreted that bedrock should be encountered approximately 600 feet below sea level (bsl) west of the fault and greater than 1,000 feet (bsl) east of the fault.

One of the main goals of this project was to collect water samples from the newly installed wells to determine water quality in each aquifer. Given the locations of these wells near San Francisco Bay and existing salt evaporator ponds, the primary constituent of concern was chlorides. Analytical testing of groundwater collected from the monitoring wells documented the presence of chloride concentrations above secondary maximum contaminant levels (MCL) for drinking water (250 ppm) in several of the wells. The Newark Aquifer well installed at drill site DE1, 5S/2W-14E008 (DE1-N), documented a chloride concentration of 37,000 parts per million (ppm). This result seems to support the suspicion that the Newark Aquifer near the bay margin is in hydraulic communication with San Francisco Bay and/or the salt evaporator ponds. The source of the chloride concentration detected above the MCL in the Centerville Aquifer (494 ppm in well 5S/1W-16M006 (Automall-C)) is being evaluated. Concentrations in the water samples collected from the other monitoring wells were below the secondary MCL.

Permeability results from soil samples collected during the study 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 revealed similar results, ranging from 2.6×10^{-7} centimeters per second (cm/sec) to 9.81×10^{-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 installation of these monitoring wells is a valuable asset to ACWD. Very little actual information exists on the geology or hydrology along the southwest edge of the Niles Cone Groundwater Basin. The only available source of information from these areas was from two nested well sites that were destroyed due to operational changes in the levee road system by Cargill Salt and as a result of the South Bay Salt Pond Restoration Project. 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. The 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.

This report will be posted on ACWD's website and all interested parties, stakeholders, agencies and the general public will be notified of its location.

6.0 SCHEDULE INFORMATION

The original implementation schedule for the project was 15 months with the assumption that drilling would occur during the winter of 2005 and 2006 (Figure 5). Due to the rainy season, the availability of equipment, and the need to complete the Northwest Niles Cone Monitoring Wells Project, the completion schedule for the study was delayed and extended the field activities beyond the original contracted time frame. The rains saturated the access roads to the drilling locations making them impassable. These delays would have required field work during the nesting season of endangered species located within the Don Edwards National Wildlife Refuge. As required by the permit requirements for access to the Refuge, field operations were suspended through the nesting season, February 1 to August 31, 2006, and did not begin until September 7, 2006. Drilling operations were completed on February 8, 2007. The actual implementation schedule is presented in Figure 6.

7.0 BUDGET INFORMATION

Actual total costs for the project was \$382,654.30. The original total proposed budget amount was \$345,441.00 with DWR grant funding covering \$249,943.00 of these costs and with ACWD responsible for the remaining costs of \$95,498.00. Therefore, the costs incurred by ACWD during this project were \$37,213.30 over that of the original proposed budget. The contract bidding process resulted in higher unit costs for well drilling and installation than originally proposed. Additional costs were also incurred due to the additional time needed to find a new drilling location and in obtaining additional permits. These additional costs were covered by ACWD. Table 5 presents the original budgeted amount and compares it to actual accrued costs by task.

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
DE1-D2	9/25/2006	Deep2	655	565	545-565	5S/2W-14E009
DE1-D1	10/12/2006	Deep1	460	450	430-450	5S/2W-14E005
DE1-F	10/24/2006	Fremont	310	300	280-300	5S/2W-14E006
DE1-C	10/31/2006	Centerville	220	210	190-210	5S/2W-14E007
DE1-N	11/1/2006	Newark	90	85	65-85	5S/2W-14E008
AutoMall-D1	1/24/2007	Deep1	800	490	470-490	5S/1W-16M008
AutoMall-F	1/29/2007	Fremont	330	320	290-320	5S/1W-16M007
AutoMall-C	2/2/2007	Centerville	260	250	235-250	5S/1W-16M006

** = 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)	Easting	Northing
5S/2W-14E009	DE1-D2	9/25/2006	Deep2	10.631	6109677.206	2008481.704
5S/2W-14E005	DE1-D1	10/12/2006	Deep1	10.665	6109687.251	2008481.019
5S/2W-14E006	DE1-F	10/24/2006	Fremont	10.708	6109695.963	2008478.578
5S/2W-14E007	DE1-C	10/31/2006	Centerville	10.519	6109703.856	2008473.422
5S/2W-14E008	DE1-N	11/1/2006	Newark	10.496	6109711.65	2008467.202
5S/1W-16M008	AutoMall-D1	1/24/2007	Deep1	14.606	6130890.657	2007159.908
5S/1W-16M007	AutoMall-F	1/29/2007	Fremont	14.659	6130882.504	2007154.113
5S/1W-16M006	AutoMall-C	2/2/2007	Centerville	14.421	6130874.502	2007148.428

* = 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)
5S/2W-14E009	DE1-D2	Deep 2	3/27/2007	Artesian	10.631	Artesian	11/20/2006	113.60	548.00	80.62
5S/2W-14E005	DE1-D1	Deep 1	3/27/2007	Artesian	10.665	Artesian	12/20/2006	68.13	426.00	72.62
5S/2W-14E006	DE1-F	Fremont	3/27/2007	Artesian	10.708	Artesian	11/20/2006	113.60	627.00	209.58
5S/2W-14E007	DE1-C	Centerville	3/27/2007	Artesian	10.519	Artesian	11/20/2006	81.44	417.00	105.49
5S/2W-14E008	DE1-N	Newark	3/27/2007	4.7	10.496	5.796	1/30/2007	37,000.00	64,046.00	14,600.00
5S/1W-16M008	AutoMall-D1	Deep1	3/28/2007	10.3	14.606	4.306	3/2/2007	12.50	370.00	26.00
5S/1W-16M007	AutoMall-F	Fremont	3/28/2007	8.8	14.659	5.859	3/6/2007	13.00	74.00	386.00
5S/1W-16M006	AutoMall-C	Centerville	3/28/2007	10.1	14.421	4.321	3/5/2007	494.38	1,791.00	1,440.00
Secondary MCL								250.00	1,000.00	

* = Alameda County Water District

MCL = Maximum Contaminant Levels

37,000 = value in bold above Secondary Maximum Contaminant Levels

**Table 4
Northwest Niles Cone 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						
9/18/2006	DE1-D2-450.5-451	Deep 1 - Deep 2	9/21/2006	Signet Testing Labs	10/16/2006	2.72E-09
9/20/2006	DE1-D2-490.5-591	Deep 2 - Deep 3	9/21/2006	Signet Testing Labs	10/16/2006	2.28E-09
10/18/2006	DE1-D1-461	Deep 1 - Deep 2	10/19/2006	Signet Testing Labs	11/3/2006	2.35E-08
1/11/2007	Automall D1-385	Fremont - Deep 1	1/17/2007	Signet Testing Labs	2/8/2007	2.52E-08
1/16/2007	Automall D1-512	Deep 1 - Deep 2	1/17/2007	Signet Testing Labs	2/8/2007	2.26E-07
1/16/2007	DE1-N-91.5	Newark - Centerville	1/17/2007	Signet Testing Labs	2/8/2007	2.76E-08
1/18/2007	Automall D1-603	Deep 2 - Deep 3	2/14/2007	Signet Testing Labs	3/9/2007	1.85E-09
1/31/2007	Automall F-330	Fremont - Deep 1	2/14/2007	Signet Testing Labs	3/9/2007	9.81E-09
2/7/2007	Automall C-265	Centerville - Fremont	2/14/2007	Signet Testing Labs	3/9/2007	9.56E-09

* = Alameda County Water District

**Table 5
DWR Cost Summary Sheet**

Task No.	Description from Approved Budget	Budget Amount by Task	Actual Costs Accrued	Amount Over Budget
1.1	Finalize Well Locations	\$5,962.00	\$5,988.38	(\$26.38)
1.2	Public Notice and Drilling Contract Selection	\$5,161.00	\$5,163.46	(\$2.46)
1.3	Permitting Process	\$13,329.00	\$13,975.19	(\$646.19)
2.1	Drill and collect lithologic data for 2 boreholes to 800 feet	\$100,570.00	\$69,161.24	\$31,408.76
2.2	Geophysical logs	\$3,000.00	\$7,000.00	(\$4,000.00)
2.3	Drill 2 boreholes and install one 2-inch monitoring well to 500	\$56,549.00	\$88,517.46	(\$31,968.46)
2.4	Drill 2 boreholes and install one 2-inch monitoring well to 400 feet	\$39,012.00	\$60,017.46	(\$21,005.46)
2.5	Drill 2 boreholes and install one 2-inch monitoring well to 300 feet	\$28,980.00	\$36,680.79	(\$7,700.79)
2.6	Drill 2 boreholes and install one 2-inch monitoring well to 150 feet	\$13,926.00	\$9,794.91	\$4,131.09
2.7	Collect and classify samples	\$17,376.00	\$19,604.75	(\$2,228.75)
2.8	Review logs and finalize well design	\$2,183.00	\$3,269.19	(\$1,086.19)
2.9	Develop wells	\$8,000.00	\$19,299.30	(\$11,299.30)
2.1	Dispose of drilling fluids and cuttings	\$29,592.00	\$21,577.15	\$8,014.85
2.11	Install stove pipes and protective standards	\$4,200.00	\$5,000.00	(\$800.00)
2.12	GPS new well locations	\$1,752.00	\$1,757.10	(\$5.10)
3.1	Collection and permeability testing of sample cores	\$5,087.00	\$2,715.90	\$2,371.10
3.2	Collect and analyze groundwater samples upon well completion	\$2,484.00	\$2,883.22	(\$399.22)
3.3	Collect and analyze groundwater samples during the Fall Monitoring Program	\$2,484.00	\$2,542.63	(\$58.63)
4.1	Submit quarterly progress reports to DWR	\$2,000.00	\$2,172.16	(\$172.16)
4.2	Submit final project summary to DWR	\$3,594.00	\$4,761.71	(\$1,167.71)
4.3	Public Disbursement of Groundwater Monitoring Report	\$200.00	\$772.30	(\$572.30)
TOTALS		\$345,441.00	\$382,654.30	(\$37,213.30)

Figures



ACWD Boundary and Study Area
FIGURE 1





DE1 Drill Sites
DE1-N, DE1-C
DE1-F, DE1-D1

City of Fremont

San Francisco Bay

DE2 Drill Sites
DE2-N, DE2-C,
DE2-F, DE2-D

Originally Proposed Drill Sites
FIGURE 2



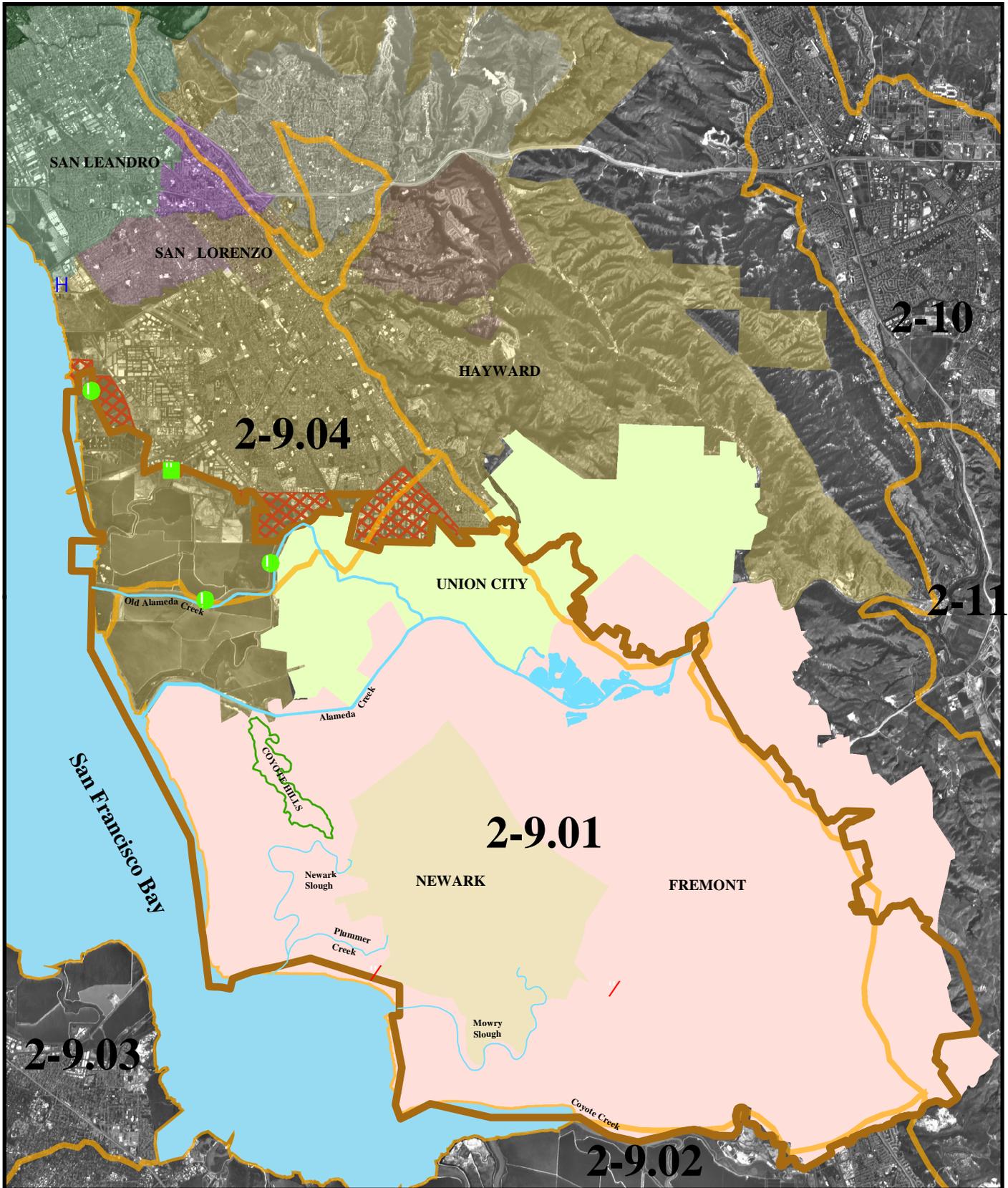
North



Proposed and Actual Drill Sites
FIGURE 3

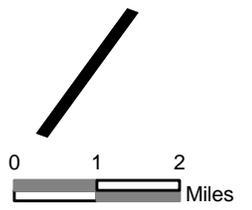


FIGURE 4: LOCAL AGENCY BOUNDARIES



- J Northwest Niles Cone Monitoring Well Project Well Cluster
- . Northwest Niles Cone Monitoring Well Project Well
- / Southwest Niles Cone Monitoring Well Project Well
- H EBMUD Bayside Groundwater Project Location

- Hayward Detachment
- ACWD Niles Cone Boundary
- DWR Groundwater Basins



Southwest Niles Cone Groundwater Monitoring Well Project (Original Schedule)

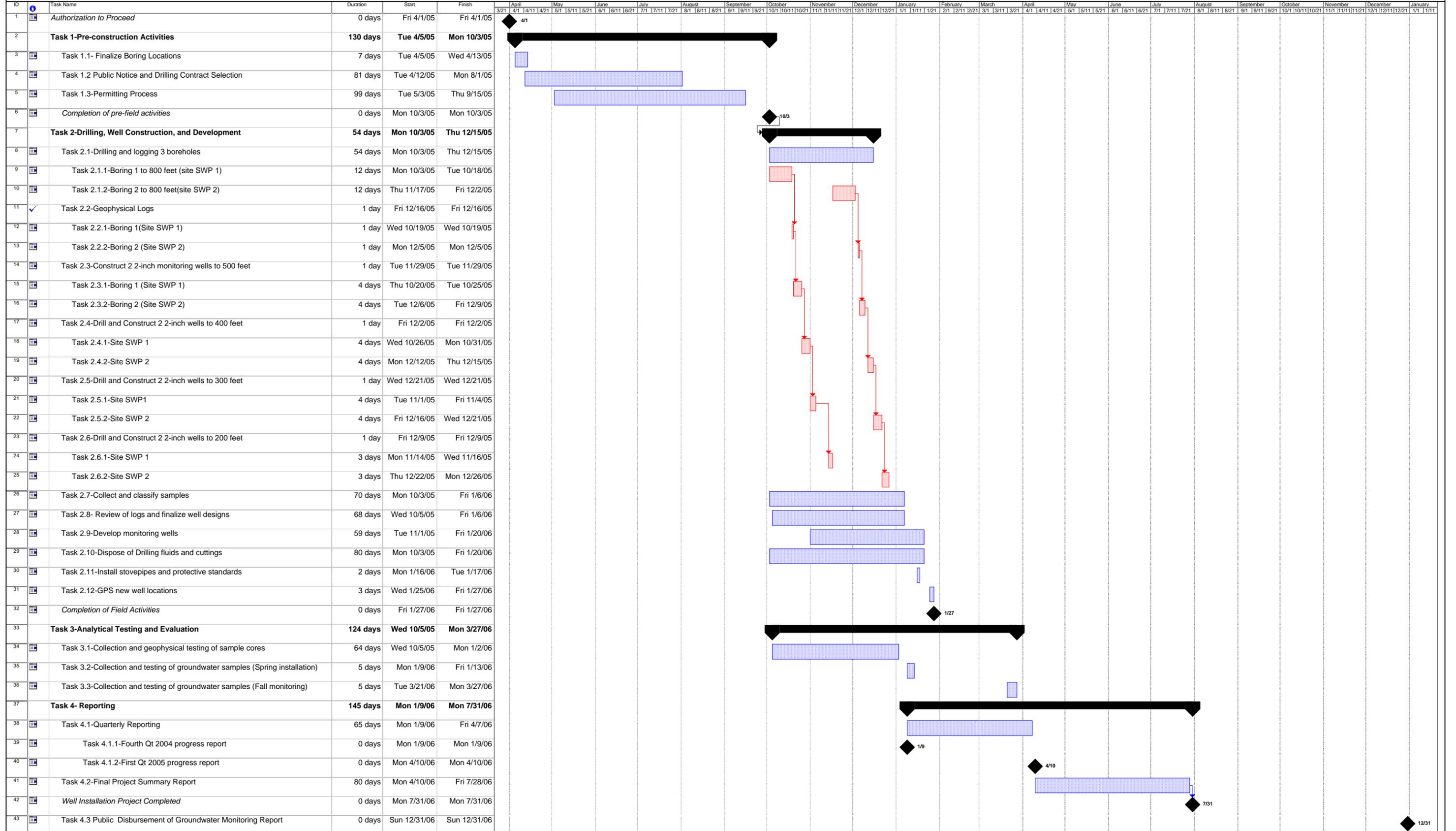


Figure 5
Project: Southwest Niles Cone Monitoring Well Project
Date: December 1, 2004

Task Progress Summary External Tasks Deadline
Split Milestone Project Summary External Milestone

Southwest Niles Cone Groundwater Monitoring Well Project (January 2007 revision)

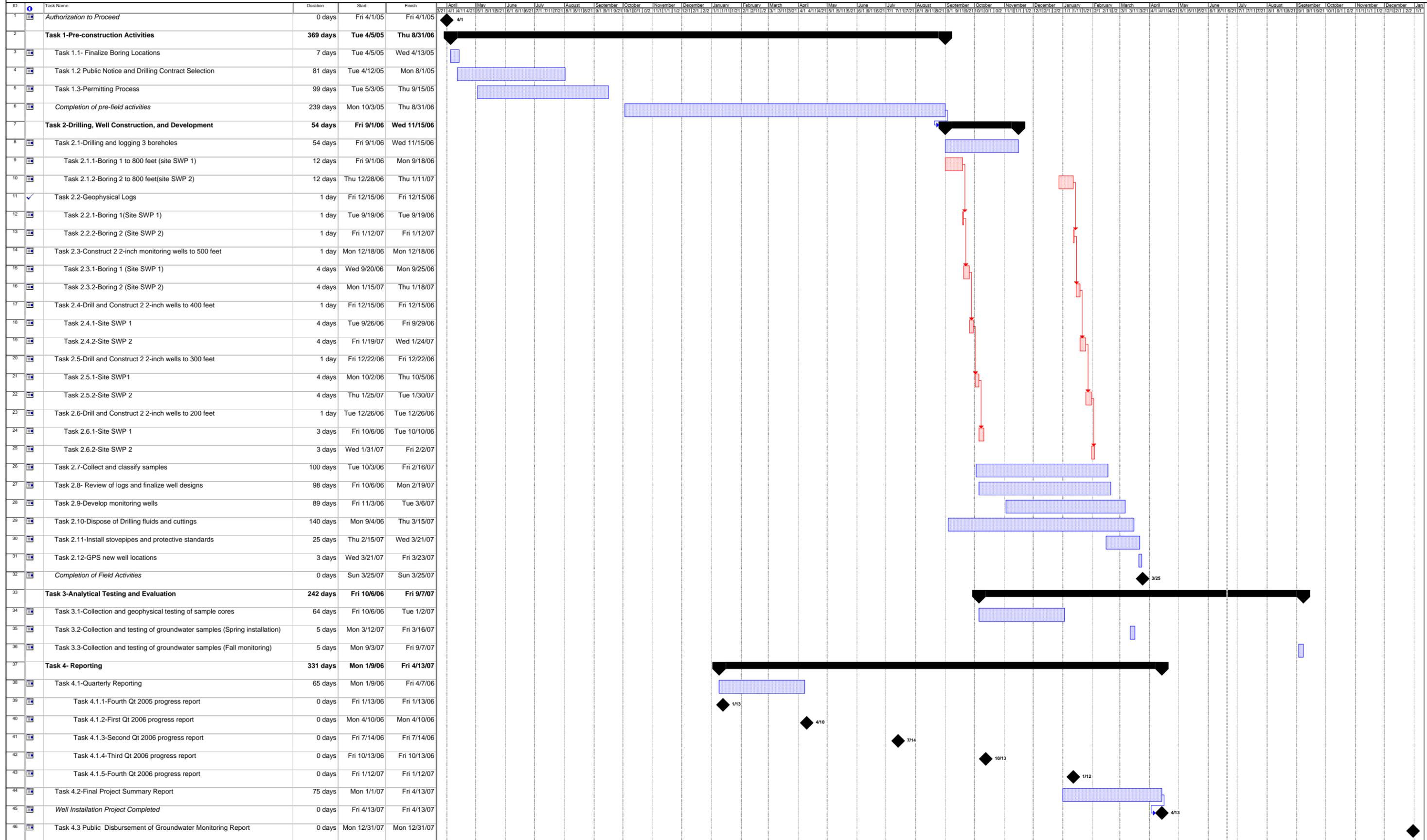


Figure 6
Project: Southwest Niles Cone Monitoring Well Project
Date: January 12, 2007

Task Split Progress Milestone Summary Project Summary External Tasks External Milestone Deadline

Appendix A

Permits

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
 * City of Fremont No. 963
 City of Newark No. 136
 City of Union City No. 109-73

Application Received Date: 10/3/06 By: M.M. Permit Issued Date: 10/4/06 Permit Expiration Date: 12/3/06 Job No: 6269 Permit No: 2006-330 Well No: 59/2W-14E009

JOB ADDRESS: Don Edwards Wildlife Refuge

PROPERTY OWNER
 NAME: US Fish & Wildlife Service
 ADDRESS: P.O. Box 524
Newark CA 94560
 TELEPHONE: 510 792-0222

CONSULTING ENGINEER
 NAME: Douglas Young / ACWD
 ADDRESS: 43885 Grimmer Blvd
Fremont CA 94555
 TELEPHONE: 510-668-4452 AG/CFG/RCE NO. 5859

WELL DRILLING CONTRACTOR
 NAME: Maggara Bros
 ADDRESS: 595 Airport Blvd.
Westerville CA 95076
 TELEPHONE: 631-724-1338 STATE LIC. NO. C57 249907

When property signed (DEID2)
**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 - 7:30 a.m. to 4:30 p.m., Monday through Friday.

PLEASE CHECK TYPE OF PROPOSED WORK

WATER (Pumping) WELL	GEOTECHNICAL INVESTIGATION	CHEMICAL INVESTIGATION
Construction <input type="checkbox"/>	Exploratory Holes <input type="checkbox"/>	Exploratory Holes <input type="checkbox"/>
Repair or Reconstruction <input type="checkbox"/>	Monitoring Wells, Construction <input checked="" type="checkbox"/>	Vapor Sampling Investigation <input type="checkbox"/>
Destruction <input type="checkbox"/>	Monitoring Wells, Destruction <input type="checkbox"/>	Monitoring Well Const. (Chemical Leak) <input type="checkbox"/>
Cathodic Protection Hcle <input type="checkbox"/>		Monitoring Well Const. (Compliance Wells) <input type="checkbox"/>
Dewatering <input type="checkbox"/>		Monitoring Well Const. (Baseline Study) <input type="checkbox"/>
	Air Sparging Well <input type="checkbox"/>	Vapor Extraction Well <input type="checkbox"/>

Description of Proposed Work _____

TOTAL ESTIMATED COST \$ _____

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

FEES:

E	Private	<u>NA</u>	
S	Public (Governmental) Agency	<u>✓</u>	
T	Public Utility		
M	Permit Issuance Fee		\$ <u>0</u>
A	Field Investigation and Inspection Fee		\$ <u>0</u>
T		ESTIMATE TOTAL	\$ <u>0</u>
U	Permit Issuance Fee		\$ <u>0</u>
A	Field Investigation and Inspection Fee		\$ <u>0</u>
L		TOTAL	\$ <u>0</u>

DEPOSIT:

P.O. NO.	Date Received
	Cash <input type="checkbox"/> Check No. _____
	Estimated Amount \$ <u>0</u>
	Actual Amount \$ <u>0</u>
	Difference \$ <u>0</u>
Refund \$ _____	Date _____
Billed 4 _____	Date _____
GUARANTEE OF PERFORMANCE	
Cash Deposit _____	Bond _____
Amount \$ _____	Date _____
(NOT TO EXCEED TOTAL ESTIMATED COST)	
Return Amount \$ _____	Date _____

ACWD SITE NO. N/A APPROVED FOR SCHEDULING BY: M.M. DATE: 10/5/06 INSPECTING OFFICER APPROVAL: Michelle Flyge DATE: 10/5/06

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: 10/3/06
 Representing: ACWD Name (printed): Douglas Young

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
 _____ City of Fremont No. 963
 _____ City of Newark No. 136
 _____ City of Union City No. 109-73

Application Received Date: 8/30/06 By: M. H. Permit Issued Date: 8/30/06 Permit Expiration Date: 12/30/06 Job No. 6269 Permit No. 2006-280 Well No. SS2W-14E005

JOB ADDRESS: Don Edwards National Wildlife Refuge
(See attached)

PROPERTY OWNER:
NAME: U.S. Fish & Wildlife Service
ADDRESS: P.O. Box 524
Newark, CA 94560
TELEPHONE: 510-712-0222

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

WELL DRILLING CONTRACTOR:
NAME: Maggiara Bros. Drilling, Inc.
ADDRESS: 595 Airport Blvd
Watsonville, CA 95076
TELEPHONE: 831-724-1338 STATE LIC. NO. C57 249957

When properly signed (DEI D)
**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 - 7:30 a.m. to 4:30 p.m., Monday through Friday.

PLEASE CHECK TYPE OF PROPOSED WORK

WATER (Pumping) WELL	GEOTECHNICAL INVESTIGATION	CHEMICAL INVESTIGATION
Construction <input checked="" type="checkbox"/>	Exploratory Holes <input type="checkbox"/>	Monitoring Well Const. (Chemical Leak) <input type="checkbox"/>
Repair or Reconstruction <input type="checkbox"/>	Monitoring Wells, Construction <input checked="" type="checkbox"/>	Monitoring Well Const. (Compliance Wells) <input type="checkbox"/>
Destruction <input type="checkbox"/>	Monitoring Wells, Destruction <input type="checkbox"/>	Monitoring Well Const. (Baseline Study) <input type="checkbox"/>
Cathodic Protection Hole <input type="checkbox"/>	<input type="checkbox"/>	Vapor Extraction Well <input type="checkbox"/>
Water Metering <input type="checkbox"/>	Air Sparging Well <input type="checkbox"/>	<input type="checkbox"/>

Description of Proposed Work Construction of groundwater monitoring well DEI D (Don Edwards site 1 deep)

TOTAL ESTIMATED COST \$ _____

PERMIT CONDITIONS
Monitoring Well Construction to comply with ACWD requirements

FEES:

ESTIMATE	Private	\$ _____
ESTIMATE	Public (Governmental) Agency	\$ _____
ESTIMATE	Public Utility	\$ _____
ESTIMATE	Permit Issuance Fee	\$ <u>0</u>
ESTIMATE	Field Investigation and Inspection Fee	\$ _____
ESTIMATE TOTAL		\$ <u>0</u>
ACTUAL	Permit Issuance Fee	\$ <u>0</u>
ACTUAL	Field Investigation and Inspection Fee	\$ _____
TOTAL		\$ <u>0</u>

DEPOSIT:

P.O. NO.	Date Received	Cash	Check No.
		Estimated Amount \$	<u>0</u>
		Actual Amount \$	<u>0</u>
		Difference \$	<u>0</u>
Refund \$	Date		
Billed \$	Date		
GUARANTEE OF PERFORMANCE			
Cash Deposit	Bond		
Amount \$	Date		
(NOT TO EXCEED TOTAL ESTIMATED COST)			
Return Amount \$	Date		

ACWD SITE NO. _____
 APPROVED FOR SCHEDULING BY: M. H. DATE: 8/30/06 INSPECTING OFFICER APPROVAL: Michelle H. DATE: 8/30/06

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: 11/15/05
 Representing: ACWD Name (printed): Douglas Young

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
 City of Fremont No. 963
 City of Newark No. 136
 City of Union City No. 109-73

Application Received Date: 8/30/06 By: MM Permit Issued Date: 8/30/06 Permit Expiration Date: 10/30/06 Job No: 6269 Permit No: 2006-282 Well No: 572W-14E007

JOB ADDRESS: Don Edwards National Wildlife Refuge
(See attached)

PROPERTY OWNER
 NAME: U.S. Fish & Wildlife Service
 ADDRESS: P.O. Box 524
Newark, CA 94560
 TELEPHONE: 510-792-0222

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

WELL DRILLING CONTRACTOR
 NAME: Maggiorn Bros. Drilling, Inc.
 ADDRESS: 595 Airport Blvd
Watsonville, CA 95076
 TELEPHONE: 831-724-1338 STATE LIC. NO. C57 249957

When property signed (DEIC)
**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 - 7:30 a.m. to 4:30 p.m., Monday through Friday.

PLEASE CHECK TYPE OF PROPOSED WORK		
WATER (Pumping) WELL	GEOTECHNICAL INVESTIGATION	CHEMICAL INVESTIGATION
Construction <input checked="" type="checkbox"/>	Exploratory Holes <input type="checkbox"/>	Exploratory Holes <input type="checkbox"/>
Repair or Reconstruction <input type="checkbox"/>	Monitoring Wells, Construction <input checked="" type="checkbox"/>	Vapor Sampling Investigation <input type="checkbox"/>
Destruction <input type="checkbox"/>	Monitoring Wells, Destruction <input type="checkbox"/>	Monitoring Well Const. (Chemical Leak) <input type="checkbox"/>
Cathodic Protection Hole <input type="checkbox"/>		Monitoring Well Const. (Compliance Wells) <input type="checkbox"/>
Dewatering <input type="checkbox"/>		Monitoring Well Const. (Baseline Study) <input type="checkbox"/>
	Air Sparging Well <input type="checkbox"/>	Vapor Extraction Well <input type="checkbox"/>

Description of Proposed Work: Construction of groundwater monitoring well DEIC

TOTAL ESTIMATED COST \$ _____

PERMIT CONDITIONS
Monitoring Well Construction to comply with ACWD requirement.

FEES:

Private	_____
Public (Governmental) Agency	_____
Public Utility	<input checked="" type="checkbox"/>
Permit Issuance Fee	\$ <u>0</u>
Field Investigation and Inspection Fee	\$ <u>0</u>
ESTIMATE TOTAL	\$ <u>0</u>
Permit Issuance Fee	\$ <u>0</u>
Field Investigation and Inspection Fee	\$ <u>0</u>
TOTAL	\$ <u>0</u>

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 EXCEED TOTAL ESTIMATED COST)

Return Amount \$ _____ Date _____

ACWD SITE NO. _____ APPROVED FOR SCHEDULING BY: MHy DATE: 8/30/06 INSPECTING OFFICER APPROVAL: Michael Hy DATE: 8/30/06

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: 11/05/05

Representing: ACWD Name (printed): Douglas Young

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
 City of Fremont No. 963
 City of Newark No. 136
 City of Union City No. 109-73

Application Received Date: 8/30/06 By: SM Permit Issued Date: 8/30/06 Permit Expiration: 7/7/07 Job No.: 6269 Permit No.: 2006-281 Well No.: SS/2W-14E006

JOB ADDRESS: Don Edwards National Wildlife Refuge
(see attached)

PROPERTY OWNER:
 NAME: U.S. Fish & Wildlife Service
 ADDRESS: P.O. Box 524
Newark, CA 94560
 TELEPHONE: 510-792-0222

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

WELL DRILLING CONTRACTOR:
 NAME: Maggiara Bros Drilling, Inc.
 ADDRESS: 505 Airport Blvd.
Watsonville, CA 95076
 TELEPHONE: 831-724-1338 STATE LIC. NO. C57 249957

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PLEASE CHECK TYPE OF PROPOSED WORK

WATER (Pumping) WELL	GEOTECHNICAL INVESTIGATION	CHEMICAL INVESTIGATION
Construction <input checked="" type="checkbox"/>	Exploratory Holes <input type="checkbox"/>	Monitoring Well Const. (Chemical Leak) <input type="checkbox"/>
Repair or Reconstruction <input type="checkbox"/>	Monitoring Wells, Construction <input checked="" type="checkbox"/>	Monitoring Well Const. (Compliance Wells) <input type="checkbox"/>
Destruction <input type="checkbox"/>	Monitoring Wells, Destruction <input type="checkbox"/>	Monitoring Well Const. (Baseline Study) <input type="checkbox"/>
Cathodic Protection Hole <input type="checkbox"/>	Air Sparging Well <input type="checkbox"/>	Vapor Extraction Well <input type="checkbox"/>
Dewatering <input type="checkbox"/>		

Description of Proposed Work: Construction of groundwater monitoring well DEIF

TOTAL ESTIMATED COST \$ _____

PERMIT CONDITIONS: Monitoring Well Construction to comply with ACWD requirements.

FEES:

ESTIMATE	Private	\$ _____
	Public (Governmental) Agency	\$ _____
	Public Utility	\$ _____
A	Permit Issuance Fee	\$ <u>0</u>
T	Field Investigation and Inspection Fee	\$ _____
E	ESTIMATE TOTAL	\$ <u>0</u>
A	Permit Issuance Fee	\$ <u>0</u>
C	Field Investigation and Inspection Fee	\$ _____
T	TOTAL	\$ <u>0</u>
U		
A		
L		

DEPOSIT:

P.O. NO.	Date Received	Cash	Check No.
		Estimated Amount \$	<u>0</u>
		Actual Amount \$	<u>0</u>
		Difference \$	<u>0</u>
Refund \$	Date		
Billed \$	Date		
GUARANTEE OF PERFORMANCE			
Cash Deposit	Bond		
Amount \$	Date		
(NOT TO EXCEED TOTAL ESTIMATED COST)			
Return Amount \$	Date		

ACWD SITE NO. _____
 APPROVED FOR SCHEDULING BY: [Signature] DATE: 8/30/06 INSPECTING OFFICER APPROVAL: [Signature] DATE: 8/30/06

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: 11/15/05
 Representing: ACWD Name (printed): Douglas Young

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
 City of Fremont No. 963
 City of Newark No. 136
 City of Union City No. 109-73

Application Received Date: 8/30/06 By: MJM Permit Issued Date: 8/30/06 Permit Expiration Date: 10/30/06 Job No.: 6269 Permit No.: 2006-283 Well No.: 5/2W-14E008

JOB ADDRESS: Don Edwards National Wildlife Refuge
~~524~~ (see attached)
 NAME: U.S. Fish & Wildlife Service
 ADDRESS: P.O. Box 524
Newark, CA 94560
 TELEPHONE: 510-792-0222

NAME: Douglas Young
 ADDRESS: 43885 South Grimmer Blvd.
Fremont, CA 94538
 TELEPHONE: 510-668-4452 (R)CGF/RCE NO. 585a

NAME: Maggiara Bros. Drilling, Inc.
 ADDRESS: 595 Airport Blvd.
Watsonville, CA 95076
 TELEPHONE: 831-724-1338 STATE LIC. NO. C57- 249957

When property signed DEIN
**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 - 7:30 a.m. to 4:30 p.m., Monday through Friday.

PLEASE CHECK TYPE OF PROPOSED WORK

WATER (Pumping) WELL	GEOTECHNICAL INVESTIGATION	CHEMICAL INVESTIGATION
Construction <input checked="" type="checkbox"/>	Exploratory Holes <input type="checkbox"/>	Exploratory Holes <input type="checkbox"/>
Repair or Reconstruction <input type="checkbox"/>	Monitoring Wells, Construction <input checked="" type="checkbox"/>	Vapor Sampling Investigation <input type="checkbox"/>
Destruction <input type="checkbox"/>	Monitoring Wells, Destruction <input type="checkbox"/>	Monitoring Well Const. (Chemical Leak) <input type="checkbox"/>
Cathodic Protection Hole <input type="checkbox"/>		Monitoring Well Const. (Compliance Wells) <input type="checkbox"/>
Dewatering <input type="checkbox"/>		Monitoring Well Const. (Baseline Study) <input type="checkbox"/>
		Vapor Extraction Well <input type="checkbox"/>

Description of Proposed Work: Construction of groundwater monitoring well DEIN

TOTAL ESTIMATED COST \$ _____

PERMIT CONDITIONS: Monitoring Well Construction to comply with ACWD requirements.

FEES:

E Private	\$ _____
S Public (Governmental) Agency	\$ _____
T Public Utility	\$ _____
M Permit Issuance Fee	\$ <u>0</u>
A Field Investigation and Inspection Fee	\$ _____
T ESTIMATE TOTAL	\$ <u>0</u>
A Permit Issuance Fee	\$ <u>0</u>
C Field Investigation and Inspection Fee	\$ _____
T TOTAL	\$ <u>0</u>

DEPOSIT:

P.O. NO.	Date Received	Cash	Check No.
		Estimated Amount \$ <u>0</u>	
		Actual Amount \$ <u>0</u>	
		Difference \$ <u>0</u>	
Refund \$ _____	Date _____		
Billed \$ _____	Date _____		
GUARANTEE OF PERFORMANCE			
Cash Deposit	Amount \$ _____	Bond	Date _____
(NOT TO EXCEED TOTAL ESTIMATED COST)			
Return Amount \$ _____	Date _____		

ACWD SITE NO. _____ APPROVED FOR SCHEDULING BY: MJM DATE: 8/30/06 INSPECTING OFFICER APPROVAL: Michelle Flynn DATE: 8/30/06

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: Douglas Young Date: 11/15/05
 Representing: ACWD Name (printed): Douglas Young

APPLICATION

FOR DRILLING PERMIT

ALAMEDA COUNTY WATER DISTRICT

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

(APPLICATION TO BE TYPED)

WELL ORDINANCE

City of Fremont No. 963
 City of Newark No. 136
 City of Union City No. 109-73

Application Received Date: 12/20/06 By: M.M. Permit Issued Date: 12/20/06 Permit Expiration Date: 2/20/07 Job No: 6269 Permit No: 2006-458 Well No: 591W-16M008

JOB ADDRESS: 190 feet South of Nobel Dr along the south side of Automall Parkway

PROPERTY OWNER
NAME: City of Fremont
ADDRESS: 3955 Liberty ST
Fremont CA 94537
TELEPHONE: 510-494-4200

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

WELL DRILLING CONTRACTOR
NAME: Maggiara Bros. Drilling INC.
ADDRESS: 545 Airport Blvd
Watsville GA 30786
TELEPHONE: 831-724-1338 STATE LIC. NO. C57 249957

When property 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 - 7:30 a.m. to 4:30 p.m., Monday through Friday.

PLEASE CHECK TYPE OF PROPOSED WORK			
WATER (Pumping) WELL	GEOTECHNICAL INVESTIGATION	CHEMICAL INVESTIGATION	
Construction <input type="checkbox"/>	Exploratory Holes <input type="checkbox"/>	Exploratory Holes <input type="checkbox"/>	Monitoring Well Const. (Chemical Leak) <input type="checkbox"/>
Repair or Reconstruction <input type="checkbox"/>	Monitoring Wells, Construction <input checked="" type="checkbox"/>	Vapor Sampling Investigation <input type="checkbox"/>	Monitoring Well Const. (Compliance Wells) <input type="checkbox"/>
Destruction <input type="checkbox"/>	Monitoring Wells, Destruction <input type="checkbox"/>	Monitoring Well Destruction <input type="checkbox"/>	Monitoring Well Const. (Baseline Study) <input type="checkbox"/>
Cathodic Protection Hole <input type="checkbox"/>		Air Sparging Well <input type="checkbox"/>	Vapor Extraction Well <input type="checkbox"/>
Dewatering <input type="checkbox"/>			

Description of Proposed Work: Drilling and Installation of monitoring well ~~Auto Well-D-1~~ Auto Well-D-1

TOTAL ESTIMATED COST \$ _____

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

FEES:	
E Private	\$ _____
S Public (Governmental) Agency	\$ _____
T Public Utility	\$ _____
M Permit Issuance Fee	\$ <u>0</u>
A Field Investigation and Inspection Fee	\$ _____
ESTIMATE TOTAL	
A Permit Issuance Fee	\$ <u>0</u>
C Field Investigation and Inspection Fee	\$ _____
T	\$ _____
U	\$ _____
A	\$ _____
L	\$ _____
TOTAL	

DEPOSIT:	
P.O. NO. _____	Date Received _____
	Cash <input type="checkbox"/> Check No. _____
	Estimated Amount \$ <u>0</u>
	Actual Amount \$ <u>0</u>
	Difference \$ <u>0</u>
Refund \$ _____	Date _____
Billed \$ _____	Date _____
GUARANTEE OF PERFORMANCE	
Cash Deposit _____	Bond _____
Amount \$ _____	Date _____
(NOT TO EXCEED TOTAL ESTIMATED COST)	
Return Amount \$ _____	Date _____

ACWD SITE NO. _____
APPROVED FOR SCHEDULING BY: [Signature] DATE: 12/20/06 INSPECTING OFFICER APPROVAL: [Signature] DATE: 12/20/06

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: 12/20/06
Representing: ACWD Name (printed): Douglas Yang

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

City of Fremont No. 963
 City of Newark No. 136
 City of Union City No. 109-73

Application Received Date: 12/20/06 By: M/M Permit Issued Date: 12/20/06 Permit Expiration Date: 2/20/07 Job No: 6269 Permit No: 2006-450 Well No: 551W-16M007

JOB ADDRESS: 180 feet South of Nobel Dr along the South side of Automall Parkway

PROPERTY OWNER NAME: City of Fremont
 ADDRESS: 39550 Liberty St
Fremont CA 94538
 TELEPHONE: 510-494-4200

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

WELL DRILLING CONTRACTOR NAME: Maggiore Bros. Drilling Inc
 ADDRESS: 595 Airport Blvd
Watsonville CA 95076
 TELEPHONE: 831-724-1338 STATE LIC. NO. C57 249957

When property signed (AutoMall-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 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 - 7:30 a.m. to 4:30 p.m., Monday through Friday.

PLEASE CHECK TYPE OF PROPOSED WORK

WATER (Pumping) WELL	GEOTECHNICAL INVESTIGATION	CHEMICAL INVESTIGATION
Construction <input type="checkbox"/>	Exploratory Holes <input type="checkbox"/>	Exploratory Holes <input type="checkbox"/>
Repair or Reconstruction <input type="checkbox"/>	Monitoring Wells, Construction <input checked="" type="checkbox"/>	Vapor Sampling Investigation <input type="checkbox"/>
Destruction <input type="checkbox"/>	Monitoring Wells, Destruction <input type="checkbox"/>	Monitoring Well Destruction <input type="checkbox"/>
Cathodic Protection Hole <input type="checkbox"/>		Air Sparging Well <input type="checkbox"/>
Dewatering <input type="checkbox"/>		Monitoring Well Const. (Chemical Leak) <input type="checkbox"/>
		Monitoring Well Const. (Compliance Wells) <input type="checkbox"/>
		Monitoring Well Const. (Baseline Study) <input type="checkbox"/>
		Vapor Extraction Well <input type="checkbox"/>

Description of Proposed Work: Drilling and Install of monitoring well Automall - F

TOTAL ESTIMATED COST \$ _____

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

FEES:

E	Private	\$ _____
S	Public (Governmental) Agency	\$ _____
T	Public Utility	\$ _____
M	Permit Issuance Fee	\$ <u>0</u>
A	Field Investigation and Inspection Fee	\$ <u>0</u>
ESTIMATE TOTAL		\$ <u>0</u>
A	Permit Issuance Fee	\$ <u>0</u>
T	Field Investigation and Inspection Fee	\$ _____
TOTAL		\$ <u>0</u>

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 EXCEED TOTAL ESTIMATED COST)

Return Amount \$ _____ Date _____

ACWD SITE NO. _____
 APPROVED FOR SCHEDULING BY: M/M DATE: 12/21/06 INSPECTING OFFICER APPROVAL: Michelle Ay DATE: 12/21/06

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: Douglas Young Date: 12/20/06
 Representing: ACWD Name (printed): Douglas Young

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
 City of Fremont No. 963
 City of Newark No. 136
 City of Union City No. 109-73

Application Received Date: 12/20/06 By: M. M. Permit Issued Date: 12/20/06 Permit Expiration Date: 2/20/07 Job No: 6269 Permit No: 2506-1419 Well No: 57/W-16M006

JOB ADDRESS: 170 feet south of Nobel Dr along the south side of Autumell Parkway

PROPERTY OWNER
 NAME: City of Fremont
 ADDRESS: 32550 Liberty ST
Fremont CA 94537
 TELEPHONE: 510-494-4700

CONSULTING ENGINEER
 NAME: Douglas Young (ACWD)
 ADDRESS: 43885 S Grimmer Blvd
Fremont CA 94555
 TELEPHONE: 50-668-4452 RG/CFG/RCE NO. 5859

WELL DRILLING CONTRACTOR
 NAME: Maggiara Bros. Drilling INC
 ADDRESS: 595 Airport Blvd
Westvale CA 95076
 TELEPHONE: 831-724-1338 STATE LIC. NO. C57 249957

When property 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 - 7:30 a.m. to 4:30 p.m., Monday through Friday.

PLEASE CHECK TYPE OF PROPOSED WORK		
WATER (Pumping) WELL	GEOTECHNICAL INVESTIGATION	CHEMICAL INVESTIGATION
Construction <input type="checkbox"/>	Exploratory Holes <input type="checkbox"/>	Exploratory Holes <input type="checkbox"/>
Repair or Reconstruction <input type="checkbox"/>	Monitoring Wells, Construction <input checked="" type="checkbox"/>	Vapor Sampling Investigation <input type="checkbox"/>
Destruction <input type="checkbox"/>	Monitoring Wells, Destruction <input type="checkbox"/>	Monitoring Well Const. (Chemical Leak) <input type="checkbox"/>
Cathodic Protection Hole <input type="checkbox"/>		Monitoring Well Const. (Compliance Wells) <input type="checkbox"/>
Dewatering <input type="checkbox"/>		Monitoring Well Const. (Baseline Study) <input type="checkbox"/>
		Vapor Extraction Well <input type="checkbox"/>

Description of Proposed Work: Drilling + Installation of Monitoring well Autumell-C

TOTAL ESTIMATED COST \$

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

FEES:

E	Private		
S	Public (Governmental) Agency	<input checked="" type="checkbox"/>	
T	Public Utility		
M	Permit Issuance Fee		\$ <u>0</u>
A	Field Investigation and Inspection Fee		\$ <u>0</u>
ESTIMATE TOTAL			\$ <u>0</u>
A	Permit Issuance Fee		\$ <u>0</u>
C	Field Investigation and Inspection Fee		\$ <u>0</u>
TOTAL			\$ <u>0</u>

DEPOSIT:

P.O. NO.	Date Received	Cash	Check No.
		Estimated Amount \$	<u>0</u>
		Actual Amount \$	<u>0</u>
		Difference \$	<u>0</u>
Refund \$	Date		
Billed 4	Date		
GUARANTEE OF PERFORMANCE			
Cash Deposit	Bond		
Amount \$	Date		
(NOT TO EXCEED TOTAL ESTIMATED COST)			
Return Amount \$	Date		

ACWD SITE NO. _____
 APPROVED FOR SCHEDULING BY: M. M. DATE: 12/20/06 INSPECTING OFFICER APPROVAL: Michelle Fry DATE: 12/20/06

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: 12/20/06
 Representing: ACWD Name (printed): Douglas Young

Appendix B

Access Agreements



UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

RECEIVED

Don Edward's San Francisco Bay
National Wildlife Refuge
AUG - 2 2006
PO Box 524, Newark, CA 94560
510/792-0222

A.C.W.D.
ENGINEERING DEPT.

SPECIAL USE PERMIT

Station No. to be Credited Permit No.
11640 - 2006-033

Date July 18, 2006

Period of Use (inclusive)

From September 1, 2006
To January 31, 2007

Permittee Name

Robert Shaver
(510) 668-4423

Permittee Address

Alameda County Water District
43885 South Grimmer Blvd.
P.O. BOX 5110
Fremont, CA 94537-5110

Purpose (specify in detail privilege requested, or units of products involved)

Construct, operate and maintain eight groundwater monitoring wells on the Refuge levees for Car gill-owned Salt Ponds 8 & 11, a part of the Don Edward's San Francisco Bay NWR.

Description (specify unit numbers: metes and bounds, or other recognizable designations)

Access on Refuge levees adjacent to Cargill Salt Ponds 8 & 11 near Mowry Slough to construct, operate and maintain eight groundwater monitoring wells as described in the document titled "Background Information on Special Use Permit Application" and subsequent amendments

Amount of fee

\$0 if not a fixed payment, specify rate and unit of charge:

- Payment Exempt
- Full Payment
- Partial Payment

- Justification: Data collected will be beneficial to the Refuge.
- Balance of payments to be made as follows:

Record of Payments

N/A

Special Conditions

See Special Conditions Sheet

This permit is issued by the U.S. Fish and Wildlife Service and accepted by the undersigned, subject to the terms, covenants, obligations, and reservations, expressed or implied herein, and to the conditions and requirements appearing on the reverse side.

Permittee Signature

Robert Shaver

Issuing Officer Signature and Title

Clyde Moller
Refuge Manager

Special Conditions (continued) - Permit # 11640-2006-033

1. The construction project will take place in the locations and in the manner described in the Permittee's application documents.
2. Permittee must carry a copy of the permit when on Refuge lands.
3. Within one month of issuance of this Special Use Permit permittee must apply for a Right-of-Way from the Service. Any costs to the Service for processing the Right-of-Way and the appraised value of Right-of-Way will be paid by the Permittee.
4. Permittee will not construct proposed wells during the Endangered Clapper rail breeding season : 2/1/07-8/31/07
5. Permittee must obtain permission from Cargill for access to proposed monitoring well sites and Cargill must agree on the monitoring well layout so as not to impact Cargill's operation.
6. The Permittee will not access surrounding tidal marsh or disturb marsh vegetation.
7. Work will not occur within 2 hours of high tide at construction sites in salt marshes on those days that the tide is higher than 6.5 feet as measured at the Golden Gate Bridge.
8. Waterfowl hunting season will be from October - January. Care should be taken to minimize impacts to the hunting public such as disruption of hunters using boats in sloughs. Hunters are most numerous on weekends.
9. Vehicle refueling and maintenance will be allowed as necessary on site under the following conditions: Drilling sites will be protected from fluids by the construction of a berm that will be covered with plastic material. The berm should be obliterated after construction phase and be returned to pre-construction contours.
10. Construction materials will be removed from the Refuge as soon as possible and nothing will be left on the Refuge after the close of the project period, except the monitoring wells themselves.
11. Food and related trash will be deposited in closed containers and removed from the Refuge daily.
12. Permittee will immediately report all sightings of feral cats, dogs, or red foxes observed on the Refuge. Fox dens will not be approached or searched.
13. The Permittee will work in a manner that minimizes disturbance to wildlife and habitat.
14. No vehicle access is permitted on the levee when the roads are so wet it would cause damage.
15. Permittee will notify Refuge Manager one week before start of construction and within two days of termination of construction.
16. ACWD is responsible for proper destruction of monitoring wells at which point they are no longer needed.
17. ACWD is responsible for repairing damage to levees caused by well construction activities. Levee repair activities conducted by the ACWD must first be approved by the Service and Cargill.



ENCROACHMENT PERMIT
Engineering Division
Permit No. ENC2007-00318
Type: Other, Public Agency

Address / Work Location: 44051 NOBEL DR

44051 Nobel on Automall Parkway.

Project Description :

Installing four (4) monitoring wells.

Comment: Contact Person:
Douglas Young 510.668.4452

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

Application Date: 12/18/2006 Applicant Name: ACWD
 Issued Date: 12/18/2006 Applicant Address: 43885 SOUTH GRIMMER BLVD P.O. BOX 5110, FREMONT, CA 9
 Est. Start Date: 12/18/2006 Applicant Phone: 668 4499
 Est. End Date: 05/18/2007 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 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: Sarah Reid DATE: 12/18/2006

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

1 2 3 4 5

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

In: for Greg Anderson Phone: 494-4704 Pager: 802-4491

Inspector Signature _____ Completed Date _____

ENGINEERING APPLICATION

For Finance Staff use only



Development and Environmental Services Department
39550 Liberty Street, P.O. Box 5006, Fremont, CA 94537-5006
510 494-4700 information 1

CASE NUMBER: ENC2007-00318
WORK ORDER NUMBER: _____

Total Deposit and/or Fee: \$ 514.00

APPLICANT - PLEASE PRINT CLEARLY AND FILL IN ALL APPLICABLE SECTIONS

PROJECT NAME:
(one letter per box)

S W N I L E C O N E M W P R O J

PROJECT SITE ADDRESS/LOCATION: Autswell @ Noble Nobel

TRACT/PARCEL MAP #: _____ APN: _____

SITE VACANT? _____ YES _____ NO _____ APN: _____

PROJECT DESCRIPTION: Installation of 4 monitoring wells in the plume area

APPLICANT: Name and mailing address of person requesting the filing of this application.

NAME: Douglas Young
COMPANY: Alameda Co Water Dist
ADDRESS: 43885 ~~30125~~ Grammer Blvd
CITY/STATE/ZIP: Fremont Ca 94538
PHONE #: (510) 668-4452 FAX#: ()
E-MAIL ADDRESS: douglas.young@acwd.com

MAIN CONTACT PERSON: Person to be contact other than applicant regarding this application.

ARCHITECT ENGINEER
 TENANT OTHER _____
NAME: _____
COMPANY: _____
ADDRESS: _____
CITY/STATE/ZIP: _____
PHONE #: () _____ FAX#: () _____
E-MAIL ADDRESS: _____

PROPERTY OWNER AUTHORIZATION:

NAME: _____
COMPANY: _____
ADDRESS: _____
CITY/STATE/ZIP: _____
PHONE #: () _____ FAX#: () _____
E-MAIL ADDRESS: _____

CHOOSE ONE:

- I am the sole owner and hereby authorize the filing of this application
- I own the project site jointly with one or more persons and am empowered to authorize the filing of this application on behalf of my fellow property owners; or,
- I own the project site in conjunction with one or more persons who are listed with their acknowledgement and authorization for the filing of this application attached for additional property owner authorization/acknowledgements.

SIGNATURE: _____

SUBDIVISIONS: SIZE OF DEVELOPMENT AND NUMBER OF LOTS

a. Total Land Area of Project Site _____ acres	c. Proposed subdivision? Yes or No _____
b. Current number of lots: _____ lots	Total # of proposed lots _____
Tentative Map Approval Date: _____	Total # of units _____
PLN#: _____	Total SFR lots _____
	Total # of Townhouse lots _____
	Total # of Common lots _____
	Total # of Condo units _____

GRADING:

Site Cut: _____ cy
Site Fill: _____ cy
Import: _____ cy
Export: _____ cy
Preliminary Grading Plan Approval Date: _____
PLN#: _____



RECEIVED

JUL 19 2006

A.C.W.D.
ENGINEERING DEPT.

July 18, 2006

Douglas T. Young, R.G.
Alameda County Water District
43885 South Grimmer Blvd.
Fremont, CA 94538

Subject: License Agreement for Ground Water Monitoring Wells
Cargill file #: 2001.009:06E & 129.100:38

Dear Mr. Young:

Enclosed you will find three copies of the license agreement for ACWD to access the sites for drilling and installing the listed monitoring wells. Please have Mr. Shaver sign all three copies, keep one copy for your files, and return the other two-signed copies. Based upon our discussions, I set the expiration of this agreement for December 31, 2006. If that does not fit your schedule, please let me know.

If there are any questions, please feel free to give me a call at (510) 790-8610 or alternatively you can email me at pat_mapelli@cargill.com.

Sincerely,

Patrick D. Mapelli
Project Manager/Property Engineer
Cargill Salt
7220 Central Avenue
Newark, CA 94560

Cc: Robert C. Douglass, Real Property Manager

2001.009:06E

LICENSE AGREEMENT

THIS AGREEMENT, made this 18th day of July, 2006, by CARGILL, INCORPORATED, a Delaware corporation (hereinafter called "Licensor"), and ALAMEDA COUNTY WATER DISTRICT c/o DOUGLAS T. YOUNG, R.G., (510) 668-4452, (hereinafter called "Licensee"), whose address is 43885 SOUTH GRIMMER BLVD FREMONT, CA 94538.

WITNESSETH

1. Licensor hereby permits Licensee, its agents, contractors, employees and equipment to enter certain lands of Licensor located PLANT SITE AT 7220 CENTRAL AVENUE NEWARK TO ACCESS THE TWO POINTS SHOWN ON ACWD DRG NO. G06-04B-37-04 (SHEET NO. 04 & 06) for the sole purpose of DRILLING AND INSTALLING GROUND WATER MONITORING WELLS AS DESCRIBED IN ACWD JOB NO. 6269.

2. The foregoing permission is given subject to the following conditions:

(a) Licensor by written notice may revoke this license at any time irrespective of expense incurred or labor expended by Licensee. Any such written notice of revocation, mailed and addressed to the Licensee at the address set forth above, or delivered to the Licensee, shall be notice hereunder by the Licensor;

(b) In the event of revocation, Licensee shall not be entitled to obtain from Licensor any reimbursement for expenses of Licensee or for any other purpose;

(c) In the event of revocation or expiration of this license, Licensee shall immediately evacuate Licensor's property and remove all equipment and materials therefrom, and shall leave Licensor's property in a condition equal to or better than its present condition.

(d) Licensee shall acquire no interest or estate in land of Licensor under this license.

(e) This license shall expire and be ended DECEMBER 31, 2006, unless previously revoked by Licensor.

(f) Licensor does not warrant or represent that the premises are safe, healthful, or suitable for the purpose for which they are permitted to be used under the terms of this license, and Licensee agrees to conduct its own investigations and make its independent determination of such matters; and

(g) Prior to entry upon said property of Licensor, Licensee, or its contractor shall at its own expense obtain from a reputable insurance company admitted to do business in California, a standard comprehensive general liability policy (including contractual liability on any written agreement) insuring Licensor against liability or loss (whether from personal injuries or property damage, or both) arising from or connected with Licensee's entry upon and use of said property pursuant to this Agreement. Said policy shall name Licensor as insured and shall have a limit of liability of not less than \$2,000,000 per occurrence (combined single limit) and shall be primary insurance.

(h) Licensee agrees to provide dust control to prevent nuisance dust.

(i) Licensee agrees to prevent dirt, equipment, or any foreign material from entering Cargill's crystallizer beds or other ponds.

(j) Licensee agrees to remove all unused materials from Cargill property unless Cargill's Representative agrees for the material to remain on site.

(k) Licensee agrees to have all of its contractors sign in at Cargill's Front Office on a daily basis.

(l) Licensee agrees to have all of its contractors comply with Cargill's Safety Policies while on Cargill property, attached to and made a part of this license.

(m) Cargill levees/roads are to be maintained during the construction period and shall be returned to their original condition and elevation at the completion of the project. If additional rock is needed to return the levee to its original condition, $\frac{3}{4}$ inch crushed red rock shall be applied at a thickness of 2 inches.

(n) Licensee agrees to obey all posted traffic signs.

(o) Licensee understands that the facility where the work will take place is a salt product facility and that under certain conditions salt can cause corrosion to equipment, tools, etc. Licensee shall be solely responsible for any damage to its contractor or subcontractor's equipment caused by exposure to salt.

3. Licensee hereby accepts this license subject to the conditions set forth in section 2 above, and by acceptance of said license and in consideration thereof,
Licensee:

(a) Assumes any and all risks in connection with his entry upon or use of Licensor's property;

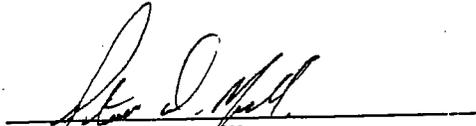
(b) Waives any claim against Licensor, its employees and agents, for injuries that may be sustained by Licensee upon said property and for damage to property of Licensee; and

(c) Agrees to indemnify Licensor against any loss and damage which shall be caused by the exercise of rights and privileges herein granted, or by any wrongful or negligent act or omission of Licensee or of its agents or employees in the course of their employment, provided, however, that this indemnity shall not extend to that portion of such loss or damage that shall have been caused by Licensor's comparative negligence or willful misconduct.

(d) Agrees to pay reasonable compensation to Licensor for any damage that Licensee should inflict or allow upon the property pursuant to the exercise of the rights and privileges herein granted.

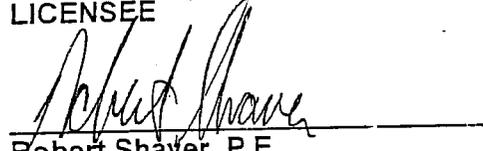
IN WITNESS WHEREOF, the parties hereto have executed this agreement the day and year first above written.

CARGILL, INCORPORATED,



Patrick D. Mapelli
Its: Project Manager/Property Engineer

ALAMEDA COUNT WATER DISTRICT
LICENSEE



Robert Shaver, P.E.
Its: Engineering Manager

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A.C.W.D.
ENGINEERING DEPT.



December 29, 2006

Douglas T. Young, R.G.
Alameda County Water District
43885 South Grimmer Blvd.
Fremont, CA 94538

Subject: License Agreement for Ground Water Monitoring Wells
Cargill file #: 2001.009:07E & 129.100:38

Dear Mr. Young:

It is my understanding that your work to complete the monitoring wells is not yet complete and will apparently run into the next calendar year. Enclosed you will find two copies of the license agreement for ACWD to access the sites for drilling and installing the listed monitoring wells. Please have Mr. Shaver sign both copies, keep one copy for your files, and return the other copy to me. Since I assume that your work is probably winding down, I have set the expiration on this license for February 28, 2007. Please let me know if you feel you need additional time and I can modify the license.

If there are any questions, please feel free to give me a call at (510) 790-8610 or alternatively you can email me at pat_mapelli@cargill.com.

Sincerely,

A handwritten signature in black ink that reads "Patrick D. Mapelli".

Patrick D. Mapelli
Project Manager/Property Engineer
Cargill Salt
7220 Central Avenue
Newark, CA 94560

Cc: Robert C. Douglass, Real Property Manager

RECEIVED

JAN - 3 2007

A.C.W.D.
ENGINEERING DEPT.

2001.009:07E

LICENSE AGREEMENT

THIS AGREEMENT, made this 1st day of January, 2007, by CARGILL, INCORPORATED, a Delaware corporation (hereinafter called "Licensor"), and ALAMEDA COUNTY WATER DISTRICT c/o DOUGLAS T. YOUNG, R.G., (510) 668-4452, (hereinafter called "Licensee"), whose address is 43885 SOUTH GRIMMER BLVD FREMONT, CA 94538.

WITNESSETH

1. Licensor hereby permits Licensee, its agents, contractors, employees and equipment to enter certain lands of Licensor located PLANT SITE AT 7220 CENTRAL AVENUE NEWARK TO ACCESS THE TWO POINTS SHOWN ON ACWD DRG NO. G06-04B-37-04 (SHEET NO. 04 & 06) for the sole purpose of DRILLING AND INSTALLING GROUND WATER MONITORING WELLS AS DESCRIBED IN ACWD JOB NO. 6269.

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(b) In the event of revocation, Licensee shall not be entitled to obtain from Licensor any reimbursement for expenses of Licensee or for any other purpose;

(c) In the event of revocation or expiration of this license, Licensee shall immediately evacuate Licensor's property and remove all equipment and materials therefrom, and shall leave Licensor's property in a condition equal to or better than its present condition.

(d) Licensee shall acquire no interest or estate in land of Licensor under this license.

(e) This license shall expire and be ended FEBRUARY 28, 2007, unless previously revoked by Licensor.

(f) Licensor does not warrant or represent that the premises are safe, healthful, or suitable for the purpose for which they are permitted to be used under the terms of this license, and Licensee agrees to conduct its own investigations and make its independent determination of such matters; and

(g) Prior to entry upon said property of Licensor, Licensee, or its contractor shall at its own expense obtain from a reputable insurance company admitted to do business in California, a standard comprehensive general liability policy (including contractual liability on any written agreement) insuring Licensor against liability or loss (whether from personal injuries or property damage, or both) arising from or connected with Licensee's entry upon and use of said property pursuant to this Agreement. Said policy shall name Licensor as insured and shall have a limit of liability of not less than \$2,000,000 per occurrence (combined single limit) and shall be primary insurance.

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(l) Licensee agrees to have all of its contractors comply with Cargill's Safety Policies while on Cargill property, attached to and made a part of this license.

(m) Cargill levees/roads are to be maintained during the construction period and shall be returned to their original condition and elevation at the completion of the project. If additional rock is needed to return the levee to its original condition, ¾ inch crushed red rock shall be applied at a thickness of 2 inches.

(n) Licensee agrees to obey all posted traffic signs.

(o) Licensee understands that the facility where the work will take place is a salt product facility and that under certain conditions salt can cause corrosion to equipment, tools, etc. Licensee shall be solely responsible for any damage to its contractor or subcontractor's equipment caused by exposure to salt.

3. Licensee hereby accepts this license subject to the conditions set forth in section 2 above, and by acceptance of said license and in consideration thereof, Licensee:

(a) Assumes any and all risks in connection with his entry upon or use of Licensor's property;

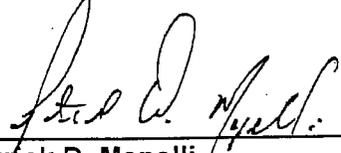
(b) Waives any claim against Licensor, its employees and agents, for injuries that may be sustained by Licensee upon said property and for damage to property of Licensee; and

(c) Agrees to indemnify Licensor against any loss and damage which shall be caused by the exercise of rights and privileges herein granted, or by any wrongful or negligent act or omission of Licensee or of its agents or employees in the course of their employment, provided, however, that this indemnity shall not extend to that portion of such loss or damage that shall have been caused by Licensor's comparative negligence or willful misconduct.

(d) Agrees to pay reasonable compensation to Licensor for any damage that Licensee should inflict or allow upon the property pursuant to the exercise of the rights and privileges herein granted.

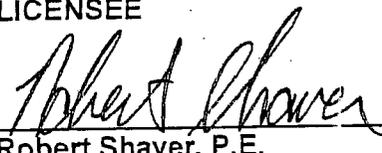
IN WITNESS WHEREOF, the parties hereto have executed this agreement the day and year first above written.

CARGILL, INCORPORATED,



Patrick D. Mapelli
Its: Project Manager/Property Engineer

ALAMEDA COUNT WATER DISTRICT
LICENSEE



Robert Shaver, P.E.
Its: Engineering Manager

Appendix C
Storm Water Protection and Emergency
Response Plans

MAGGIORA BROS. DRILLING, INC.

DRILLING CONTRACTORS - PUMP SALES & SERVICE
CALIFORNIA CONTRACTOR'S LICENSE NO. 249957

Corporate Office
595 Airport Blvd.
Watsonville, CA 95076

Tel: (831) 724-1338
Tel: (800) 728-1480
Fax: (831) 724-3228

SEPTEMBER 30, 2004

ALAMEDA COUNTY WATER DISTRICT
43885 SOUTH GRIMMER BOULEVARD
FREEMONT, CALIFORNIA 94537

SUBJECT; STORM DRAIN PROTECTION AND EMERGENCY RESPONSE PLAN.

DEAR DOUG YOUNG,

To prepare for the drilling of the monitoring wells we plan to have the following supplies on the job site.

One half a yard of sand (bagged) with two hundred sand bags.

Petroleum products Absorbent towels.

One hundred fifty lbs. of absorbent powder.

One hundred feet of erosion control and sediment retention WATTLES.

One hundred by ten feet sheet of filter cloth.

And all tools and materials needed to properly install and maintain these supplies.

THE PLAN

Park equipment on plastic sheets and build containment vessel by placing sand bags and wattles under the edges of the plastic.

On wells sites #1 and #2 we will have drilling fluids and cuttings from the shaker will go directly into a dump truck and dumped at the determined dump site.

MAGGIORA BROS. DRILLING, INC.

DRILLING CONTRACTORS - PUMP SALES & SERVICE
CALIFORNIA CONTRACTOR'S LICENSE NO. 249957

Corporate Office
595 Airport Blvd.
Watsonville, CA 95076

Tel: (831) 724-1338
Tel: (800) 728-1480
Fax: (831) 724-3228

SUBMITTAL TRANSMITTAL

Date: 10-01-04

Project: NORTHWEST NILES CONE MONITORING WELLS

Submittal No. MBD 1

Subject: SWPPP AND ERP PLANS

Spec. Sec. Ref.: E-14.8

Supplier: MAGGIORA BROS. DRILLING

Contract Deviations(if any):

To: ACWD. DOUG YOUNG

Submitted By: JIM PROOST

Comments: PLAN ATTACHED.

MAGGIORA BROS. DRILLING, INC.

DRILLING CONTRACTORS - PUMP SALES & SERVICE
CALIFORNIA CONTRACTOR'S LICENSE NO. 249957

Name
Date
Page 2

We will pump excess cement back into the concrete truck for them to dispose of.

Excess water from drilling and well developing will be pumped into a water truck. We will decant the clean water at a site approved by ACWD. The rest will go to the dump site.

When we start drilling we will protect drainage with filter cloth, sand bags and wattles.

If it was to start raining we will have visquine to cover any material that may enter the water ways.

We have a BMPs FOR CONTRACTORS ACTIVITIES PLAN and have trained staff.

In the event that a situation would occur that was beyond the control of the personal on hand the ERP for notification of proper personal would be utilized.

By having this plan in place there is little chance that a leak could occur that the crew on hand could not control.

In the event that a HASMAT spill was to happen I feel that the supplies on hand could control that spill and a clean up plan would then be planned. The dump truck that will be used on this job is sealed because of the amount of sand that we haul and it will be on site during the critical times of the job. That would leave us to find a back-ho street sweeper or what was needed to clean up the site.

Jim Proost



Project Coordinator

MAGGIORA BROS. DRILLING, INC.

DRILLING CONTRACTORS - PUMP SALES & SERVICE
CALIFORNIA CONTRACTOR'S LICENSE NO. 249957

Corporate Office
595 Airport Blvd.
Watsonville, CA 95076

Tel: (831) 724-1338
Tel: (800) 728-1480
Fax: (831) 724-3228

ON SITE REVIEW OF SPILL PREVENTION AND SPILL PLAN

TASK	YES	NO	DATE	OPER	YES	NO	DATE	OPER
	TIME ATOR				TIME ATOR			

EQUIPMENT PARKED ON PLASTIC SHEETS								
PLASTIC EDGES ARE BERMED 4" FOR CONTAINMENT AND ARE IN PLACE.								
FUELING AREA IS SUPPLIED WITH ABSORBENTS AND WASTE BARREL.								
INSPECT EQUIPMENT FOR LEAKS AT THE BEGINNING OF EACH SHIFT.								
IF LEAK IS NOTICED PLACE ABSORBENT PADS AND DRIP PAN IF NEEDED.								
MAKE NOTE OF MINOR LEAK FOR NEXT SHIFT AND CHANGED PADS HAS NEEDED.								
PUT USED PADS IN PLASTIC BAGS THEN INTO WASTE BARREL.								
ARE SUPPLIES SUFFICIENT FOR NEXT SHIFT?								
DO YOU HAVE THE SPILL CONTAINMENT PLAN?								
DID A SEMI-SIGNIFICANT SPILL OCCUR AND WAS CONTAINED?								
DID A SIGNIFICANT SPILL OCCUR AND DID A NOTIFICATION PLAN TAKE PLACE?								
IS RAIN EMINENT AND WAS THE STORM DRAIN PROTECTION PLAN PERFORMED?								

**FOR A SIGNIFICANT SPILL NOTIFY
THE FOLLOWING PEOPLE**

Notification shall be given to:

Alameda County Water District

43885 South Grimmer Boulevard
PO Box 5110
Fremont, California 94537
Contact: Douglas Young
Telephone: (510) 668-4452

Alameda County Public Works

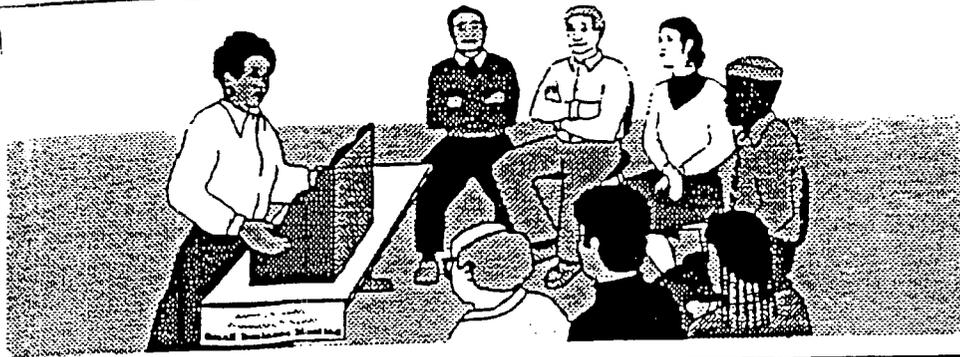
399 Elmhurst Street
Hayward, California 94544
Contact: James Yoo
Telephone: (510) 670-5588

State of California Fish and Game

P.O. Box 47
Yountville, California 94599
Contact: John Krause
Telephone: (415) 454-8050

MAGGIORA BROS. DRILLING
595 AIRPORT BLVD.
WATSONVILLE, CA 95076
CONTACT: MARK MAGGIORA
DAY PHONE 831-724-1338
NITE PHONE 831-901-7505

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



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



4. BMPs FOR CONTRACTOR ACTIVITIES

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

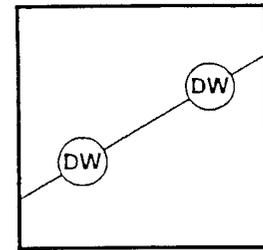
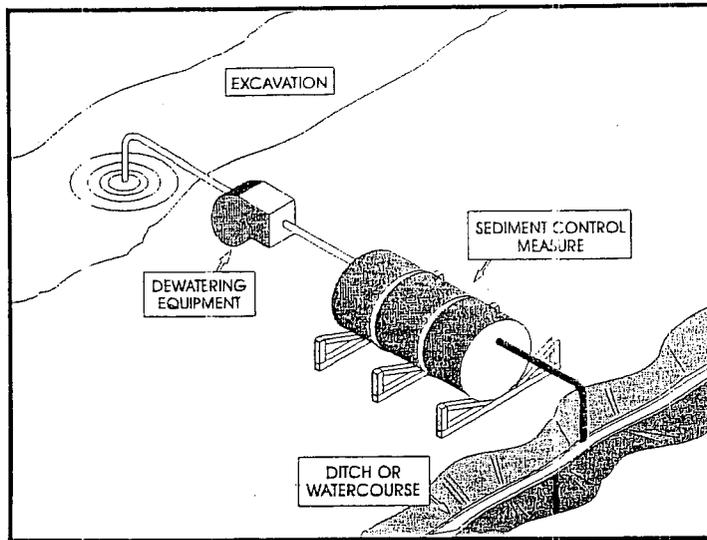
Contractor Training

- 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	✓	✓				



- 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.



Standards and Specifications

- 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.
- 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 device 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.

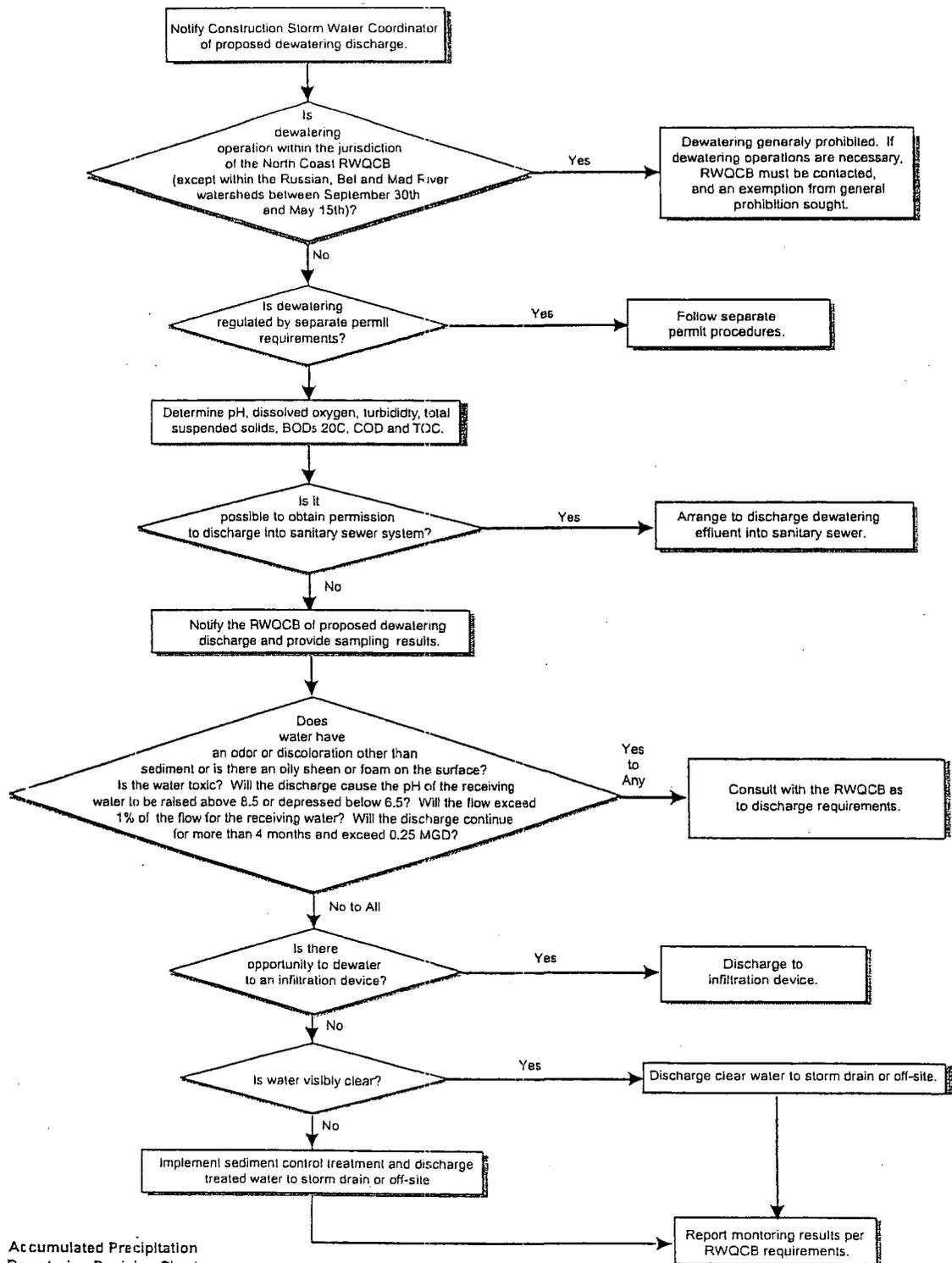
Maintenance and Inspection

- 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.



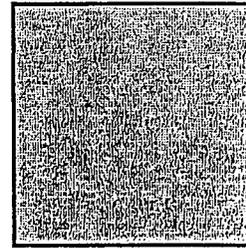
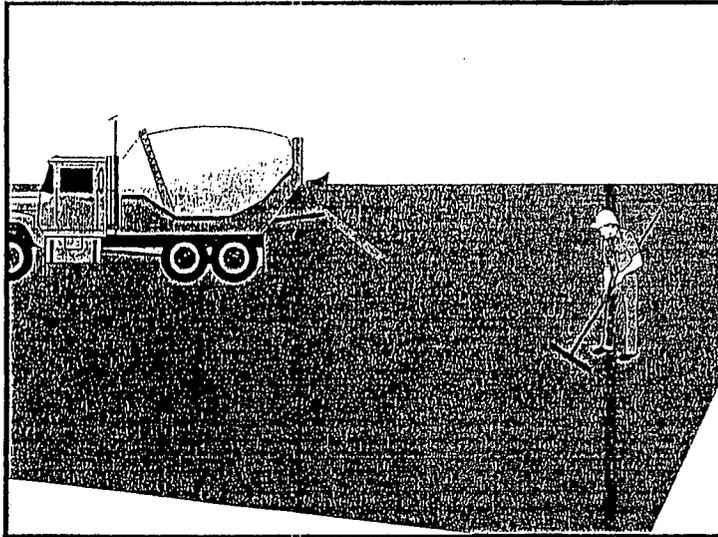
Dewatering Operations

NS-2



Accumulated Precipitation
Dewatering Decision Chart





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).

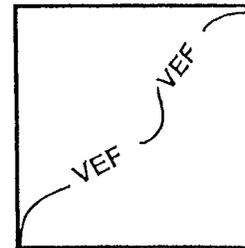
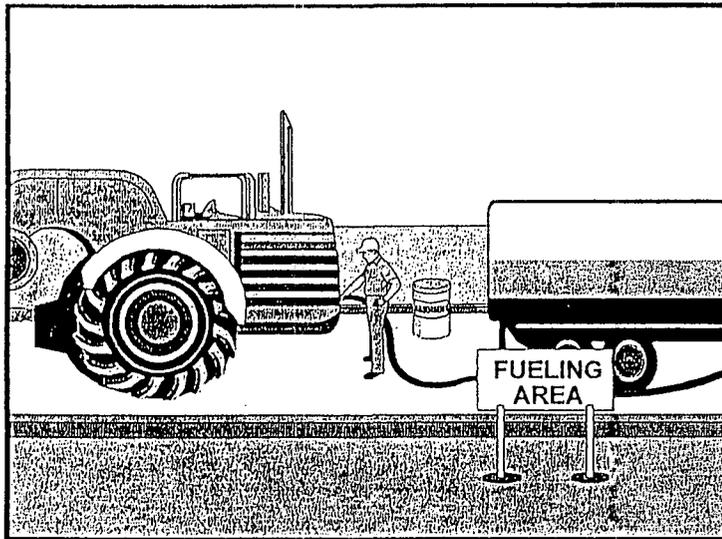


following characteristics, and shall be arranged with the construction storm water coordinator:

- 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.
 - 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.

Maintenance and Inspection





- 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.



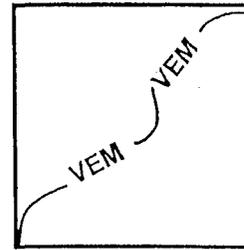
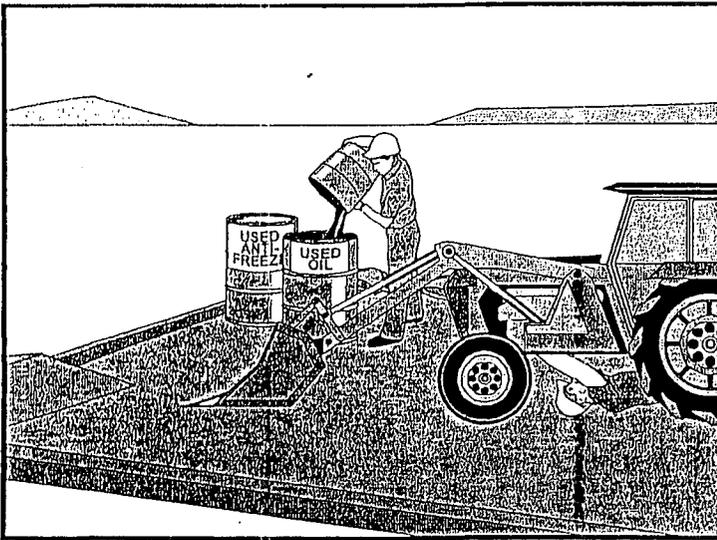
Vehicle and Equipment Fueling

NS-9

- 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.
- 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.

Maintenance and Inspection





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

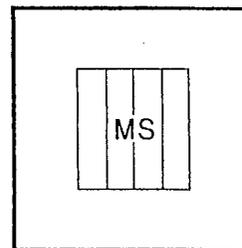
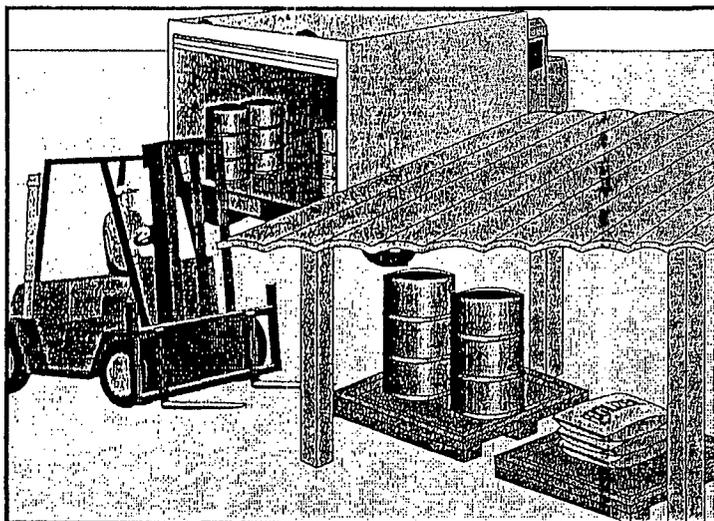


when seal coat, tack coat, slurry seal, or fog seal is applied to adjacent surfaces. Seal coat, tack coat, slurry seal, or fog seal shall not be applied if rainfall or thunderstorms are predicted to occur during the application or curing period.

- 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.
- 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.

Maintenance and Inspection





- 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.

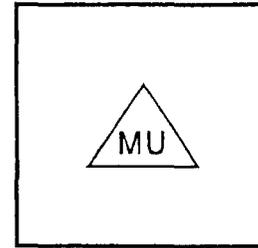
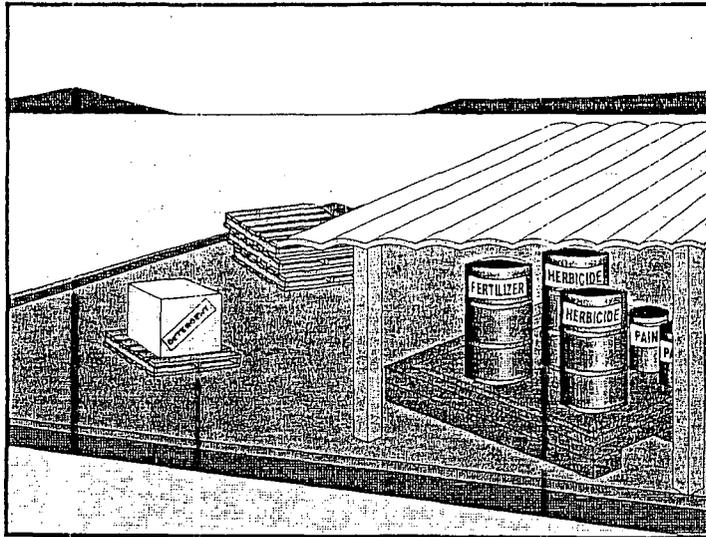
Spill Clean-up

- 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.





- 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.

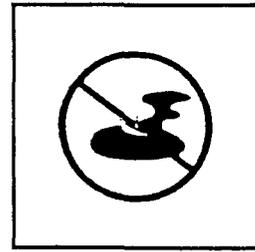
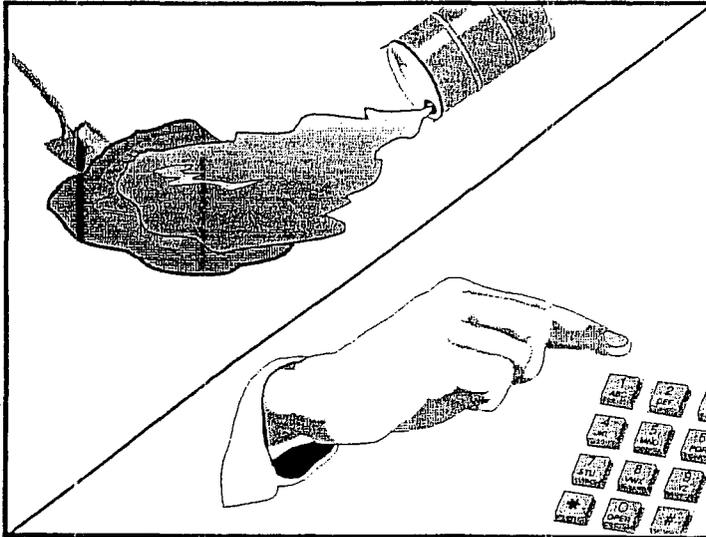
Standards and Specifications

- 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.





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.



Spill Prevention and Control

WM-4

- 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.



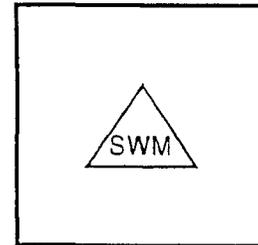
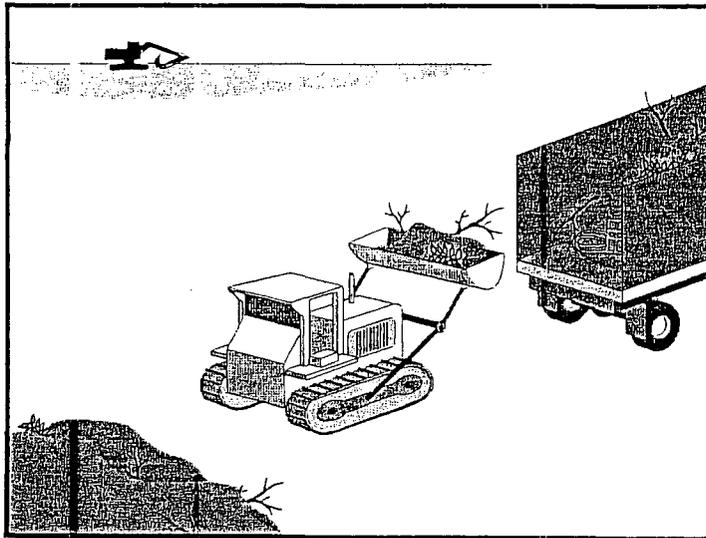
- Significant/Hazardous Spills

- 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.





- 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

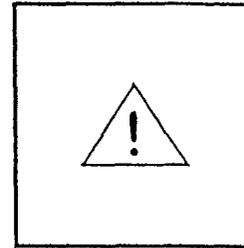
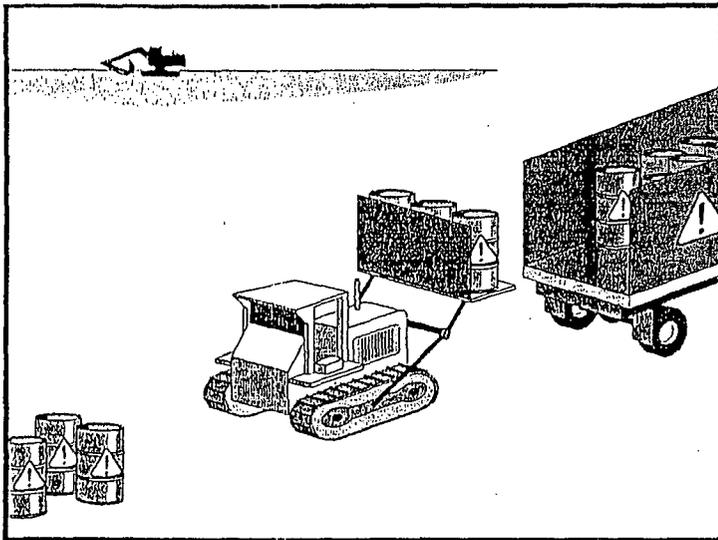


through the use of measures to elevate waste form site surfaces.

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

Maintenance and Inspection





- 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,
 - Concrete Curing Compounds,
 - Palliatives,
 - Septic Wastes,
 - Stains,
 - Wood Preservatives,
 - Any materials deemed a hazardous waste in California, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302.
 - Asphalt Products,
 - Pesticides,
 - Acids,
 - Paints,
 - Solvents,
 - Roofing Tar, or

- 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.

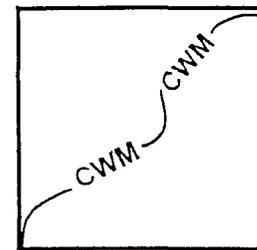
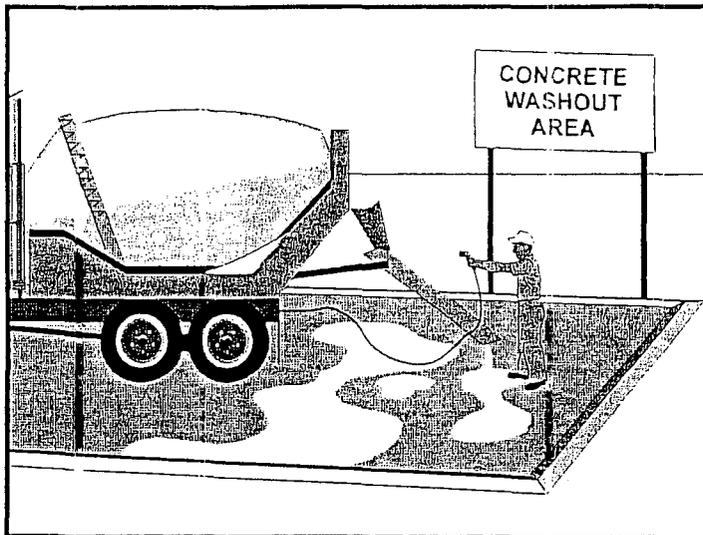


Hazardous Waste Management

WM-6

- 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.





- 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 from 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 free of 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

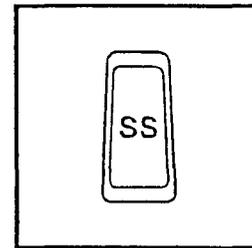
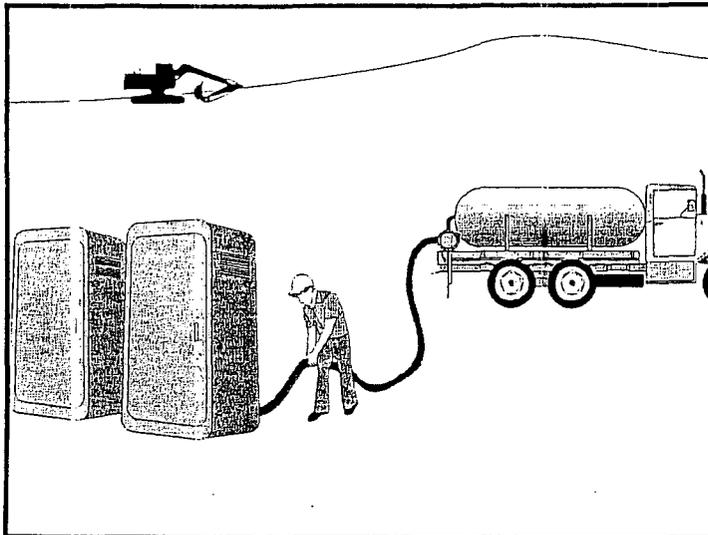
length and minimum width of 3m (10 ft). The quantity and volume shall be sufficient to contain all liquid and concrete waste generated by washout operations. The length and width of a facility may be increased, at the Contractor's expense, upon approval of the RE. Lath and flagging shall be commercial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

Maintenance and Inspection





- 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



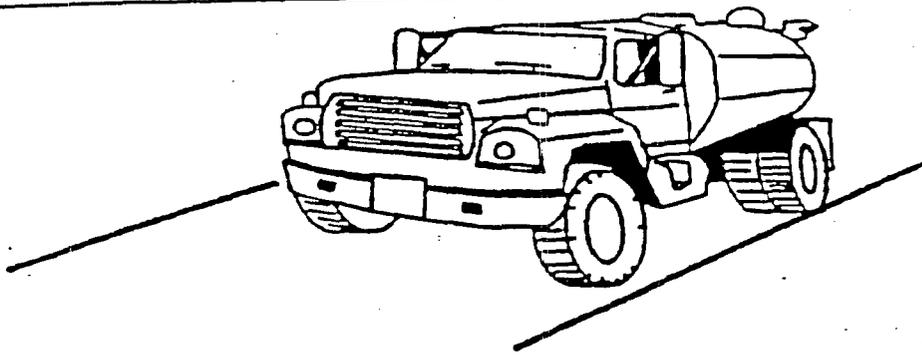
sanitary facilities shall be secured to prevent overturning.

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

Maintenance and
Inspection



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 repellent, 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



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 repellent, 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.

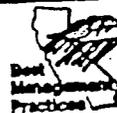
CalTrans, Standard Specifications, Sections 10, "Dust Control"; Section 17, "Watering"; and Section 18, "Dust Palliative".

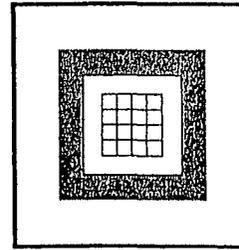
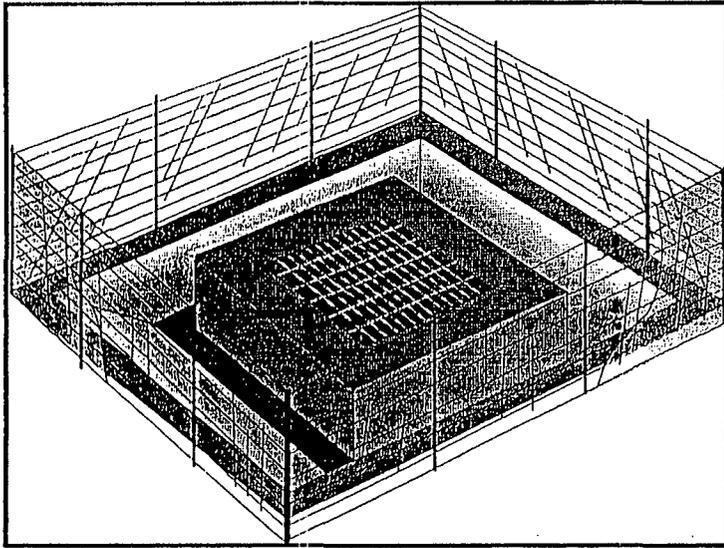
Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM10), Visibility Reducing Particles, Sulfates, Lead, and Hydrogen Sulfide, California Air Resources Board, April 1991.

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

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

ESC21





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 $0.014 \text{ m}^3/\text{s}$ (0.5 cfs).
- Sandbag barriers for inlet protection are applicable when sheet flows or concentrated flows exceed $0.014 \text{ m}^3/\text{s}$ (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 $130 \text{ m}^3/\text{ha}$ ($67 \text{ yd}^3/\text{ac}$) 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.

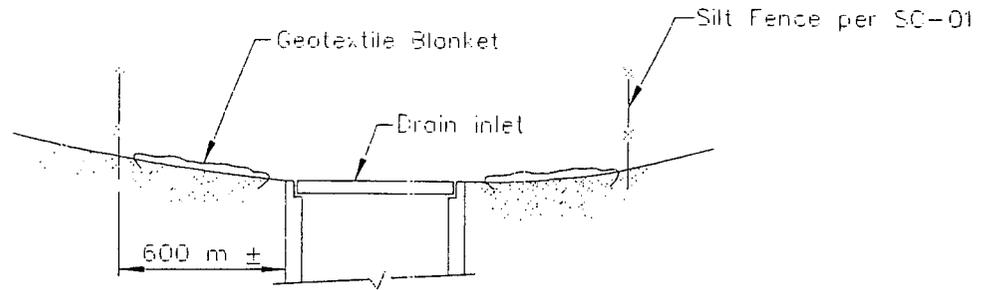
■ *Type 3 - Sandbag Barrier*

- 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.

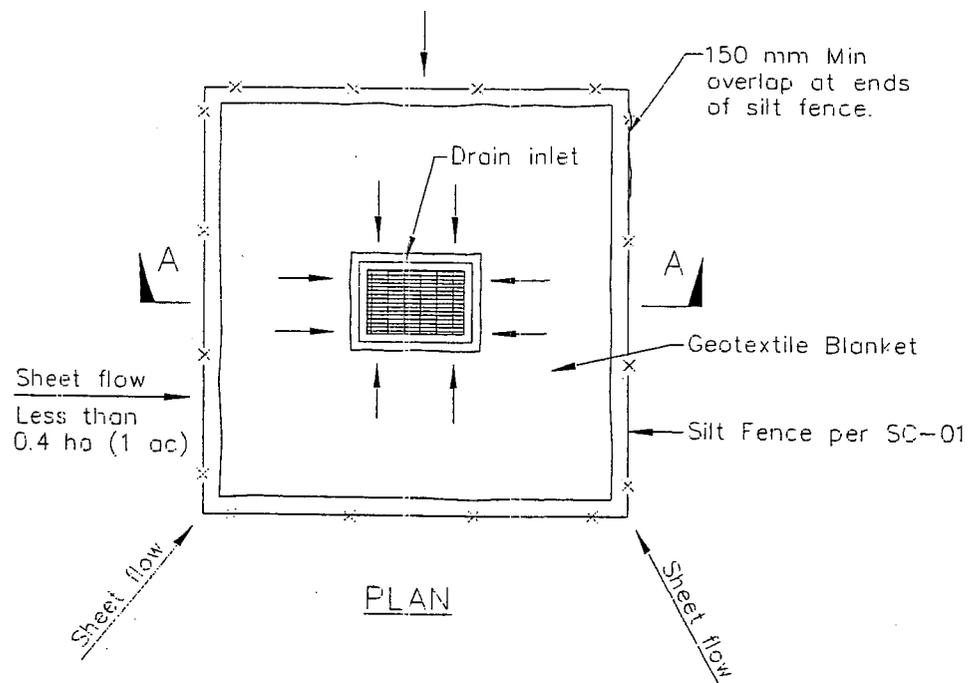


Storm Drain Inlet Protection

SC-10



SECTION A-A

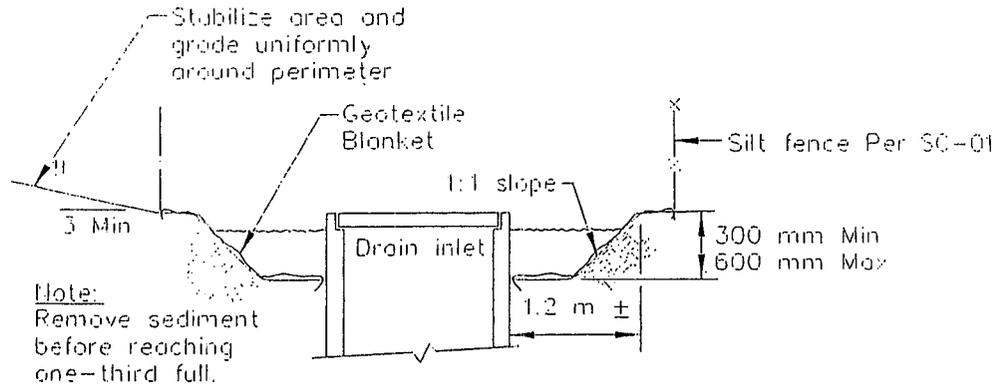


DI PROTECTION TYPE 1
NOT TO SCALE

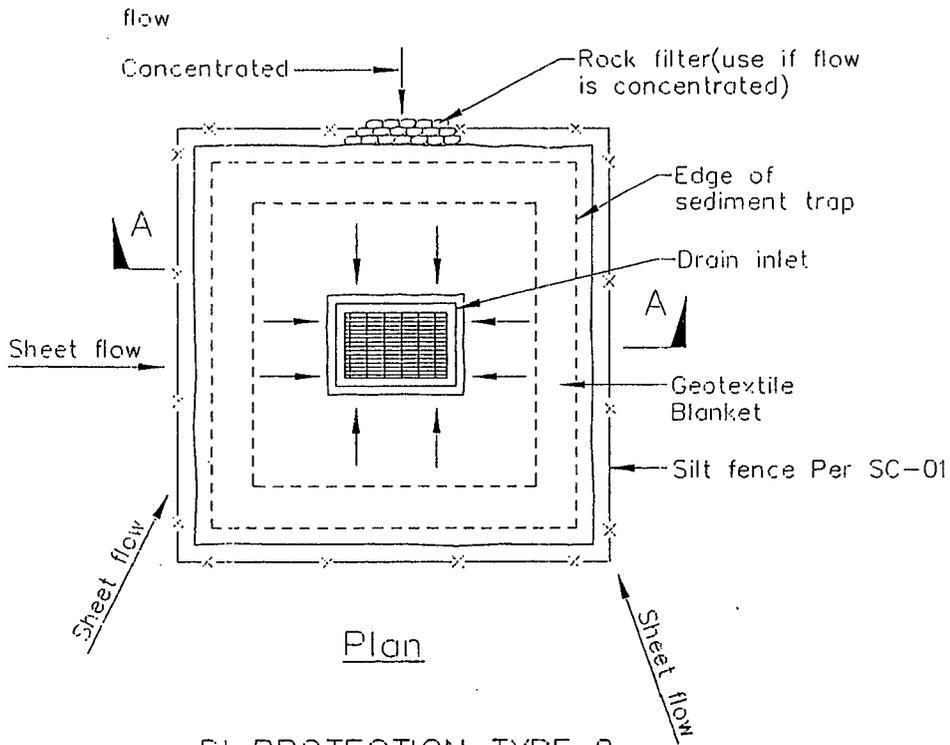
NOTES:

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.





Section A-A



Plan

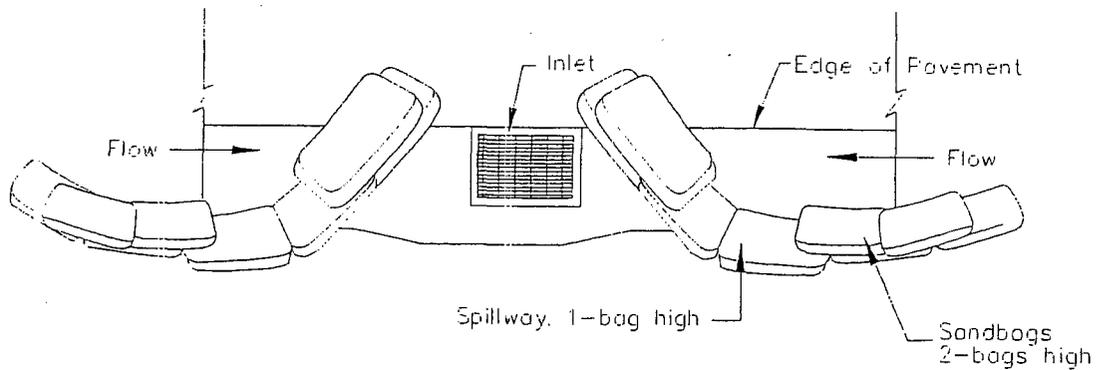
DI PROTECTION TYPE 2
NOT TO SCALE

- 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.

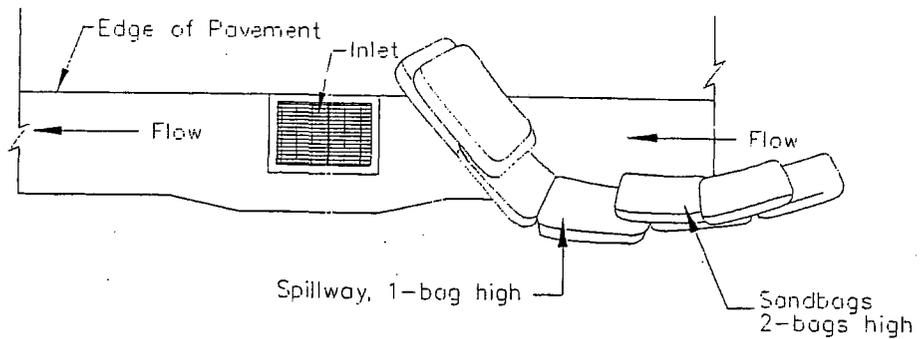


Storm Drain Inlet Protection

SC-10



TYPICAL PROTECTION FOR INLET ON SUMP



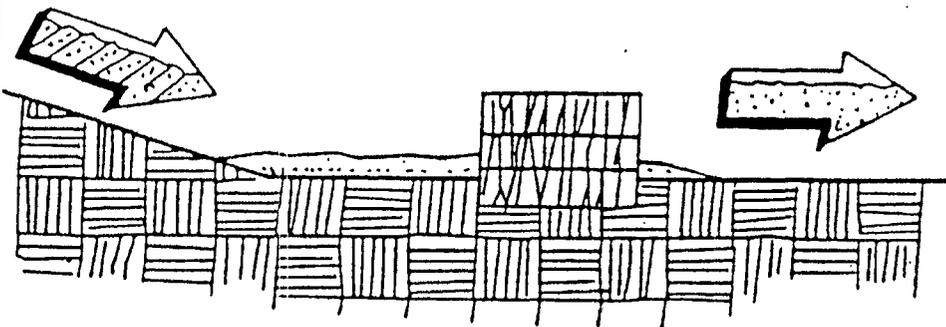
TYPICAL PROTECTION FOR INLET ON GRADE

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



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.

Objectives

Housekeeping Practice

Contain Waste

Minimize Disturbed Areas

Stabilize Disturbed Areas

Protect Slopes/Channels

Control Site Perimeter

Control Internal Erosion

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

ESC51



BMP: STRAW BALE BARRIERS (Continue)

- 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.

ESC51



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.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, Jun 1981.

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

Stormwater Management Water for the Puget Sound Basin, Washington State Department of Ecology, The Technical Manual - February 1992, Publication # 91-75.

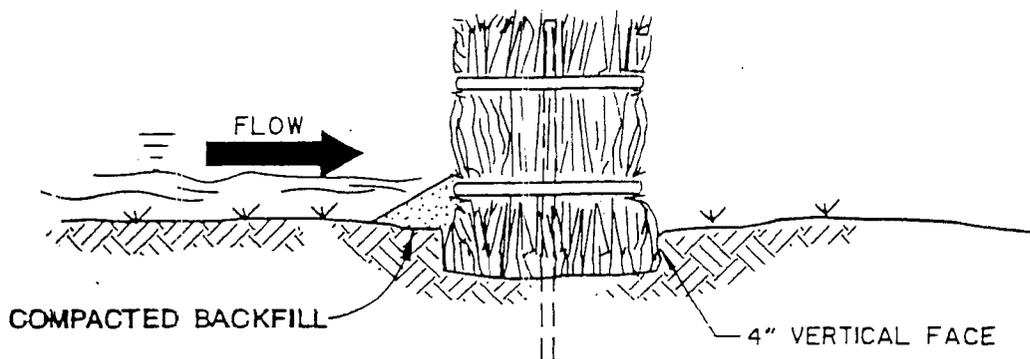
Water Quality for Construction Businesses, City of Bellevue, Washington.

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

ESC51

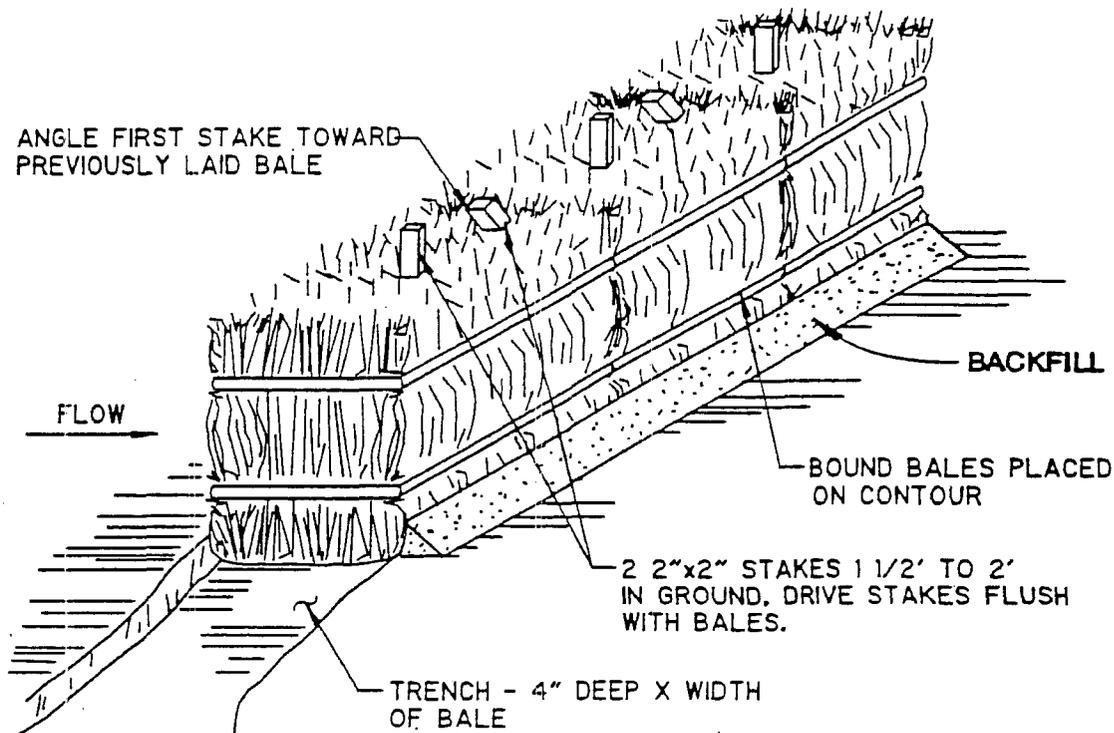


Additional Information — Straw Bale Barrier



- 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

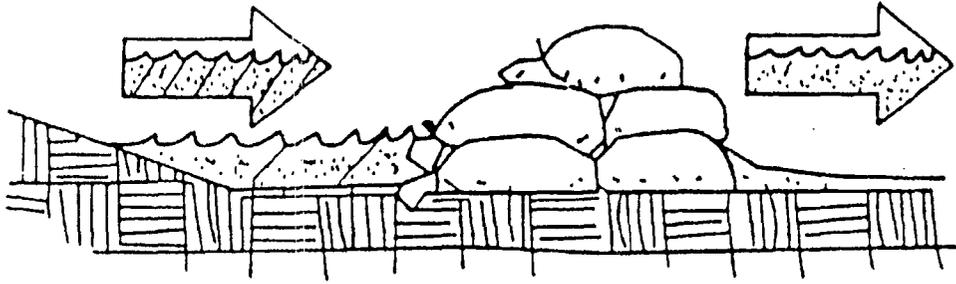
ANCHORING DETAIL

STRAW BALE BARRIERS

ESC51



BMP: SAND BAG BARRIER



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.

Objectives

Housekeeping Practices

Contain Waste

Minimize Disturbed Areas

Stabilize Disturbed Areas

Protect Slopes/Channels

Control Site Perimeter

Control Internal Erosion

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



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

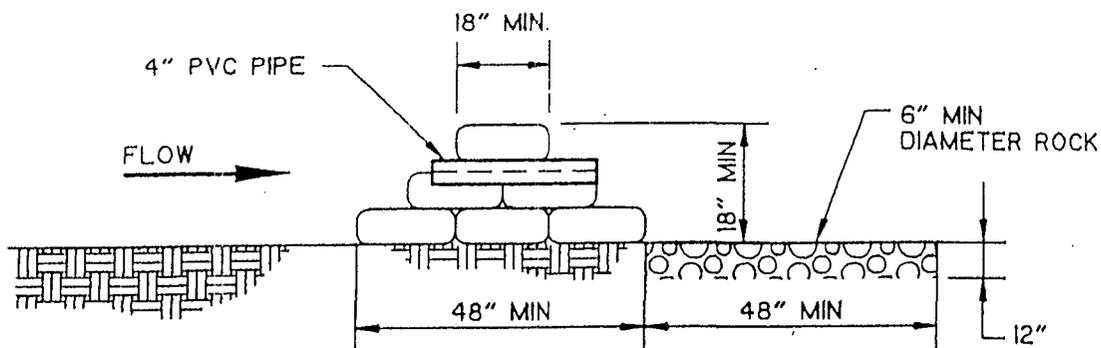
Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

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

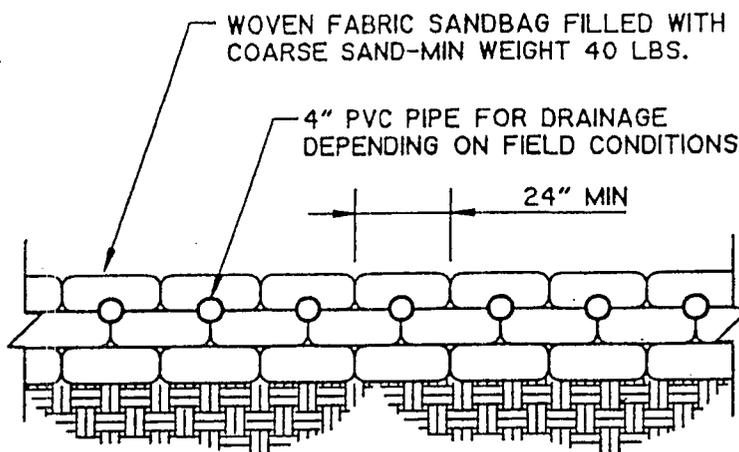
ESC52



Additional Information — Sand Bag Barrier



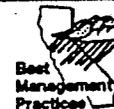
CROSS-SECTION



FRONT VIEW

SAND BAG BERM

ESC52



Appendix D
Boring Logs
and
Well Completion Diagrams

Southwest Niles Cone Monitoring Wells Project

JOB NUMBER: 6269 DWG NUMBER: ----- LOCATION: DE1 DATE: 10/12/2006

LOGGED BY: Douglas Young & Stephanie Penn

ELECTRIC LOG BY: Welenco

HOLE DIAMETER: 8.75"

DRILLER: Maggiora Bros. Drilling, Inc.

DRILLING METHOD: Mud Rotary

TOTAL DEPTH: 460

STATE ID:

5S/2W-14E005

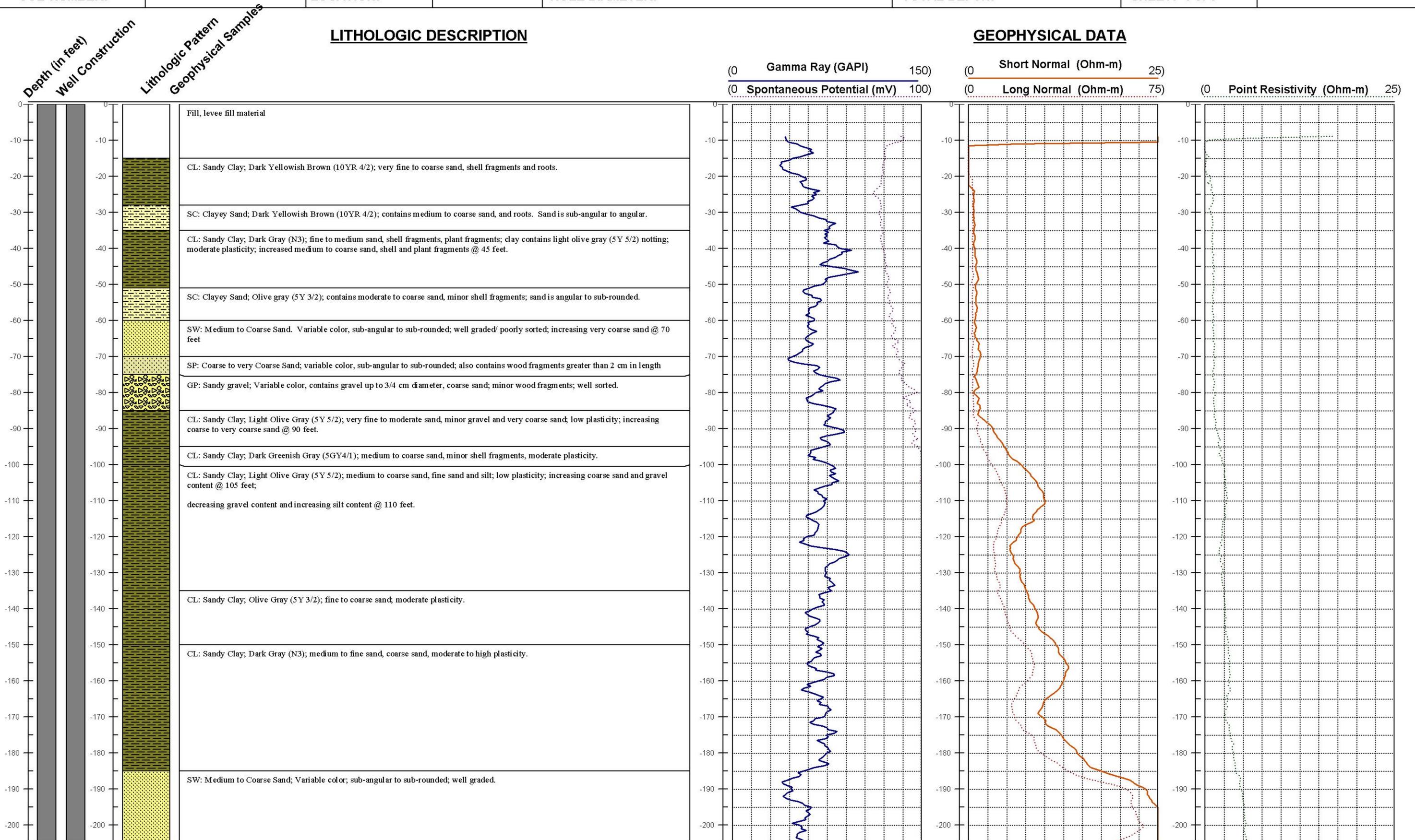
SHEET: 1 of 3

BORING

DE1-D1

LITHOLOGIC DESCRIPTION

GEOPHYSICAL DATA



*Based on Boring DE1-D2

*Based on Boring DE1-D2



Southwest Niles Cone Monitoring Wells Project

LOGGED BY: Douglas Young & Stephanie Penn

DRILLER: Maggiora Bros. Drilling, Inc.

STATE ID: 5S/2W-14E005

BORING
DE1-D1

JOB NUMBER: 6269

DWG NUMBER: -----

LOCATION: DE1

DATE: 10/12/2006

ELECTRIC LOG BY: Welenco

DRILLING METHOD: Mud Rotary

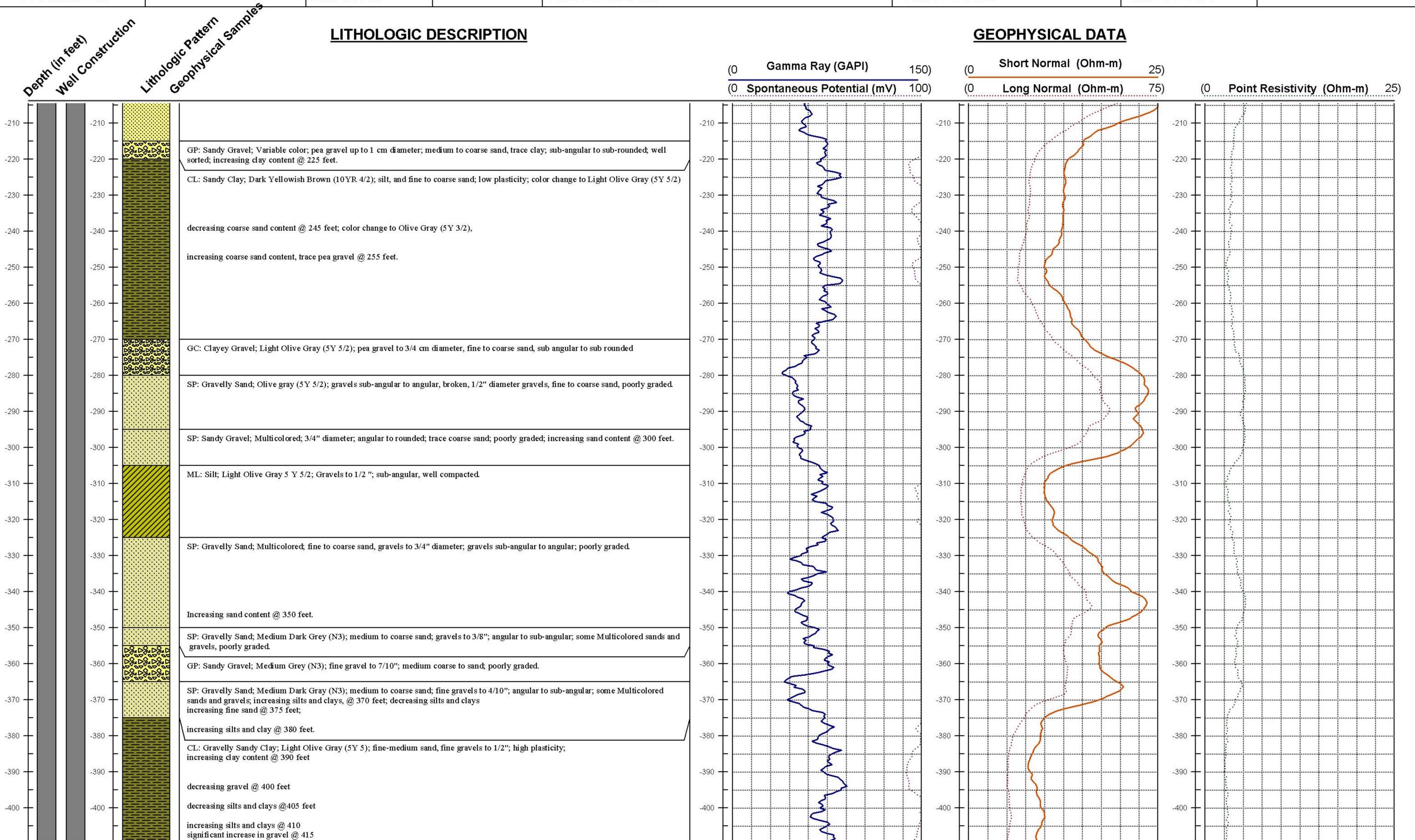
SHEET: 2 of 3

HOLE DIAMETER: 8.75"

TOTAL DEPTH: 460

LITHOLOGIC DESCRIPTION

GEOPHYSICAL DATA



*Based on Boring DE1-D2

*Based on Boring DE1-D2



Southwest Niles Cone Monitoring Wells Project

LOGGED BY: Douglas Young & Stephanie Penn

DRILLER: Maggiora Bros. Drilling, Inc.

STATE ID:

BORING

ELECTRIC LOG BY: Welenco

DRILLING METHOD: Mud Rotary

5S/2W-14E005

DE1-D1

JOB NUMBER: 6269

DWG NUMBER: -----

LOCATION: DE1

DATE: 10/12/2006

HOLE DIAMETER: 8.75"

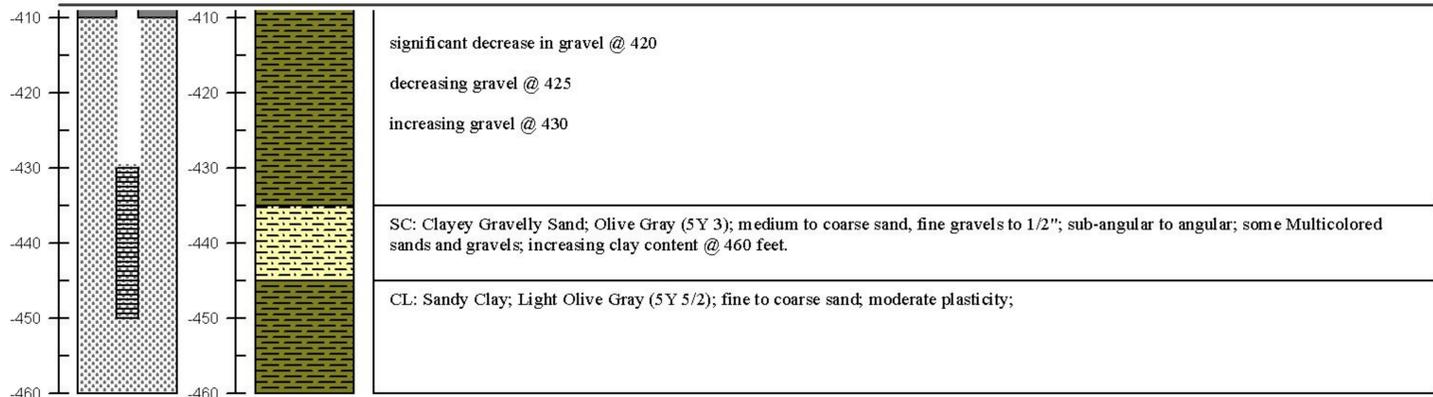
TOTAL DEPTH: 460

SHEET: 3 of 3

LITHOLOGIC DESCRIPTION

GEOPHYSICAL DATA

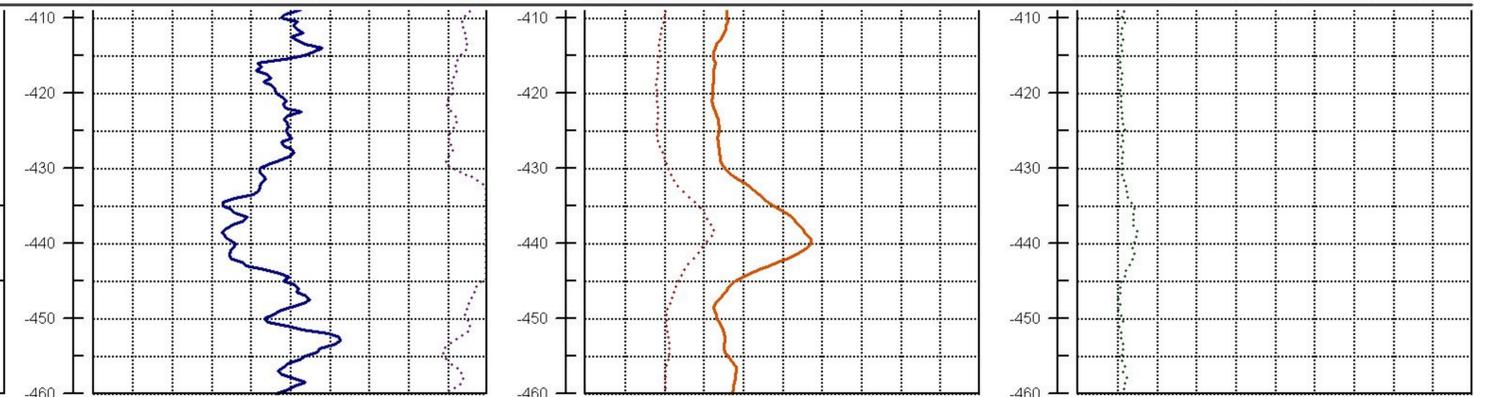
Depth (in feet)
Well Construction
Lithologic Pattern
Geophysical Samples



(0 Gamma Ray (GAPI) 150)
(0 Spontaneous Potential (mV) 100)

(0 Short Normal (Ohm-m) 25)
(0 Long Normal (Ohm-m) 75)

(0 Point Resistivity (Ohm-m) 25)



*Based on Boring DE1-D2

*Based on Boring DE1-D2

Southwest Niles Cone Monitoring Wells Project

LOGGED BY: Douglas Young & Stephanie Penn

DRILLER: Maggiora Bros. Drilling, Inc.

STATE ID: 5S/2W-14E009

BORING
DE1-D2

ELECTRIC LOG BY: Welenco

DRILLING METHOD: Mud Rotary

SHEET: 1 of 4

JOB NUMBER: 6269

DWG NUMBER: -----

LOCATION: DE1

DATE: 9/25/2006

HOLE DIAMETER: 8.75"

TOTAL DEPTH: 655

LITHOLOGIC DESCRIPTION

GEOPHYSICAL DATA

Depth (in feet)
Well Construction
Lithologic Pattern
Geophysical Samples

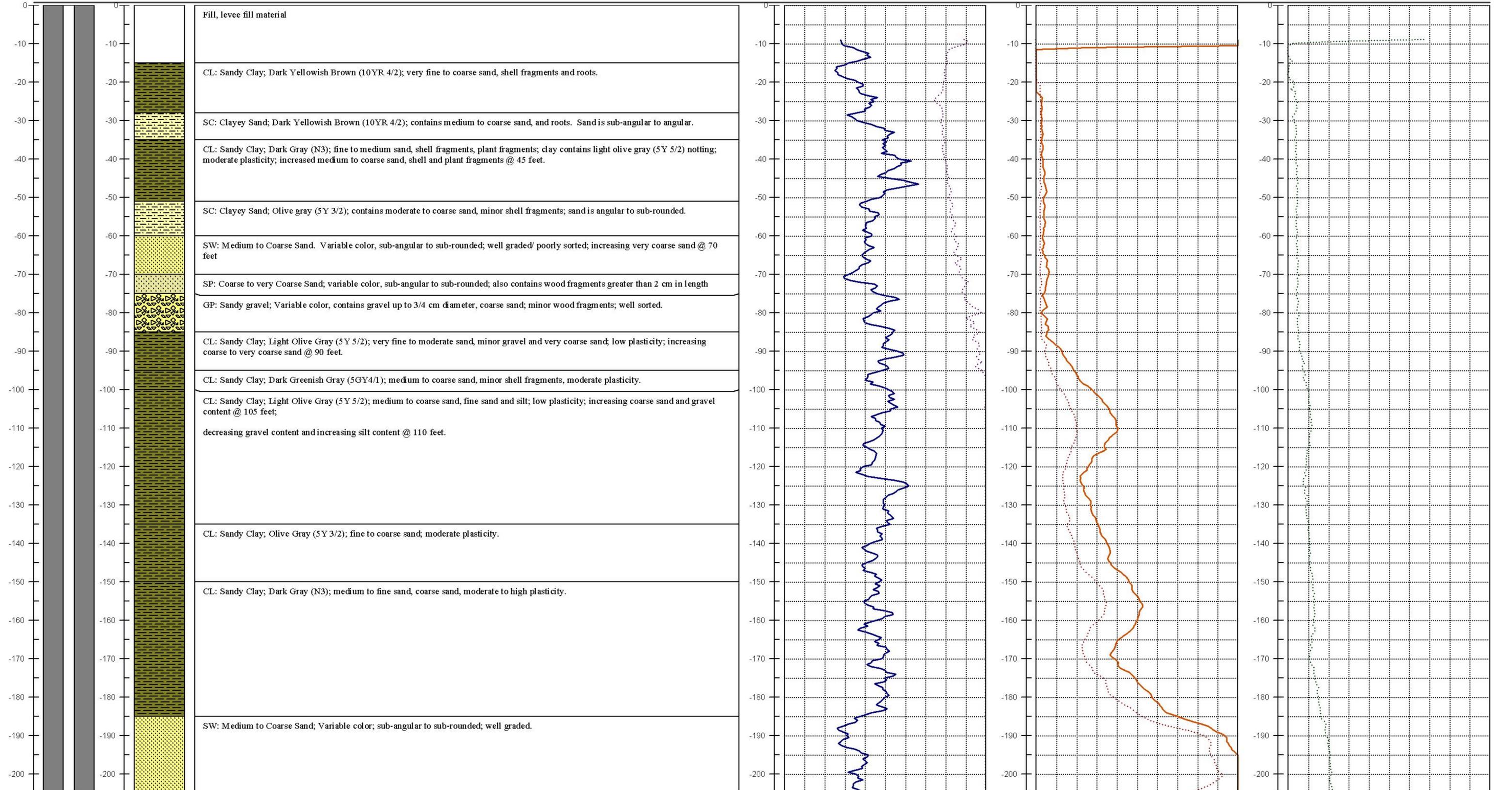
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(0 Short Normal (Ohm-m) 25)

(0 Spontaneous Potential (mV) 100)

(0 Long Normal (Ohm-m) 75)

(0 Point Resistivity (Ohm-m) 25)



Southwest Niles Cone Monitoring Wells Project

LOGGED BY: Douglas Young & Stephanie Penn

DRILLER: Maggiora Bros. Drilling, Inc.

STATE ID: 5S/2W-14E009

BORING
DE1-D2

JOB NUMBER: 6269

DWG NUMBER: -----

LOCATION: DE1

DATE: 9/25/2006

HOLE DIAMETER: 8.75"

DRILLING METHOD: Mud Rotary

SHEET: 2 of 4

LITHOLOGIC DESCRIPTION

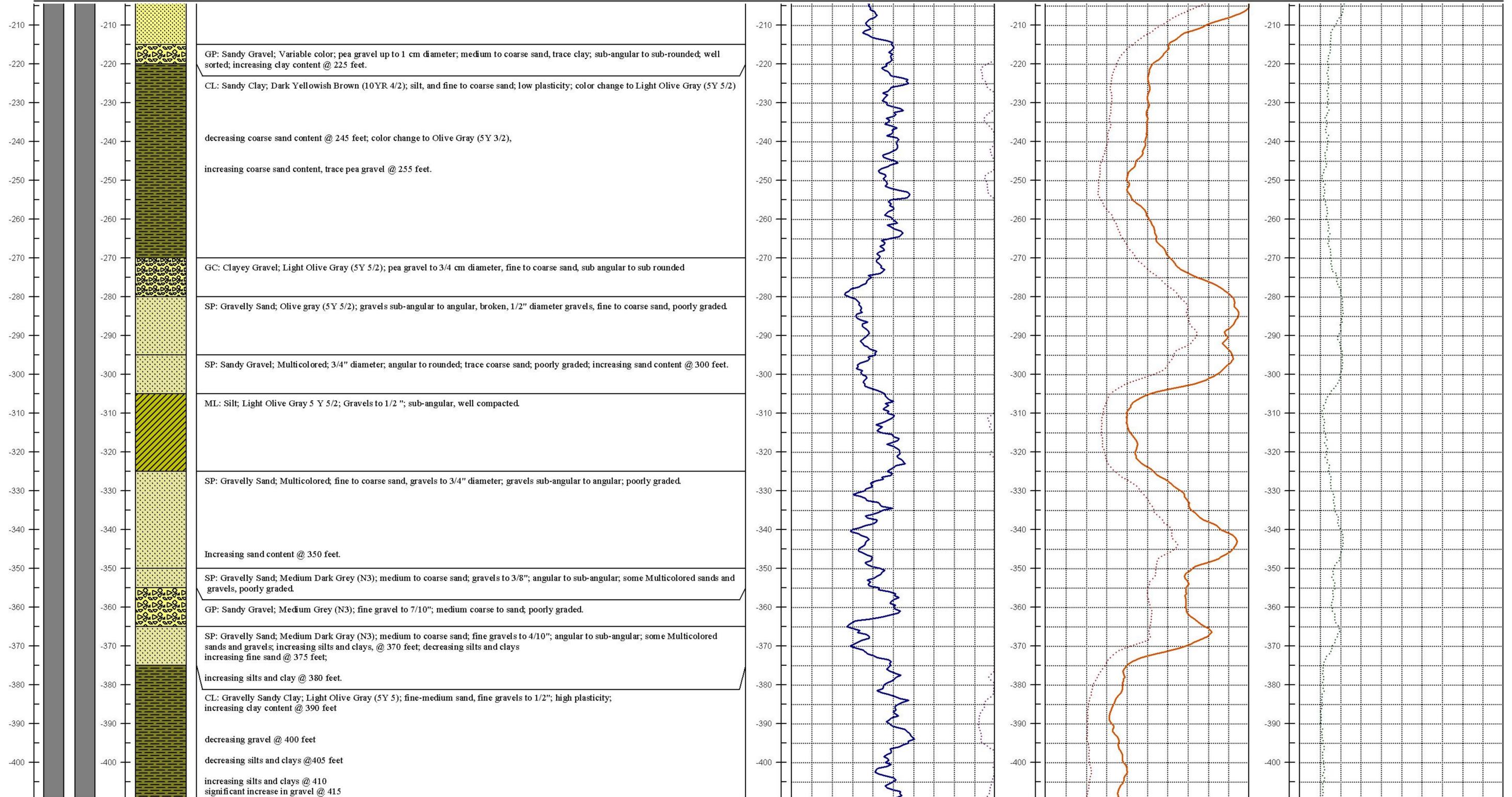
GEOPHYSICAL DATA

Depth (in feet)
Well Construction
Lithologic Pattern
Geophysical Samples

(0 Gamma Ray (GAPI) 150)
(0 Spontaneous Potential (mV) 100)

(0 Short Normal (Ohm-m) 25)
(0 Long Normal (Ohm-m) 75)

(0 Point Resistivity (Ohm-m) 25)



Southwest Niles Cone Monitoring Wells Project

LOGGED BY: Douglas Young & Stephanie Penn

DRILLER: Maggiora Bros. Drilling, Inc.

STATE ID: 5S/2W-14E009

BORING
DE1-D2

ELECTRIC LOG BY: Welenco

DRILLING METHOD: Mud Rotary

SHEET: 3 of 4

JOB NUMBER: 6269

DWG NUMBER: -----

LOCATION: DE1

DATE: 9/25/2006

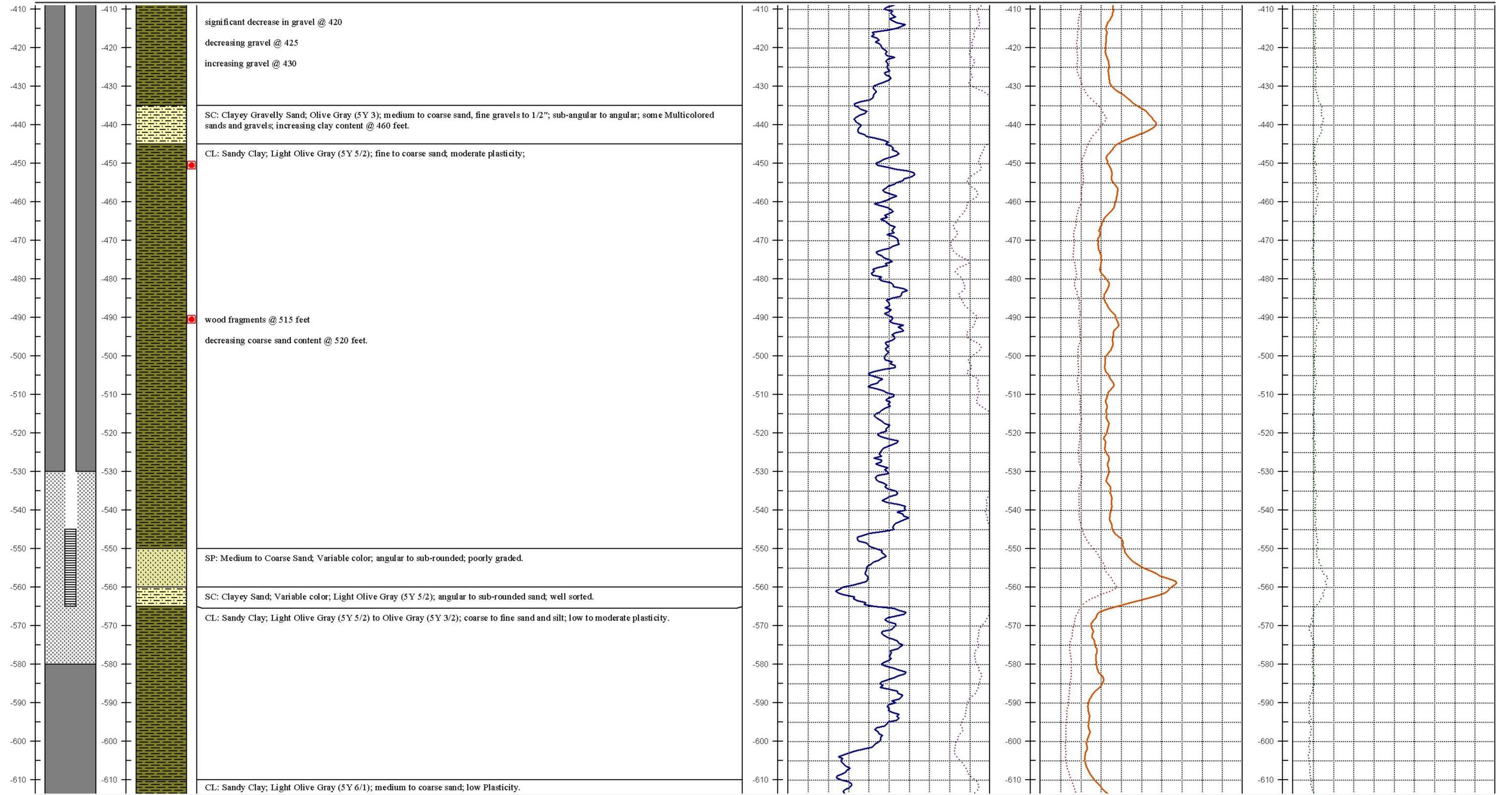
HOLE DIAMETER: 8.75"

TOTAL DEPTH: 655

Depth (in feet)
Well Construction
Lithologic Pattern
Geophysical Samples

LITHOLOGIC DESCRIPTION

GEOPHYSICAL DATA



Southwest Niles Cone Monitoring Wells Project

LOGGED BY: Douglas Young & Stephanie Penn

DRILLER: Maggiora Bros. Drilling, Inc.

STATE ID:

BORING

ELECTRIC LOG BY: Welenco

DRILLING METHOD: Mud Rotary

5S/2W-14E009

DE1-D2

JOB NUMBER: 6269

DWG NUMBER: -----

LOCATION: DE1

DATE: 9/25/2006

HOLE DIAMETER: 8.75"

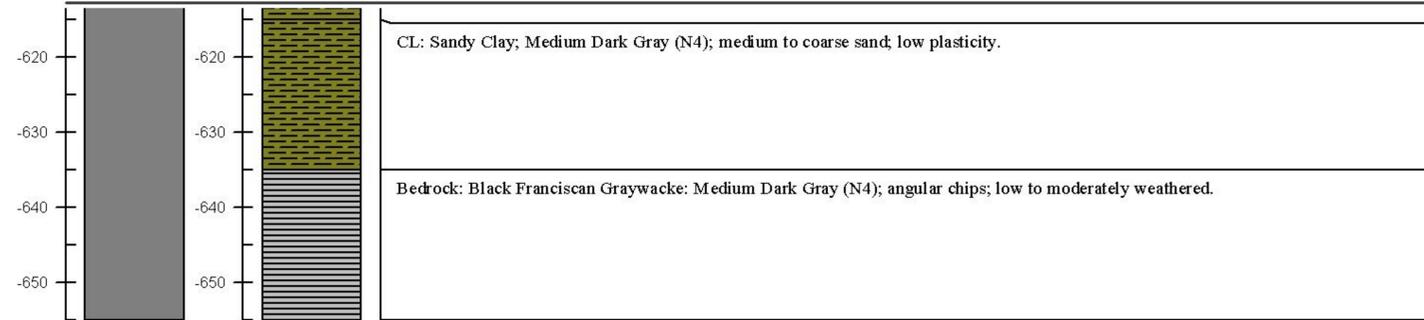
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SHEET: 4 of 4

LITHOLOGIC DESCRIPTION

GEOPHYSICAL DATA

Depth (in feet)
Well Construction
Lithologic Pattern
Geophysical Samples



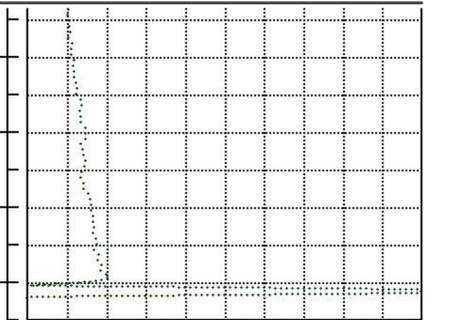
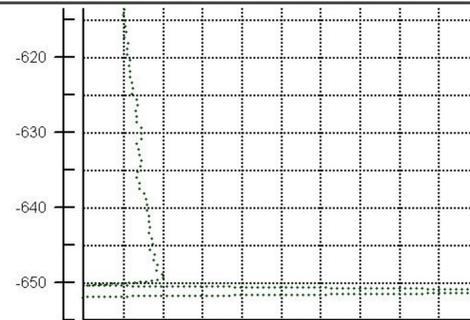
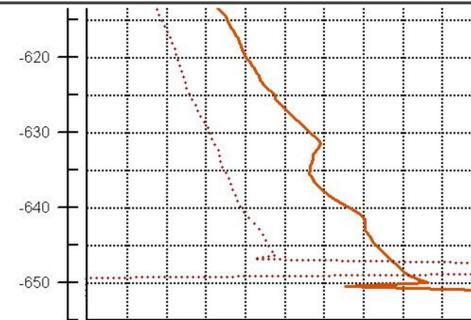
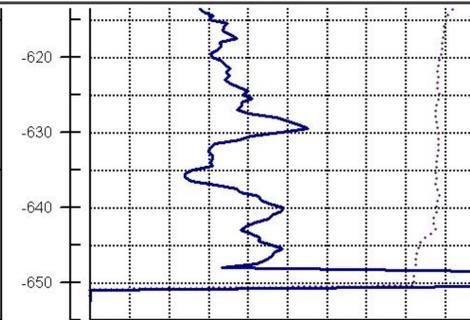
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(0 Short Normal (Ohm-m) 25)

(0 Spontaneous Potential (mV) 100)

(0 Long Normal (Ohm-m) 75)

(0 Point Resistivity (Ohm-m) 25)



Southwest Niles Cone Monitoring Wells Project

LOGGED BY: Douglas Young & Stephanie Penn

DRILLER: Maggiora Bros. Drilling, Inc.

STATE ID: 5S/2W-14E006

BORING DE1-F

ELECTRIC LOG BY: Welenco

DRILLING METHOD: Mud Rotary

SHEET: 1 of 2

JOB NUMBER: 6269

DWG NUMBER: -----

LOCATION: DE1

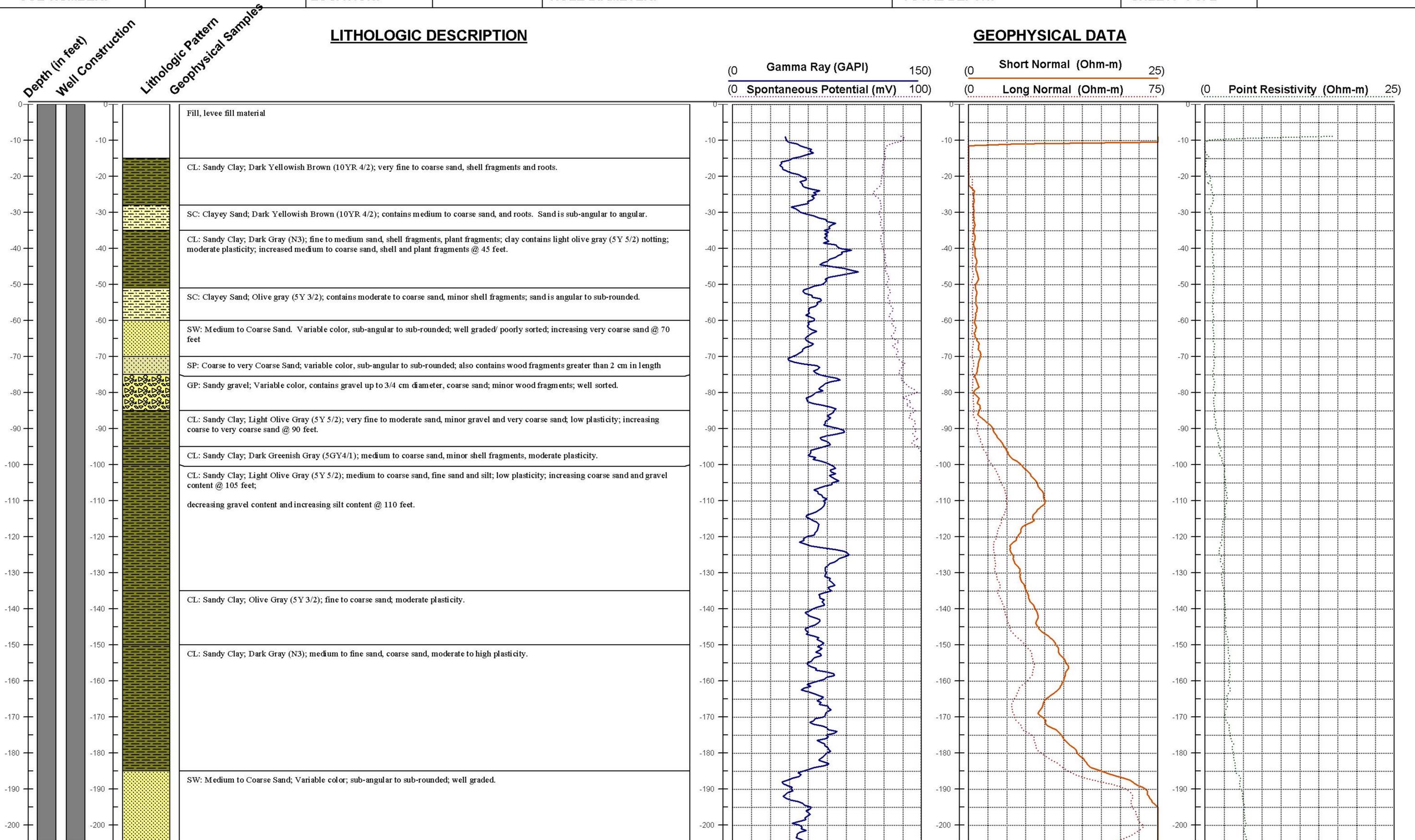
DATE: 10/24/2006

HOLE DIAMETER: 8.75"

TOTAL DEPTH: 310

LITHOLOGIC DESCRIPTION

GEOPHYSICAL DATA



*Based on Boring DE1-D2

*Based on Boring DE1-D2



Southwest Niles Cone Monitoring Wells Project

LOGGED BY: Douglas Young & Stephanie Penn

DRILLER: Maggiora Bros. Drilling, Inc.

STATE ID: 5S/2W-14E006

BORING
DE1-F

JOB NUMBER: 6269

DWG NUMBER: -----

LOCATION: DE1

DATE: 10/24/2006

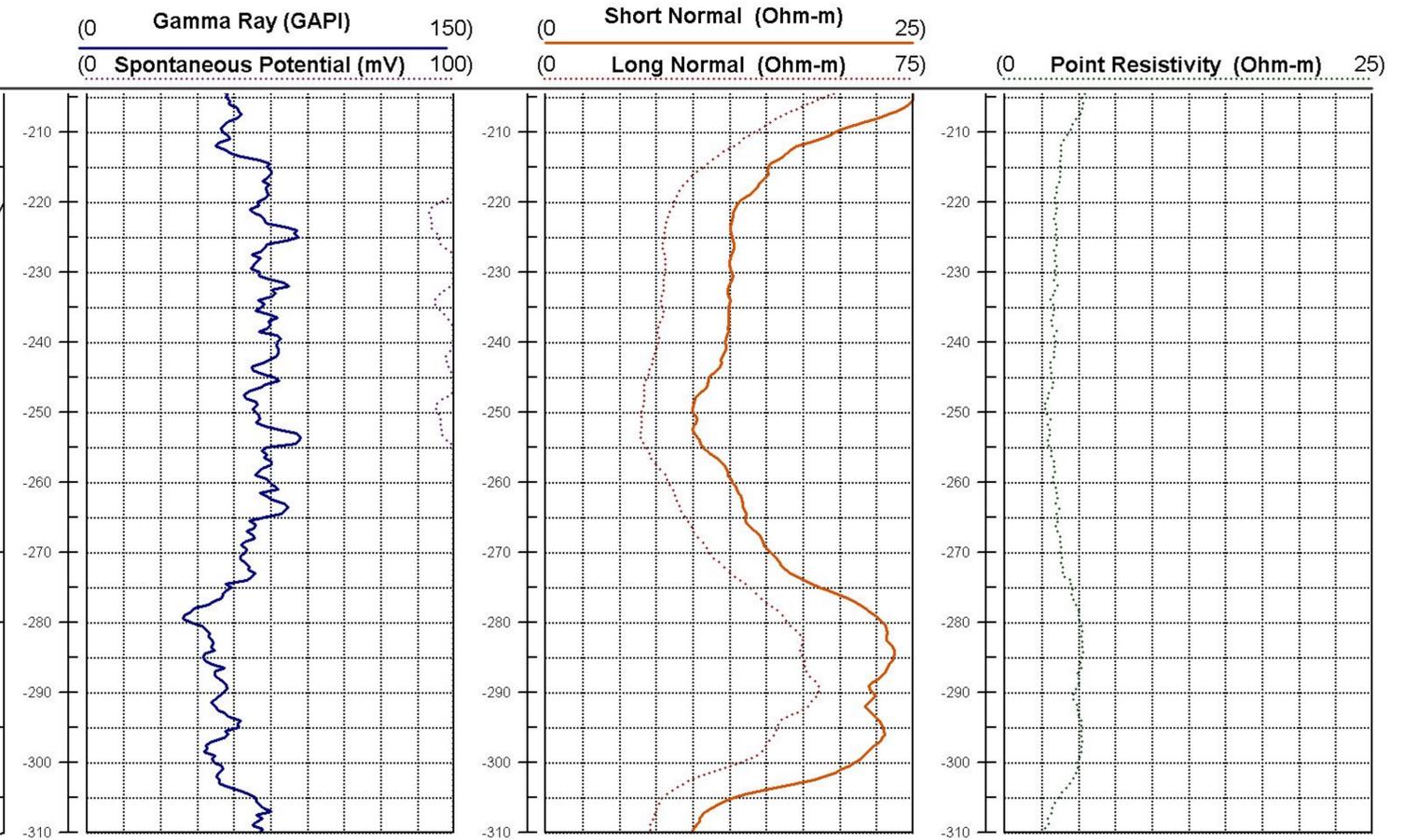
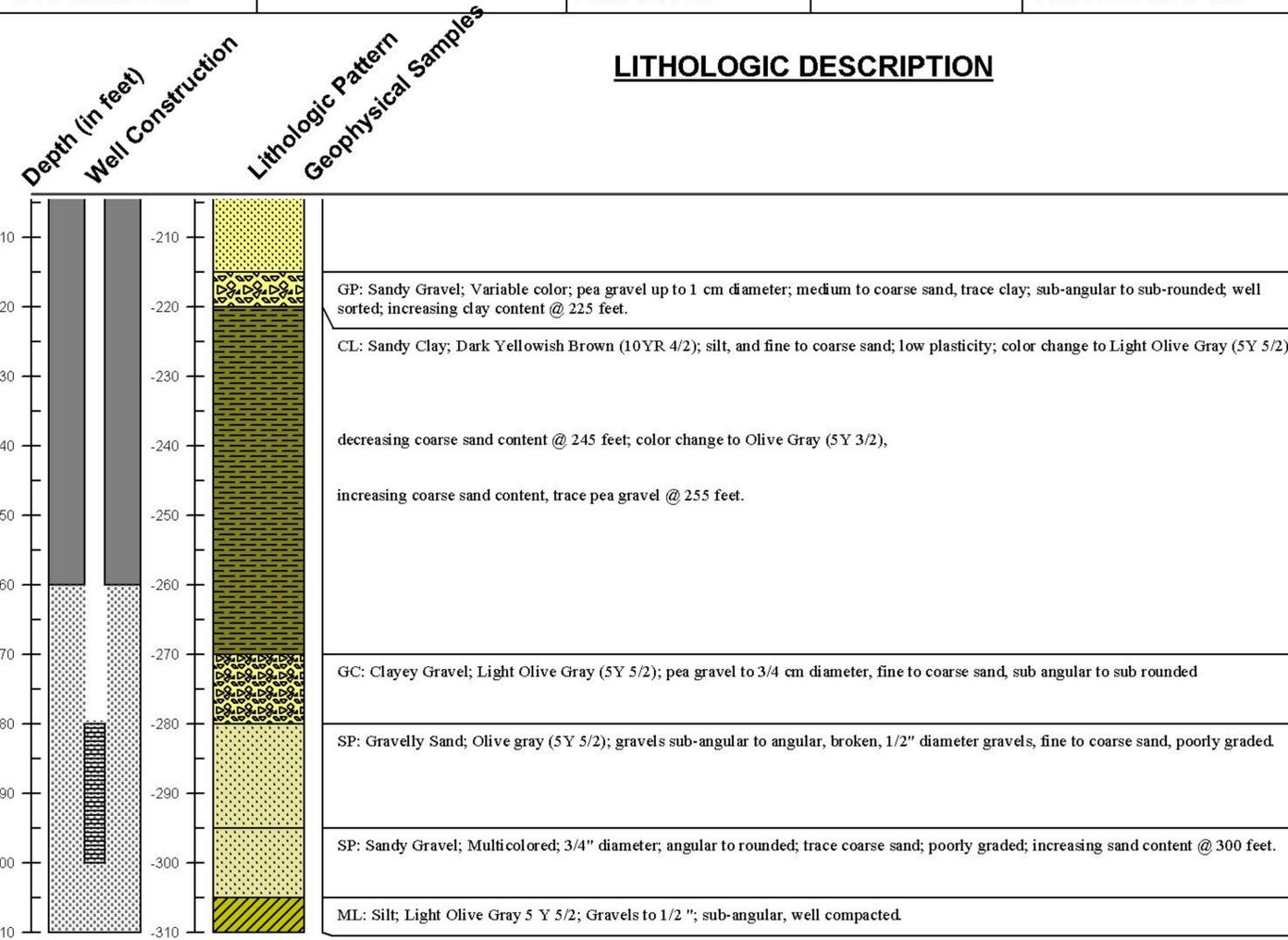
HOLE DIAMETER: 8.75"

DRILLING METHOD: Mud Rotary

SHEET: 2 of 2

LITHOLOGIC DESCRIPTION

GEOPHYSICAL DATA



*Based on Boring DE1-D2

*Based on Boring DE1-D2

Southwest Niles Cone Monitoring Wells Project

LOGGED BY: Douglas Young & Stephanie Penn

DRILLER: Maggiora Bros. Drilling, Inc.

STATE ID: 5S/2W-14E007

BORING DE1-C

ELECTRIC LOG BY: Welenco

DRILLING METHOD: Mud Rotary

SHEET: 1 of 2

JOB NUMBER: 6269

DWG NUMBER: -----

LOCATION: DE1

DATE: 10/31/2006

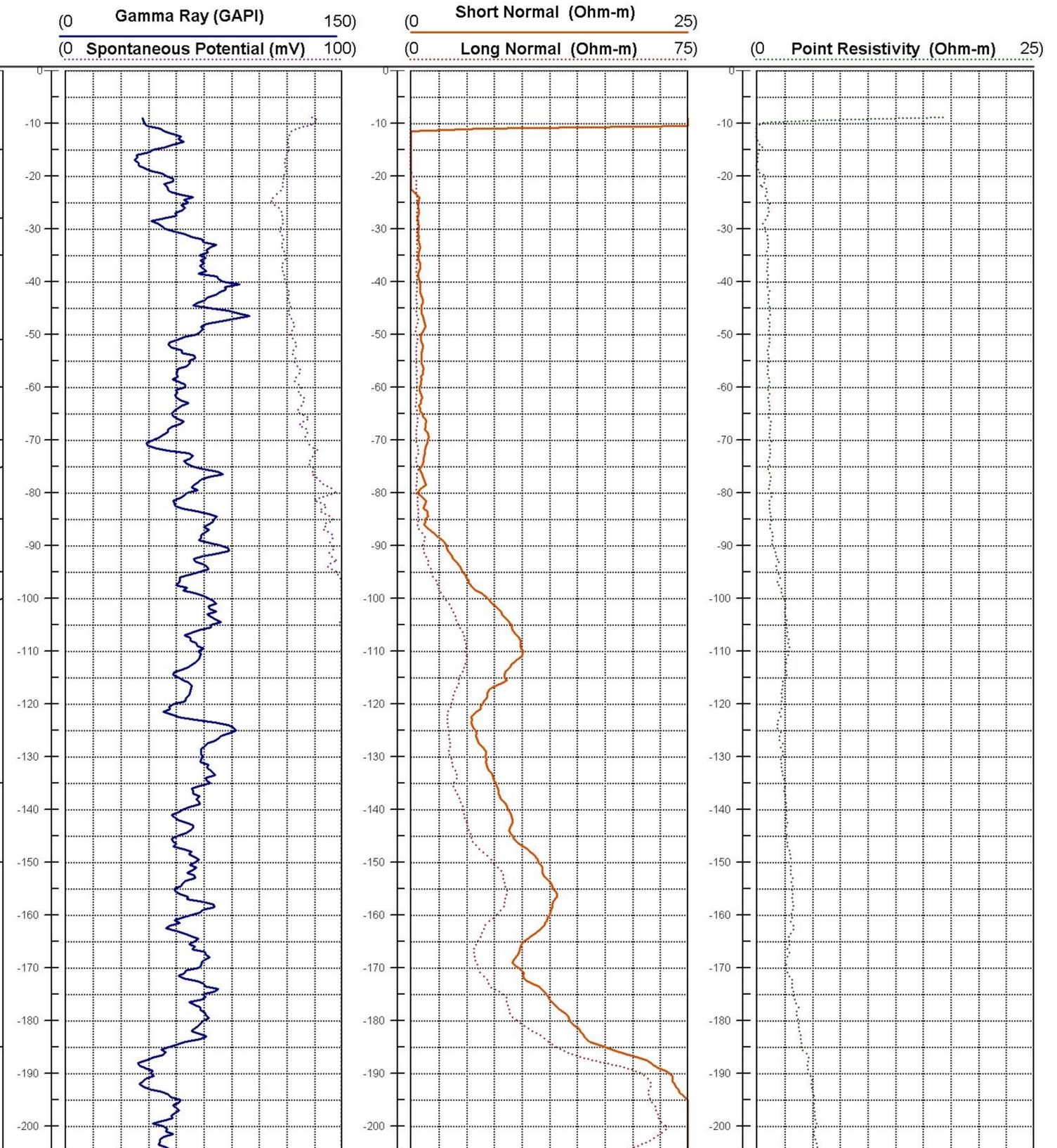
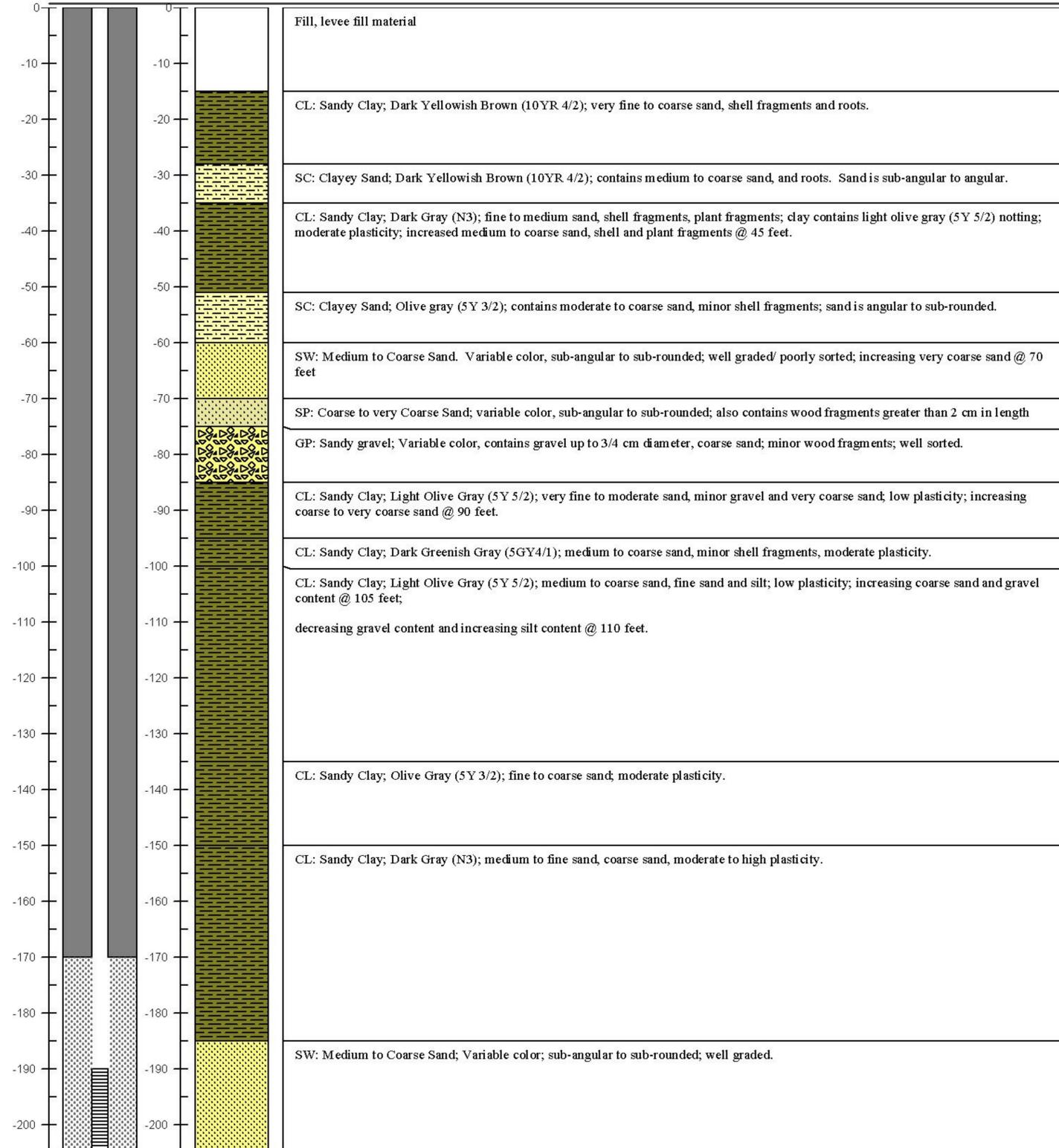
HOLE DIAMETER: 8.75"

TOTAL DEPTH: 220

Depth (in feet)
Well Construction
Lithologic Pattern
Geophysical Samples

LITHOLOGIC DESCRIPTION

GEOPHYSICAL DATA



*Based on Boring DE1-D2

*Based on Boring DE1-D2

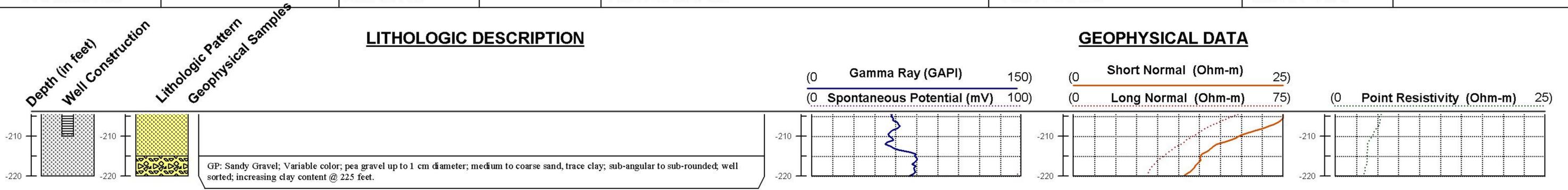


Southwest Niles Cone Monitoring Wells Project

LOGGED BY: Douglas Young & Stephanie Penn		DRILLER: Maggiora Bros. Drilling, Inc.		STATE ID: 5S/2W-14E007		BORING DE1-C	
ELECTRIC LOG BY: Welenco		DRILLING METHOD: Mud Rotary		SHEET: 2 of 2			
JOB NUMBER: 6269		DWG NUMBER: -----		LOCATION: DE1		DATE: 10/31/2006	
				HOLE DIAMETER: 8.75"			
				TOTAL DEPTH: 220			

LITHOLOGIC DESCRIPTION

GEOPHYSICAL DATA



*Based on Boring DE1-D2

*Based on Boring DE1-D2

Southwest Niles Cone Monitoring Wells Project

JOB NUMBER: 6269 DWG NUMBER: ----- LOCATION: DE1 DATE: 11/1/2006

LOGGED BY: Douglas Young, Sean Gehlke & Stephanie Penn
 ELECTRIC LOG BY: Welenco
 HOLE DIAMETER: 8.75"

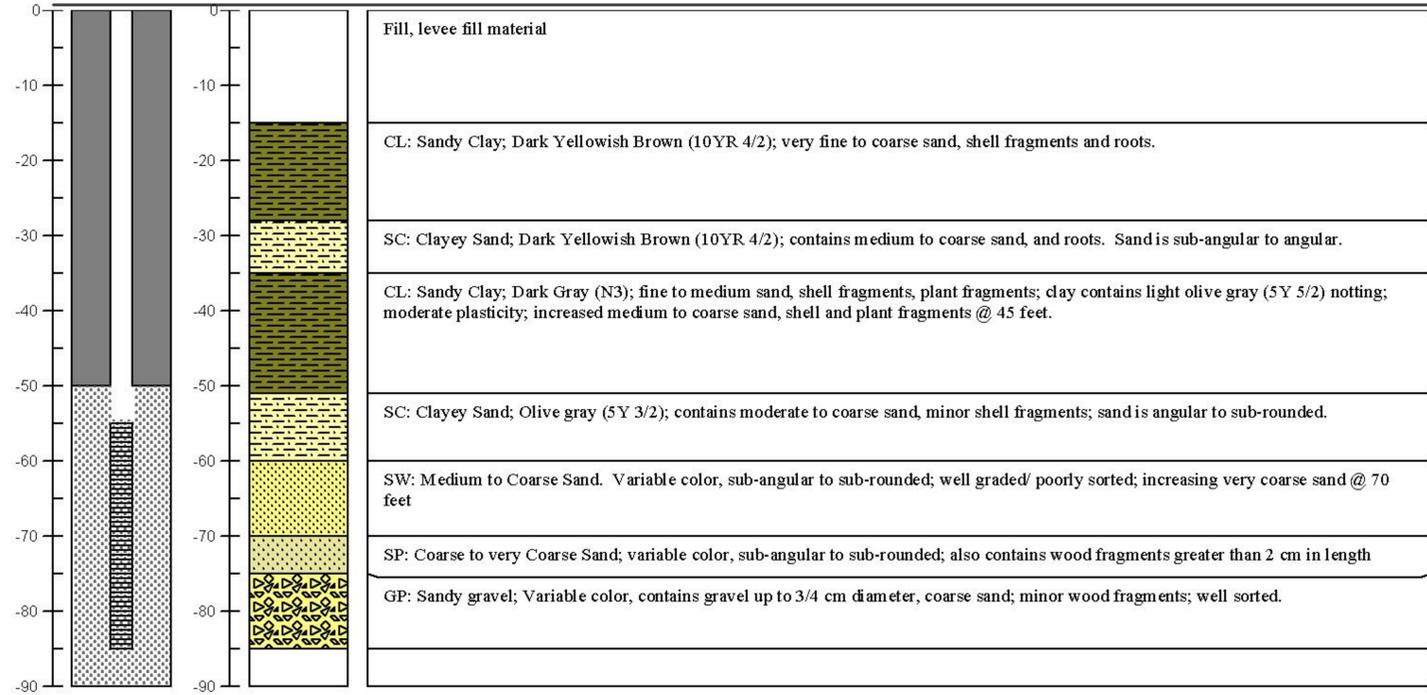
DRILLER: Maggiora Bros. Drilling, Inc.
 DRILLING METHOD: Mud Rotary
 TOTAL DEPTH: 90 feet

STATE ID: 5S/2W-14E008
 SHEET: 1 of 1

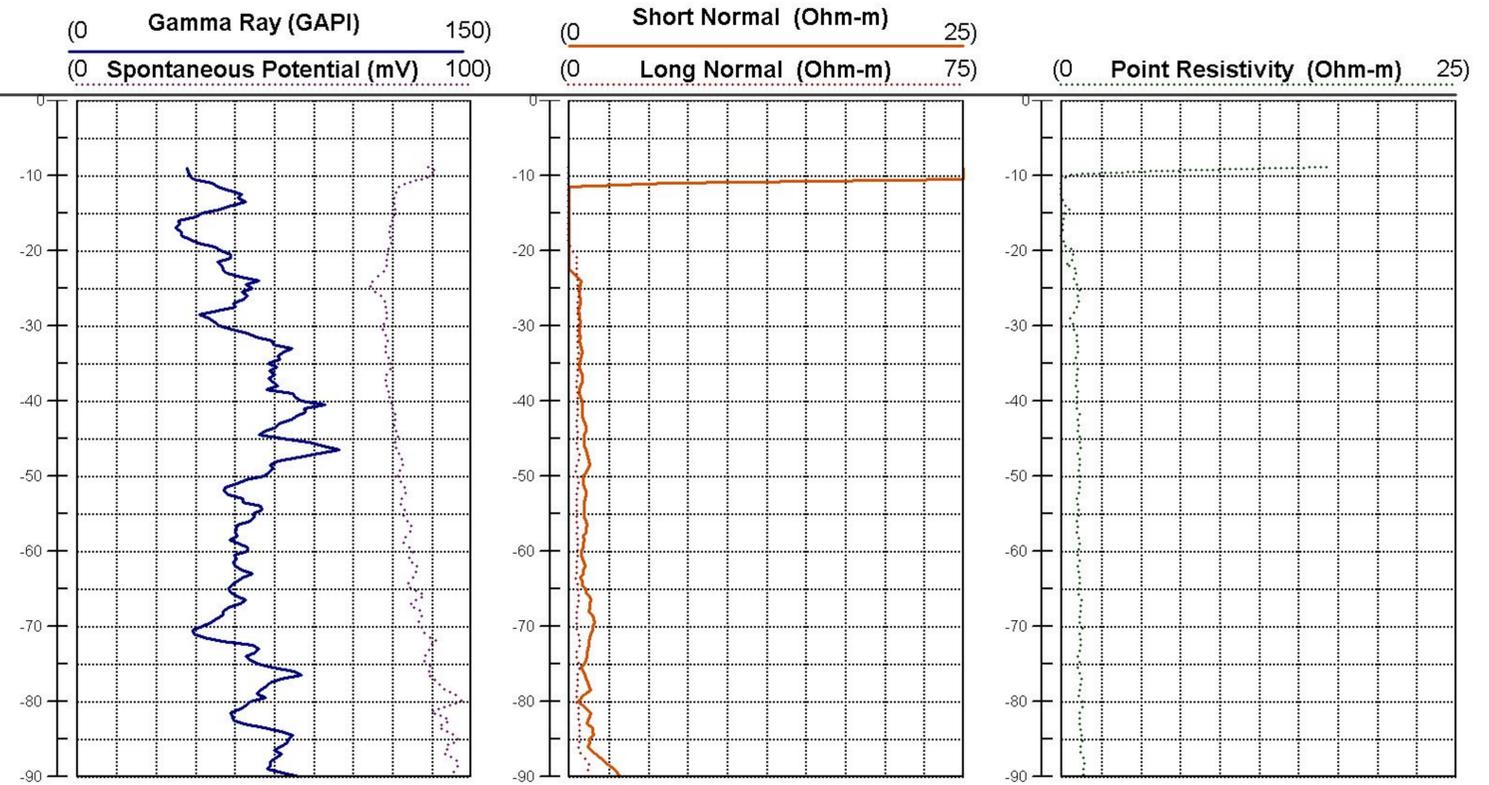
BORING
DE1-N

LITHOLOGIC DESCRIPTION

Depth (in feet)
 Well Construction
 Lithologic Pattern
 Geophysical Samples



GEOPHYSICAL DATA



*Based on boring DE1-D2

*Based on boring DE1-D2



Southwest Niles Cone Monitoring Wells Project

LOGGED BY: Douglas Young & Stephanie Penn

DRILLER: Maggiora Bros. Drilling, Inc.

STATE ID: 5S/1W-16M0008

BORING
AUTOMALL-D1

JOB NUMBER: 6269

DWG NUMBER: -----

LOCATION: Automall

DATE: 1/24/2007

ELECTRIC LOG BY: Welenco

DRILLING METHOD: Mud Rotary

SHEET: 1 of 4

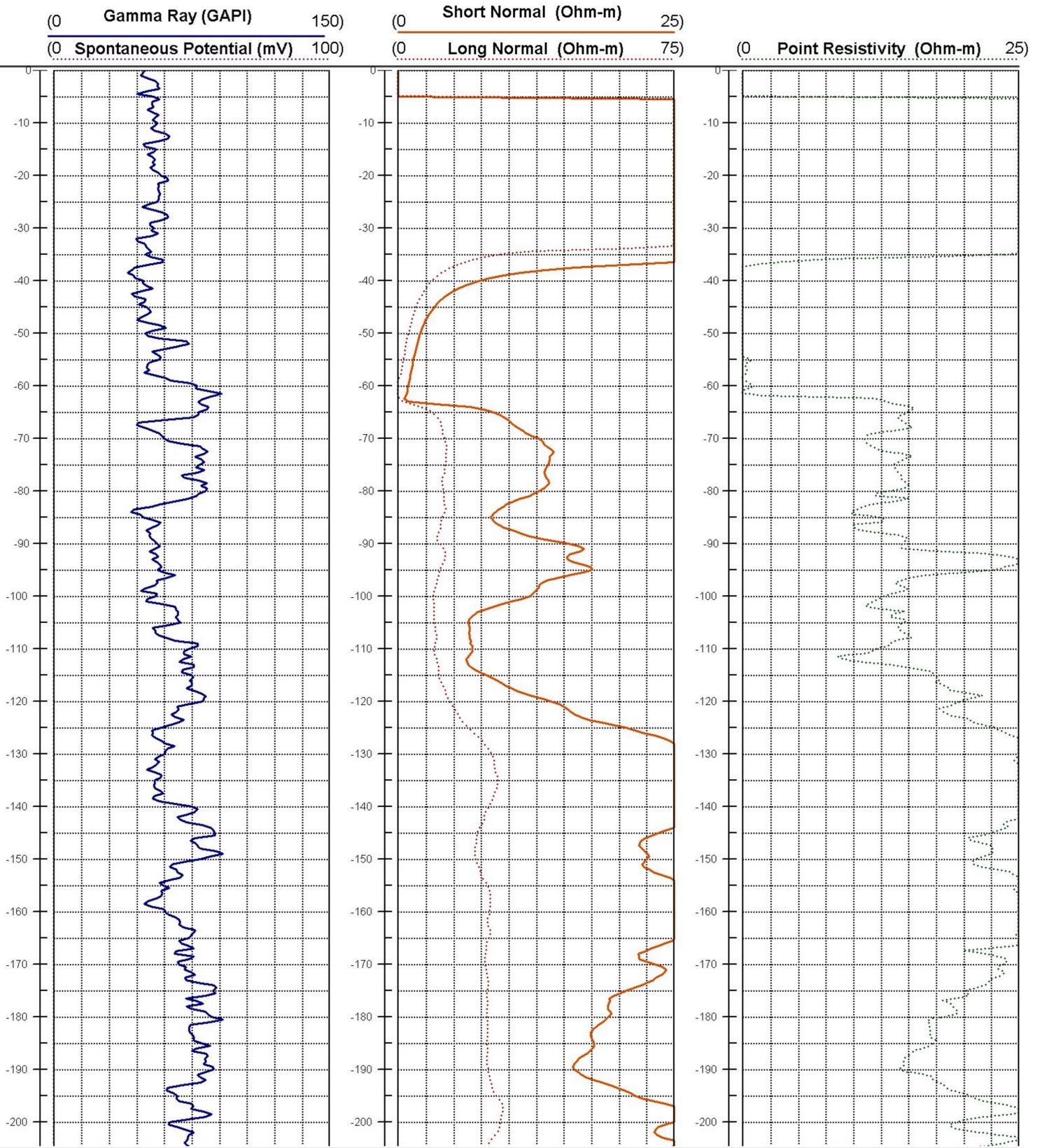
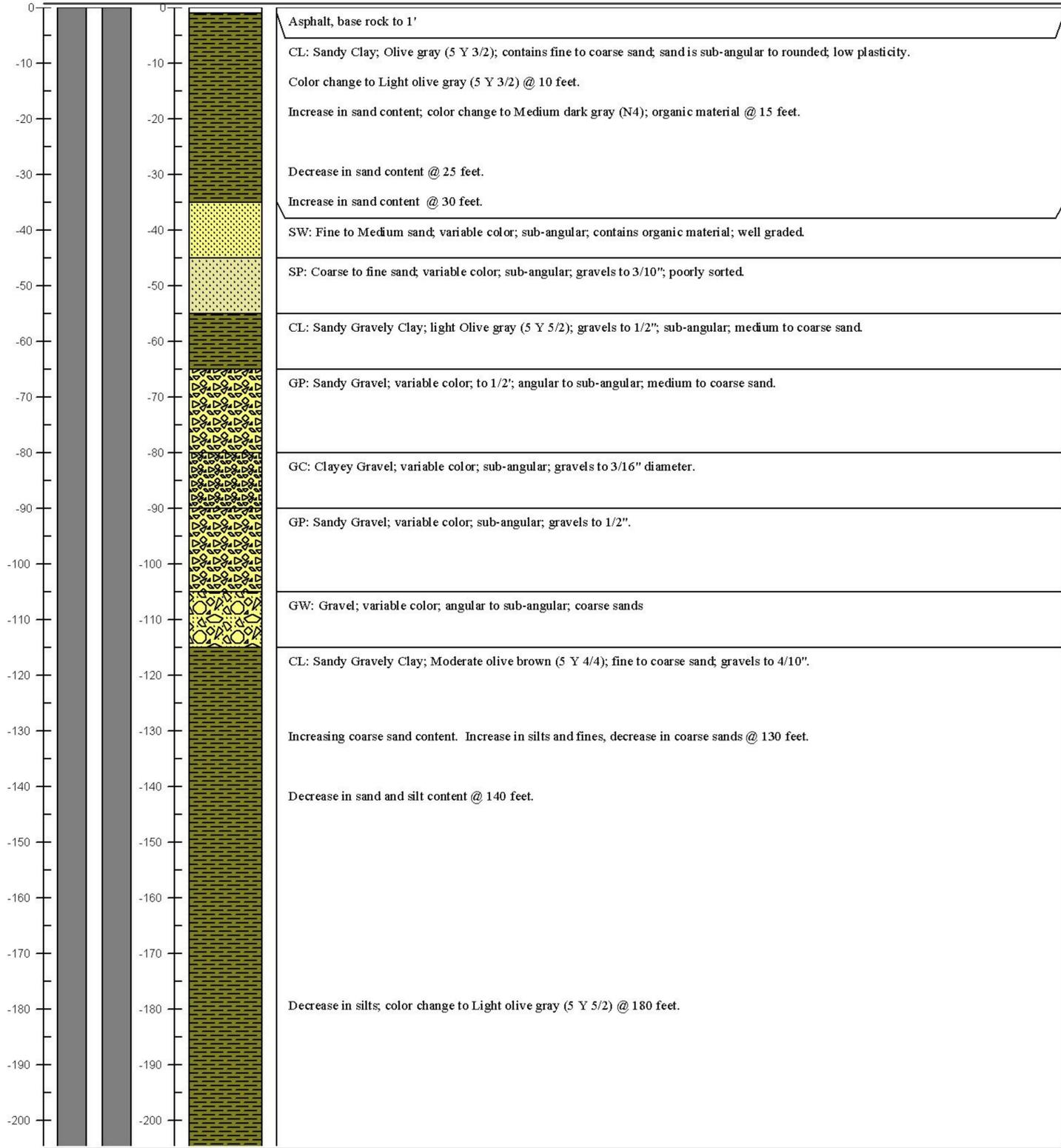
HOLE DIAMETER: 8.75"

TOTAL DEPTH: 800

LITHOLOGIC DESCRIPTION

GEOPHYSICAL DATA

Depth (in feet)
Well Construction
Lithologic Pattern
Geophysical Samples



Southwest Niles Cone Monitoring Wells Project

LOGGED BY: Douglas Young & Stephanie Penn

DRILLER: Maggiora Bros. Drilling, Inc.

STATE ID: 5S/1W-16M0008

BORING
AUTOMALL-D1

JOB NUMBER: 6269

DWG NUMBER: -----

LOCATION: Automall

DATE: 1/24/2007

ELECTRIC LOG BY: Welenco

DRILLING METHOD: Mud Rotary

SHEET: 2 of 4

HOLE DIAMETER: 8.75"

TOTAL DEPTH: 800

LITHOLOGIC DESCRIPTION

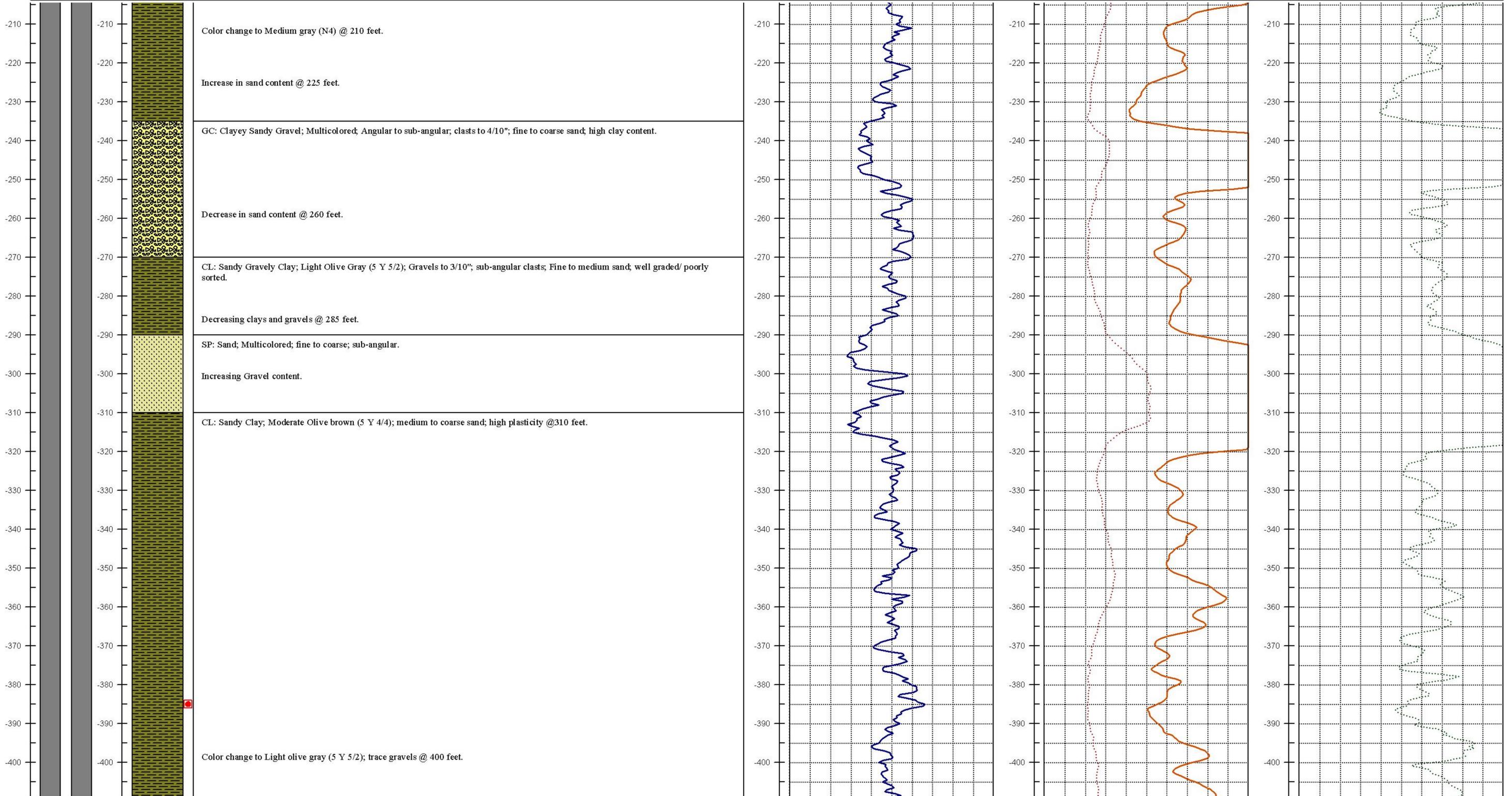
GEOPHYSICAL DATA

Depth (in feet)
Well Construction
Lithologic Pattern
Geophysical Samples

(0 Gamma Ray (GAPI) 150)
(0 Spontaneous Potential (mV) 100)

(0 Short Normal (Ohm-m) 25)
(0 Long Normal (Ohm-m) 75)

(0 Point Resistivity (Ohm-m) 25)



Southwest Niles Cone Monitoring Wells Project

LOGGED BY: Douglas Young & Stephanie Penn

DRILLER: Maggiora Bros. Drilling, Inc.

STATE ID: 5S/1W-16M0008

BORING
AUTOMALL-D1

JOB NUMBER: 6269

DWG NUMBER: -----

LOCATION: Automall

DATE: 1/24/2007

HOLE DIAMETER: 8.75"

DRILLING METHOD: Mud Rotary

SHEET: 3 of 4

LITHOLOGIC DESCRIPTION

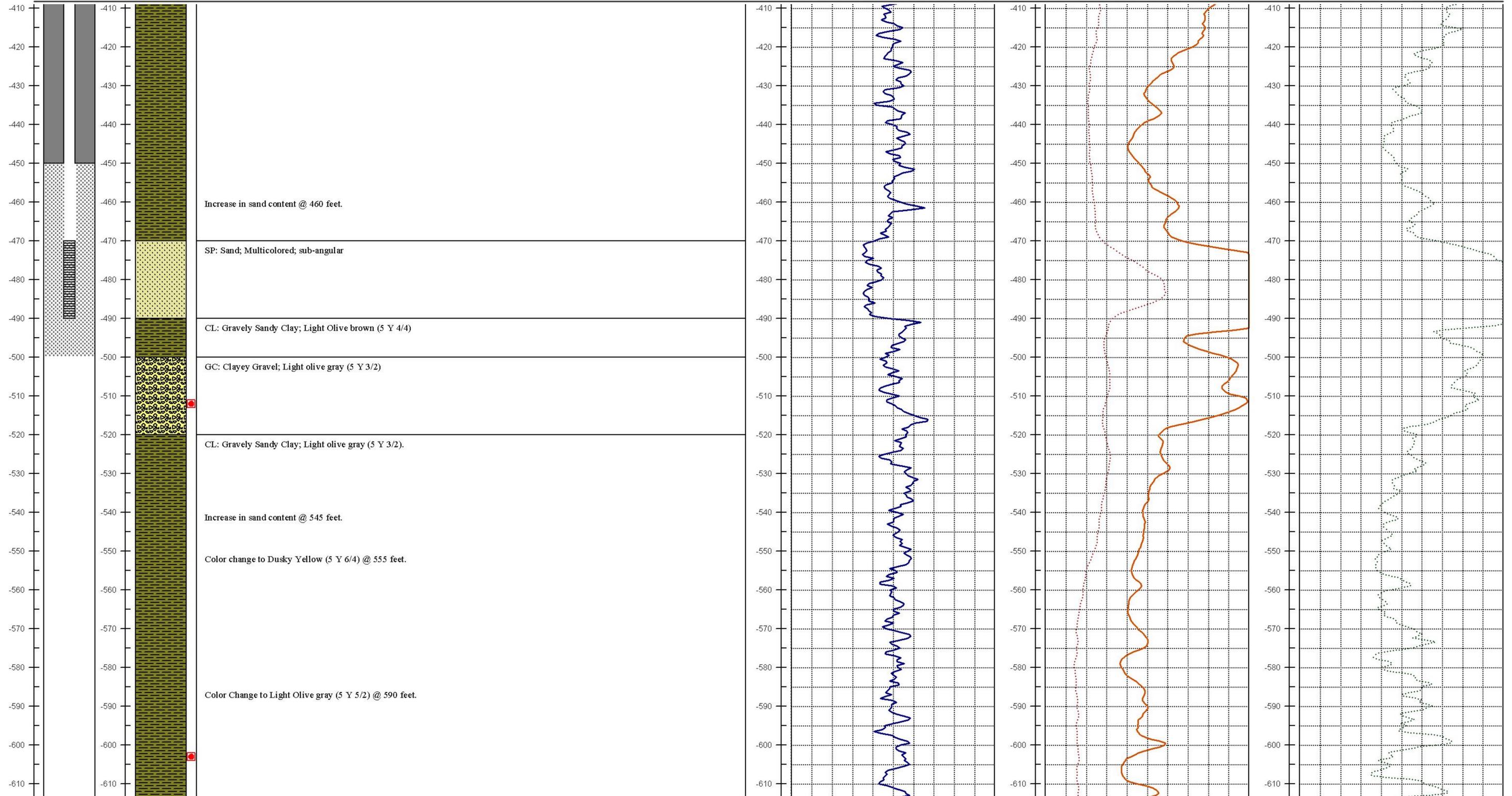
GEOPHYSICAL DATA

Depth (in feet)
Well Construction
Lithologic Pattern
Geophysical Samples

(0 Gamma Ray (GAPI) 150)
(0 Spontaneous Potential (mV) 100)

(0 Short Normal (Ohm-m) 25)
(0 Long Normal (Ohm-m) 75)

(0 Point Resistivity (Ohm-m) 25)



Southwest Niles Cone Monitoring Wells Project

LOGGED BY: Douglas Young & Stephanie Penn

DRILLER: Maggiora Bros. Drilling, Inc.

STATE ID:

BORING

ELECTRIC LOG BY: Welenco

DRILLING METHOD: Mud Rotary

5S/1W-16M0008

AUTOMALL-D1

JOB NUMBER: 6269

DWG NUMBER: -----

LOCATION: Automall

DATE: 1/24/2007

HOLE DIAMETER: 8.75"

TOTAL DEPTH: 800

SHEET: 4 of 4

LITHOLOGIC DESCRIPTION

GEOPHYSICAL DATA

Depth (in feet)
Well Construction
Lithologic Pattern
Geophysical Samples

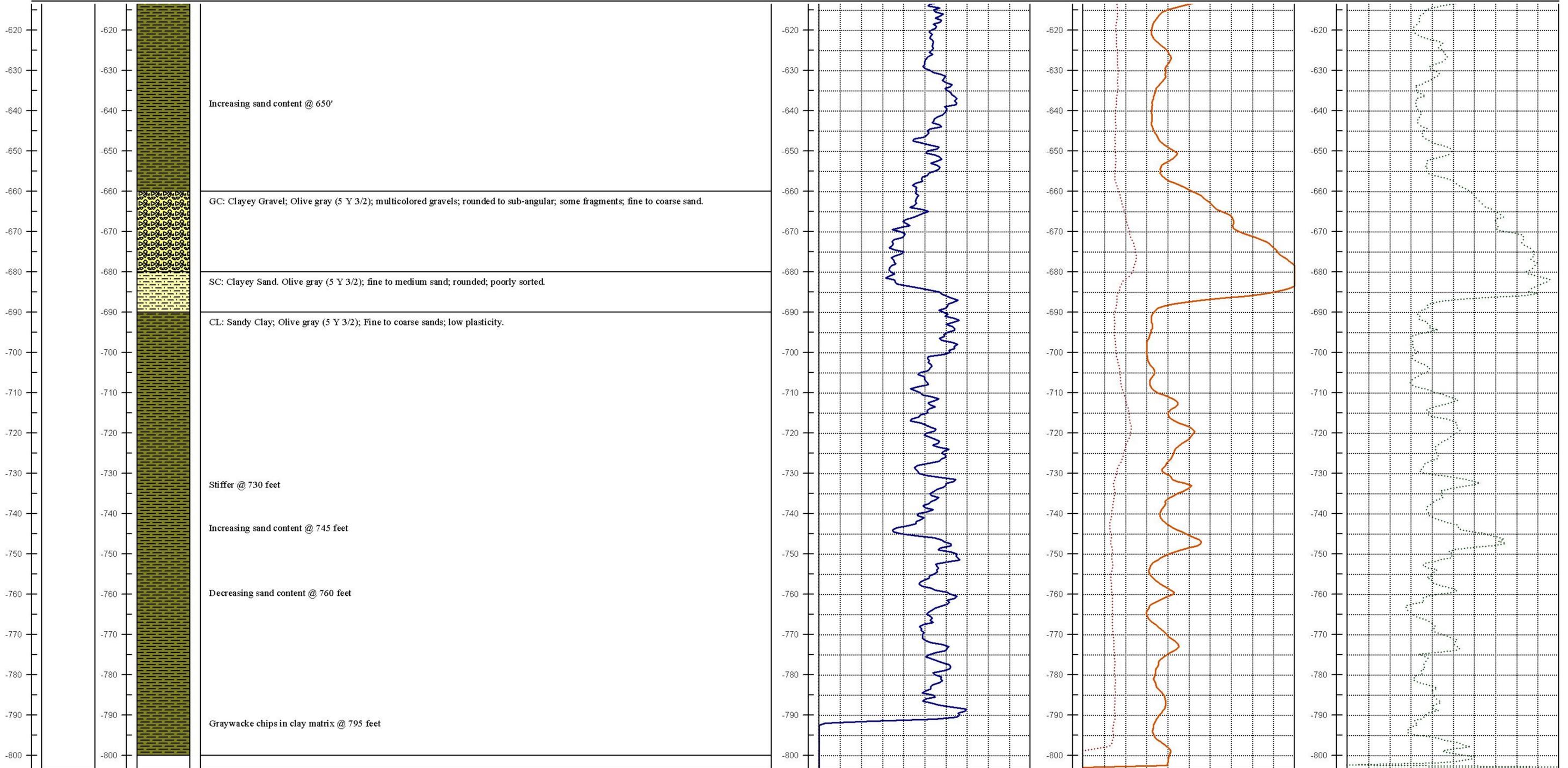
(0 Gamma Ray (GAPI) 150)

(0 Short Normal (Ohm-m) 25)

(0 Spontaneous Potential (mV) 100)

(0 Long Normal (Ohm-m) 75)

(0 Point Resistivity (Ohm-m) 25)



Southwest Niles Cone Monitoring Wells Project

LOGGED BY: Douglas Young & Stephanie Penn

DRILLER: Maggiora Bros. Drilling, Inc.

STATE ID: 5S/1W-16M0007

BORING
AUTOMALL-F

JOB NUMBER: 6269

DWG NUMBER: -----

LOCATION: Automall

DATE: 1/29/2007

ELECTRIC LOG BY: Welenco

DRILLING METHOD: Mud Rotary

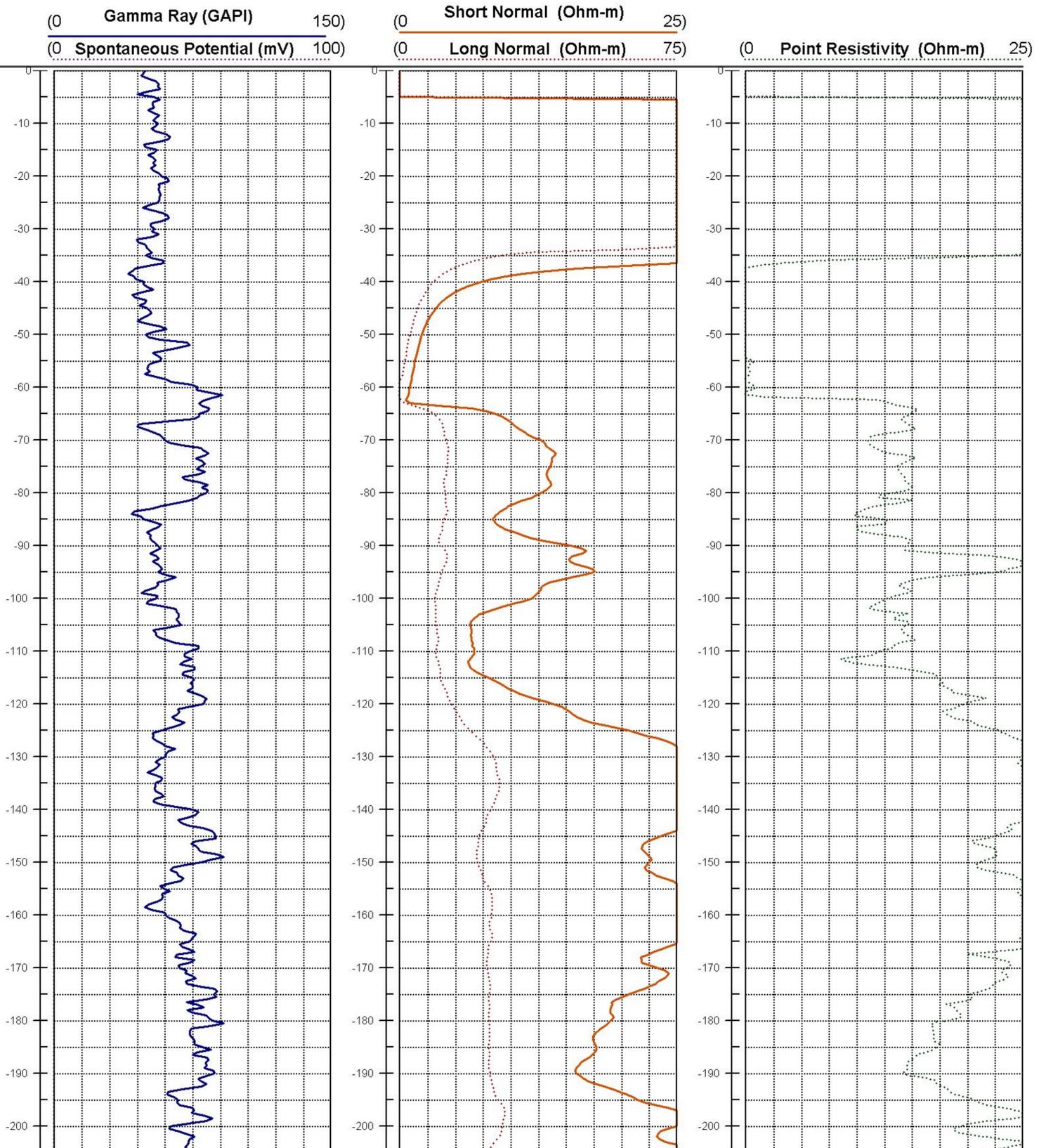
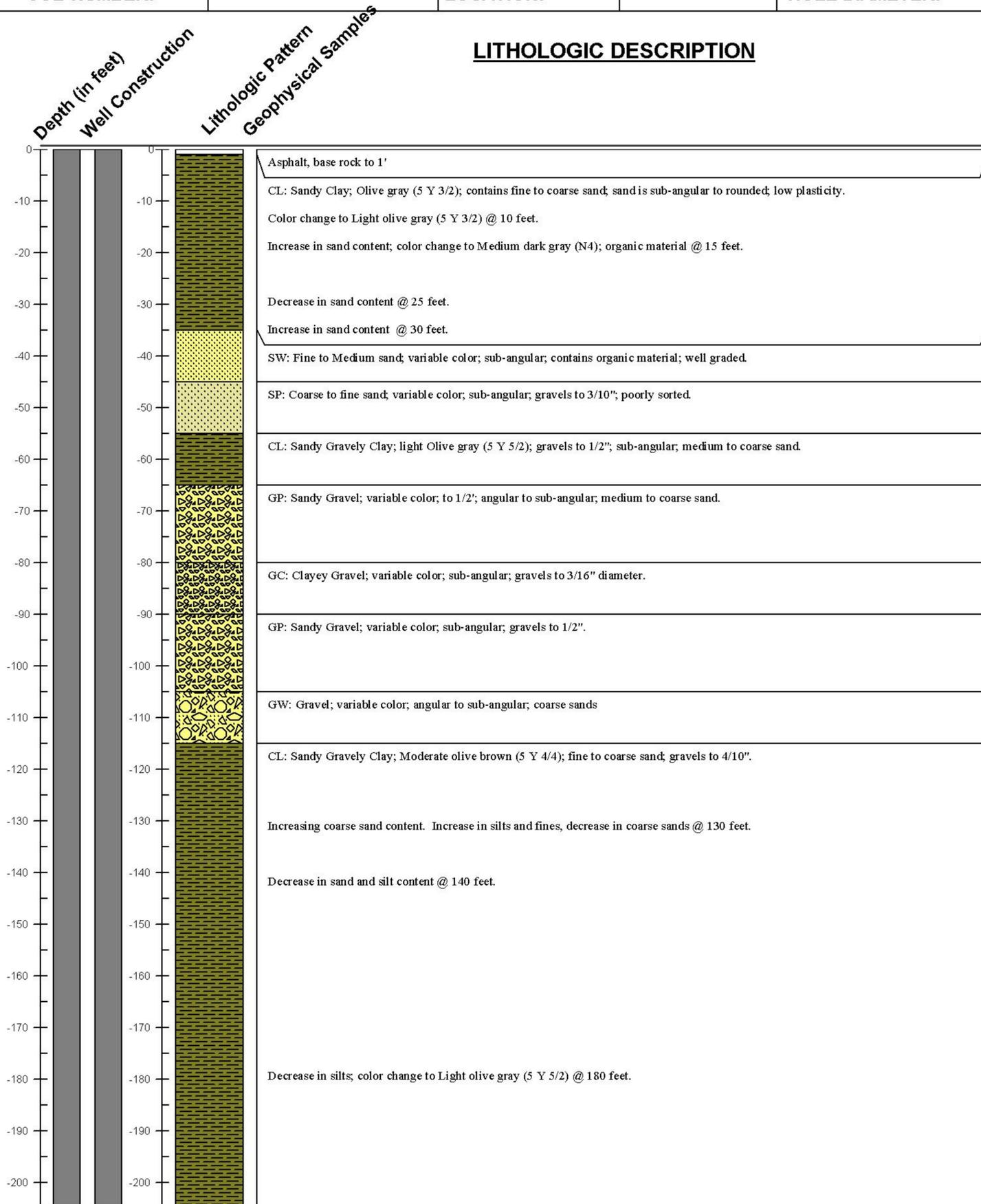
SHEET: 1 of 2

HOLE DIAMETER: 8.75"

TOTAL DEPTH: 330

LITHOLOGIC DESCRIPTION

GEOPHYSICAL DATA



*Based on Boring Automall-D1

*Based on Boring Automall-D1



Southwest Niles Cone Monitoring Wells Project

LOGGED BY: Douglas Young & Stephanie Penn

DRILLER: Maggiora Bros. Drilling, Inc.

STATE ID: 5S/1W-16M0007

BORING
AUTOMALL-F

JOB NUMBER: 6269

DWG NUMBER: -----

LOCATION: Automall

DATE: 1/29/2007

HOLE DIAMETER: 8.75"

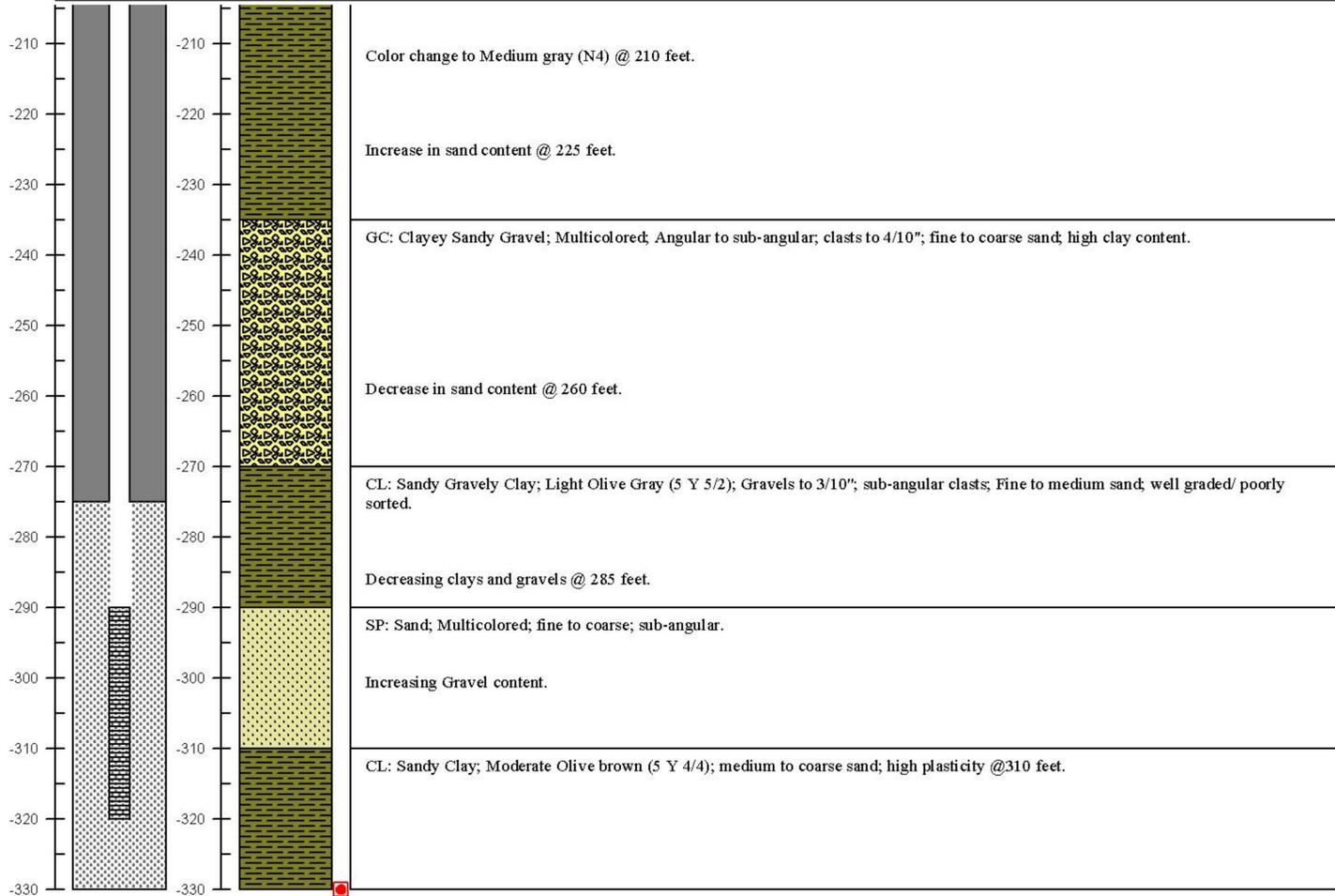
TOTAL DEPTH: 330

SHEET: 2 of 2

LITHOLOGIC DESCRIPTION

GEOPHYSICAL DATA

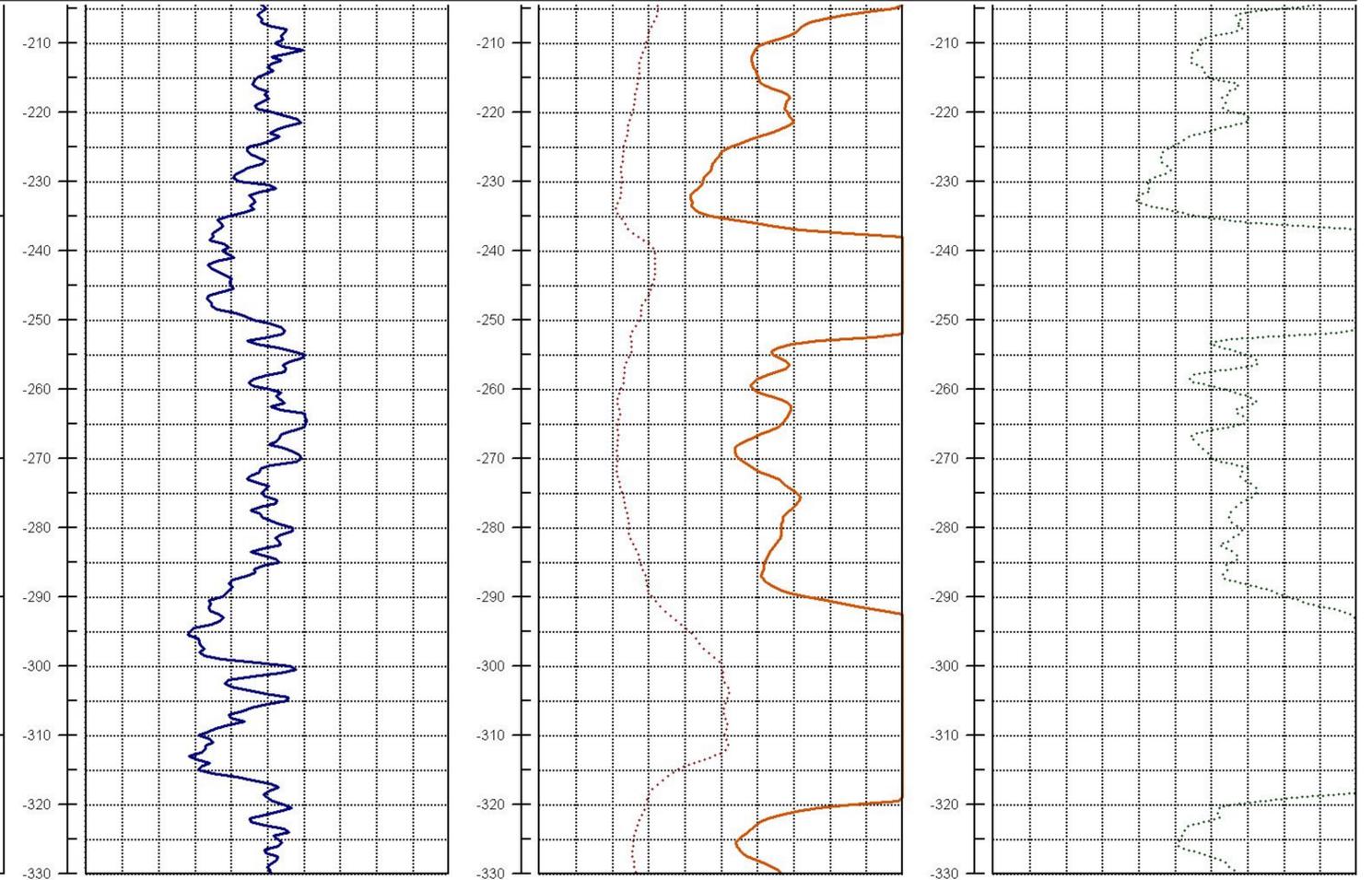
Depth (in feet)
Well Construction
Lithologic Pattern
Geophysical Samples



(0 Gamma Ray (GAPI) 150)
(0 Spontaneous Potential (mV) 100)

(0 Short Normal (Ohm-m) 25)
(0 Long Normal (Ohm-m) 75)

(0 Point Resistivity (Ohm-m) 25)



*Based on Boring Automall-D1

*Based on Boring Automall-D1

Southwest Niles Cone Monitoring Wells Project

LOGGED BY: Douglas Young & Stephanie Penn

DRILLER: Maggiora Bros. Drilling, Inc.

STATE ID: 5S/1W-16M0006

BORING
AUTOMALL-C

ELECTRIC LOG BY: Welenco

DRILLING METHOD: Mud Rotary

SHEET: 1 of 2

JOB NUMBER: 6269

DWG NUMBER: -----

LOCATION: Automall

DATE: 2/2/2007

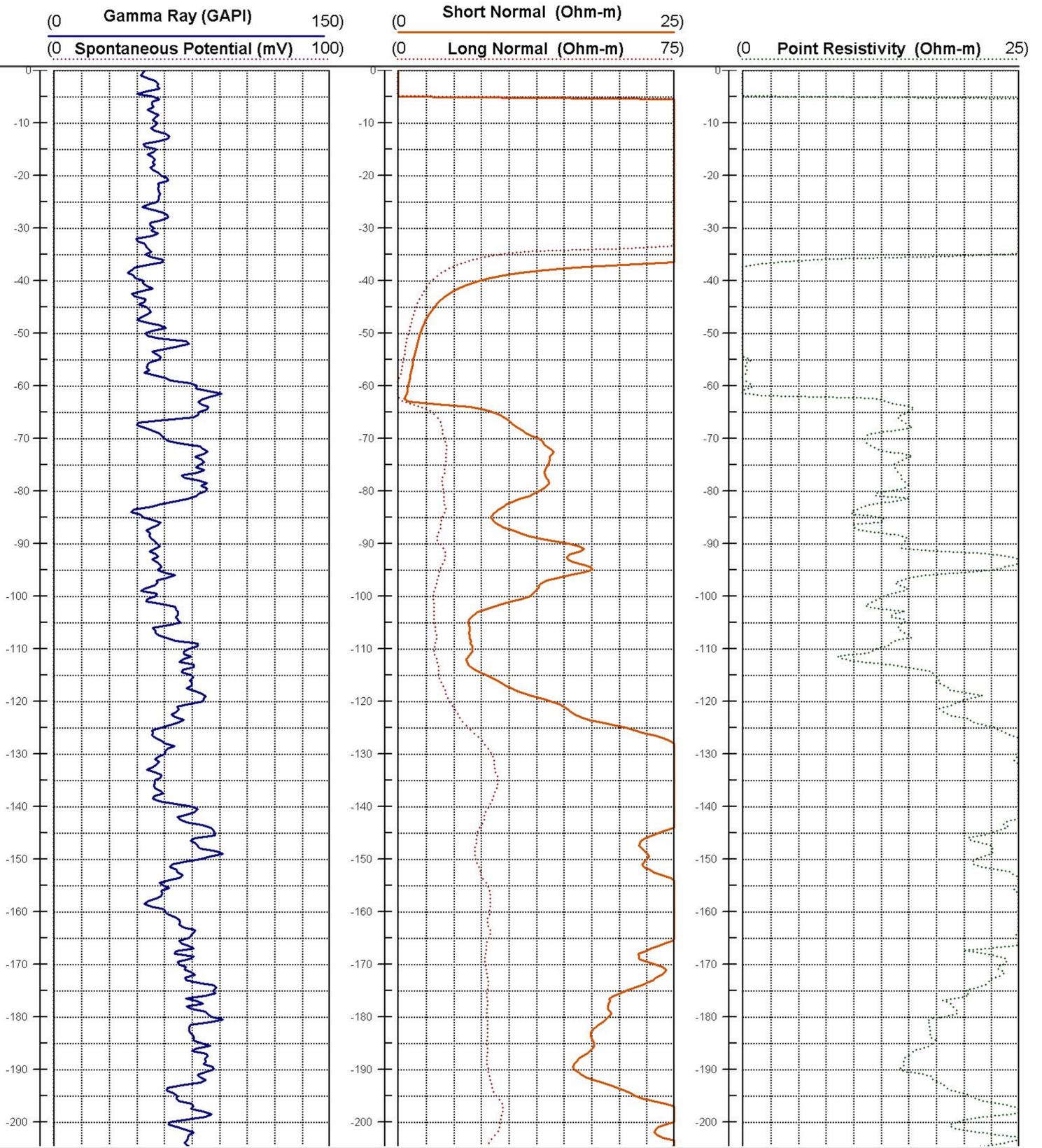
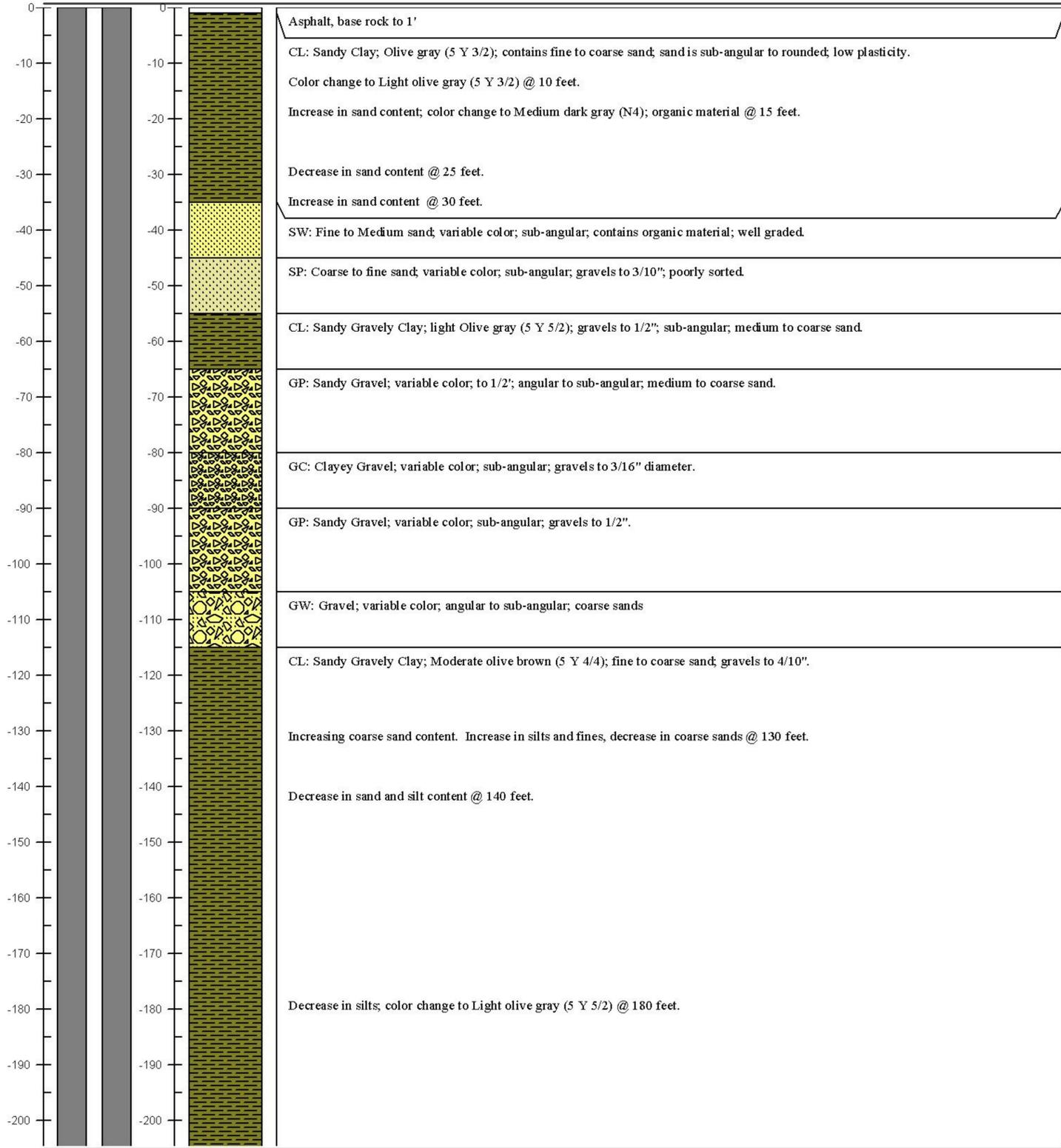
HOLE DIAMETER: 8.75"

TOTAL DEPTH: 260

LITHOLOGIC DESCRIPTION

GEOPHYSICAL DATA

Depth (in feet)
Well Construction
Lithologic Pattern
Geophysical Samples



*Based on Boring Automall-D1

*Based on Boring Automall-D1



Southwest Niles Cone Monitoring Wells Project

LOGGED BY: Douglas Young & Stephanie Penn

DRILLER: Maggiora Bros. Drilling, Inc.

STATE ID: 5S/1W-16M0006

BORING
AUTOMALL-C

JOB NUMBER: 6269

DWG NUMBER: -----

LOCATION: Automall

DATE: 2/2/2007

HOLE DIAMETER: 8.75"

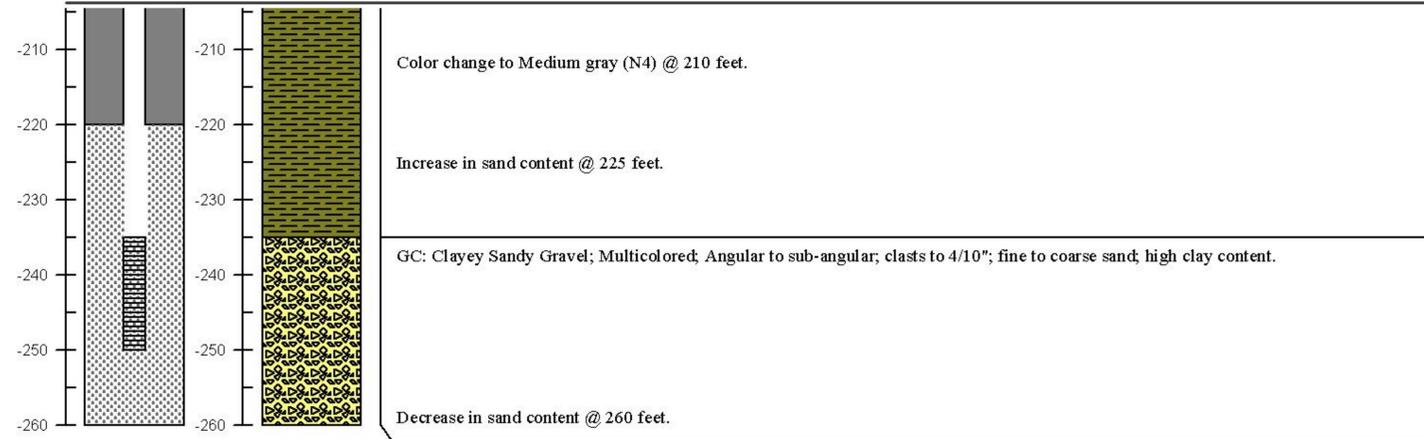
TOTAL DEPTH: 260

SHEET: 2 of 2

LITHOLOGIC DESCRIPTION

GEOPHYSICAL DATA

Depth (in feet)
Well Construction
Lithologic Pattern
Geophysical Samples



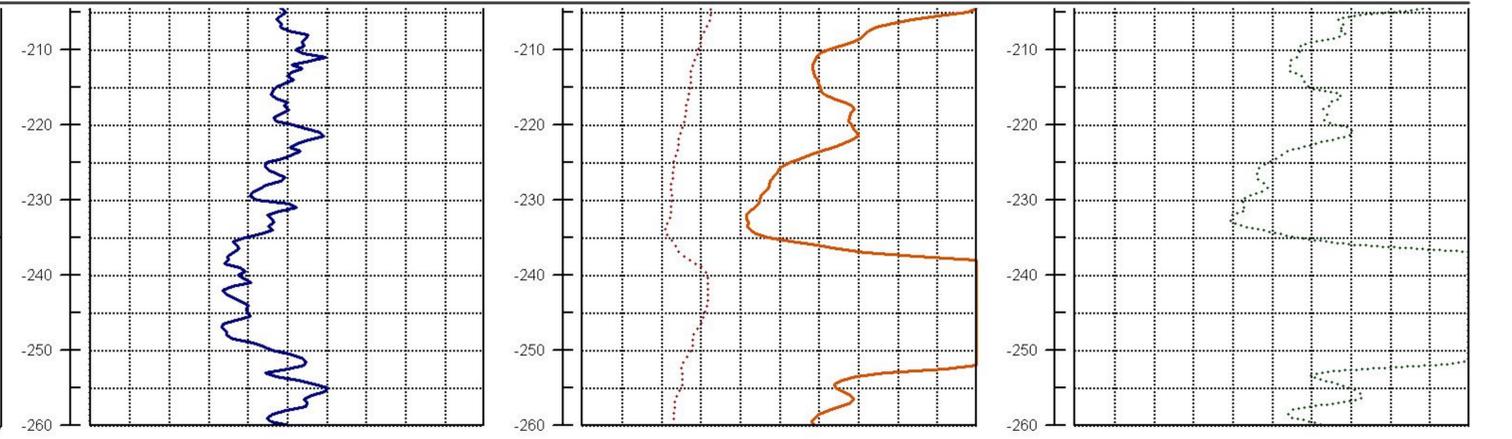
(0 Gamma Ray (GAPI) 150)

(0 Short Normal (Ohm-m) 25)

(0 Spontaneous Potential (mV) 100)

(0 Long Normal (Ohm-m) 75)

(0 Point Resistivity (Ohm-m) 25)



*Based on Boring Automall-D1

*Based on Boring Automall-D1

Appendix E
Well Development Logs



MONITORING WELL SAMPLING RECORD

WELL ID: Aut1mall-D SS/IW-16M008
 PROJECT NO: 6269
 PROJECT NAME: Northwest & Southwest Niles Cone MW
 DATE: 03/01/07
 SAMPLED BY: Jeremy Bautista

DEPTH TO WATER: _____
 TOTAL DEPTH OF WELL: 490.0'
 WELL DIAMETER: 2.0"
 CASING VOLUME: _____
 METHOD OF PURGING: air lift

3/1/07

3/2/07

TIME	CUMULATIVE VOL. REMOVED (GALLONS)	TEMPERATURE (°C)	pH (UNITS)	SPECIFIC CONDUCTANCE (UMHOS/CM)	REMARKS (COLOR, TURBIDITY & SEDIMENT)
1230	150	22.9	8.73	704	clear, 30
1245	300	23.0	8.66	657	clear, 30.9
1315	600	22.9	8.63	627	clear, 16.3.9
1345	900	22.2	8.62	613	clear, 25.9
1430	1350	21.6	8.53	582	clear, 9.9
1500	1650	21.4	8.54	564	clear, 5.9
1100	2250	21.8	8.58	558	clear, 9.0
1110	2320	20.8	8.54	572	clear, 10.7
1140	2520	21.5	8.53	475	clear, 4.83
1150	2570	22.1	8.53	545	clear, 4.81
1200	2620	21.5	8.51	560	clear, 4.94

NOTES: Sampling done over a two-day period.



MONITORING WELL SAMPLING RECORD

George = 831-212-4831

WELL ID: Automall - F
 PROJECT NO: _____
 PROJECT NAME: 1
 DATE: Tuesday March 6, 2007
 SAMPLED BY: Pat Munchon

DEPTH TO WATER: _____
 TOTAL DEPTH OF WELL: _____
 WELL DIAMETER: _____
 CASING VOLUME: _____
 METHOD OF PURGING: _____

@ 168' below surface
 210'
 250'
 250'

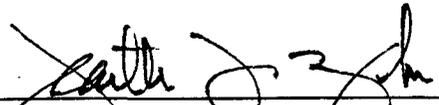
TIME	CUMULATIVE VOL. REMOVED (GALLONS)	TEMPERATURE (°C)	pH (UNITS)	SPECIFIC CONDUCTANCE (UMHOS/CM)	REMARKS (COLOR, TURBIDITY, SEDIMENT)
1005	Start	development			
1035	10 gal. minute 300 gal.	22.4	8.50	7.00	sediment = none, flashiness 9.99 - water light brown with cloudy color
1100	550 gal	25.3	8.43	8.43 6.49	C = 1:1 cloudy but clear T = 83 - changed range on machine S = none
1110	Start development @ 210'				C = 1:1 cloudy - clear T = 33 S = none
1140	850 gal	26.2	8.44	644	C = 1:1 cloudy - clear T = 33 S = none
1210	1150 gal	25.3	8.40	652	C = 1:1 cloudy - clear T = 14 NTU S = none
1300	1700 gal	22.6	8.46	631	C = clear T = 4.3 NTU S = none
1425	Start up @ 250'	22.2	8.40	634	C = 1:1 cloudy - clear T = 3.5 NTU S = none
1510		22.2	8.40	637	C = clear T = 3.5 NTU S = none
1510		21.2	8.40	650	C = clear T = 2.97 S = none
1515		21.0	8.40	645	C = clear T = 2.36 S = none

NOTES: _____

Appendix F
Groundwater Sample
Chain-of-Custody Records
And Laboratory Results

Spring /Fall Monitoring for Cl, Hardness and TDS

Sample Name	Sampling date	Analysis	Value	Unit	
158206	DE1-D2	11/20/2006 00:00:00	Cl	113.6	mg/L
158206	DE1-D2	11/20/2006 00:00:00	TDS	548	mg/L
158206	DE1-D2	11/20/2006 00:00:00	THARD	80.62	mg/L
158208	DE1-D1	11/20/2006 13:18:00	TDS	454	mg/L
158208	DE1-D1	11/20/2006 13:18:00	Cl	107.5	mg/L
158208	DE1-D1	11/20/2006 13:18:00	THARD	95.72	mg/L
158209	DE1-F	11/20/2006 15:15:00	TDS	627	mg/L
158209	DE1-F	11/20/2006 15:15:00	THARD	209.58	mg/L
158209	DE1-F	11/20/2006 15:15:00	Cl	113.6	mg/L
158207	DE1-C	11/20/2006 16:30:00	TDS	417	mg/L
158207	DE1-C	11/20/2006 16:30:00	Cl	81.44	mg/L
158207	DE1-C	11/20/2006 16:30:00	THARD	105.49	mg/L
158210	DE1-D1	12/20/2006 15:10:00	THARD	72.62	mg/L
158210	DE1-D1	12/20/2006 15:10:00	TDS	426	mg/L
158210	DE1-D1	12/20/2006 15:10:00	Cl	68.13	mg/L
158963	5S2W-14E08	1/30/2007 16:41:00	THARD	14600	mg/L
158963	5S2W-14E08	1/30/2007 16:41:00	TDS	64046	mg/L
158963	5S2W-14E08	1/30/2007 16:41:00	Cl	37000	mg/L
160050	AUTOMALL_D	3/2/2007 12:10:00	Cl	12.5	mg/L
160050	AUTOMALL_D	3/2/2007 12:10:00	THARD	26	mg/L
160050	AUTOMALL_D	3/2/2007 12:10:00	TDS	370	mg/L
160048	AUTOMALL_C	3/5/2007 14:15:00	THARD	1440	mg/L
160048	AUTOMALL_C	3/5/2007 14:15:00	TDS	1791	mg/L
160048	AUTOMALL_C	3/5/2007 14:15:00	Cl	494.38	mg/L
160049	AUTOMALL_F	3/6/2007 15:15:00	THARD	74	mg/L
160049	AUTOMALL_F	3/6/2007 15:15:00	TDS	386	mg/L
160049	AUTOMALL_F	3/6/2007 15:15:00	Cl	13	mg/L



 Water Quality Laboratory Supervisor
 Alameda County Water District

4.25.2007

Appendix G
Permeability Laboratory
Reports

MAR 12 2007

March 9, 2007

A.C.W.D.
ENGINEERING DEPT.

REPORT NO: 07G032

STL NO.: 0018092
PO NO.: 36409 OS

REPORT TO: ALAMEDA COUNTY WATER DISTRICT
MR. DOUG YOUNG
43885 SOUTH GRIMMER BOULEVARD
FREMONT, CA 94538

PROJECT: GEO LAB - DOUG YOUNG
43885 SOUTH GRIMMER BOULEVARD
FREMONT, CA

SUBJECT: GEOTECHNICAL LABORATORY TESTING

REPORT FOR PROJECT NO. 29748

Our firm has performed laboratory testing for the above referenced project. Please see the attached laboratory data sheets for test information.

We trust that this information will meet your needs at this time. If additional information is required, or if we can be of further assistance, please do not hesitate to contact our office.

Respectfully submitted,
SIGNET TESTING LABORATORIES, INC.



Patricia Slavin-Hodgkins
Geotechnical Laboratory Manager

PMHV.

cc: ALAMEDA COUNTY WATER DISTRICT/MR. DOUG YOUNG
* FILE COPY*

Alameda County Water District Chain of Custody

Project: SW Niles Core MW Proj Project #: 29748 29748 Sampler ID: <i>Douglas Young</i>				Sample Matrix S = Soil W = Water	Type of Container	Number of Containers <i>Method 4574 Method 8500 Flex well Pump Testing</i>	Comments
ID #	Date	Time	Sampling Location	Sample Matrix	Type of Container	Number of Containers	Comments
<i>AUC 603</i>	<i>1/18/07</i>	<i>14:20</i>	<i>Automell D-1</i>	<i>S</i>	<i>Small liner</i>	<i>1</i>	
<i>AUC 330</i>	<i>1/31/07</i>	<i>15:33</i>	<i>Automell - F</i>	<i>S</i>	<i>liner</i>	<i>1</i>	
<i>AUC 265</i>	<i>2/7/07</i>	<i>12:00</i>	<i>Automell - C</i>	<i>S</i>	<i>liner</i>	<i>1</i>	
Field Conditions (weather, etc.)				Field Procedures (Preservation, Quality Control, etc.)			
				<i>None</i>			
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:		LABORATORY COMMENTS: (SAMPLE CONDITION, PRESERVATION, ETC.) <i>Report Results to D. Young @ 510-668-4452.</i>		
<i>[Signature]</i>	<i>2/13/07</i>	<i>10:10</i>	<i>[Signature]</i>				
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:				
RELINQUISHED BY:	DATE:	TIME:	RECEIVED FOR LAB BY:				
<i>[Signature]</i>			<i>[Signature]</i>				

PERMEABILITY TEST (ASTM D5084-90, method C ,

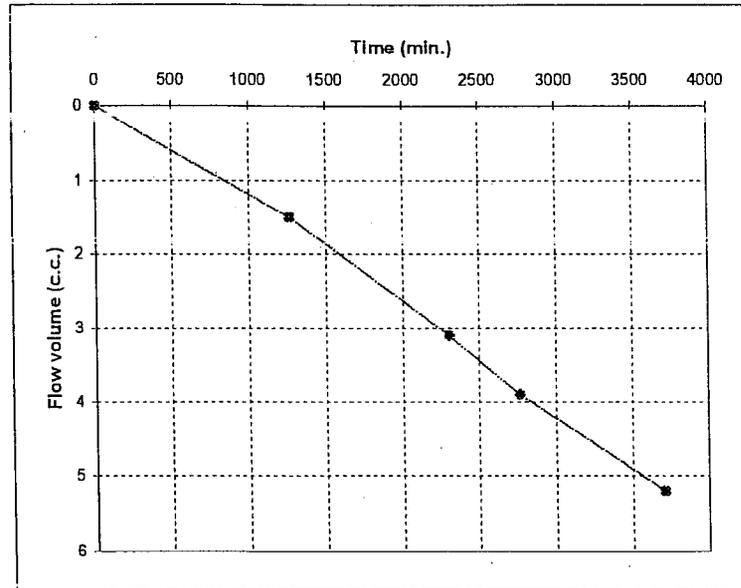
Client : Alameda County
 Project : SW Niles Cone MW Project
 Job # : 29748
 Boring # : Automall
 Sample # : C
 Depth (ft) : 265
 Date setup for test : 02/21/07
 Soil type : Olive gray clay

Specimen:

	<u>Initial</u>	<u>Final</u>	
Total wt. =	457.2	458.2	gms
Ht. =	3.020	3.016	in
Ave dia. =	2.407		in
Area =	4.551	4.537	sq.in
Volume =	225.2	224.2	c.c.
Moisture =	24.4	24.7	%
Total density =	126.7	127.5	pcf
Dry density =	101.8	102.3	pcf
Gs (Assumed) =	2.70		
Void ratio =	0.655	0.647	
% Saturation =	100.7	102.9	

	<u>Head</u>	<u>Tail</u>	
Area of pipettes =	0.877	1.002	sq. cm.

Sig3 = 20



Data reductions:	<u>Elapsed Time (min)</u>	<u>Inflow (c.c.)</u>	<u>Outflow (c.c.)</u>	<u>Inflow / Outflow</u>	<u>h1 (cm)</u>	<u>h2 (cm)</u>	<u>Ln(h1/h2)</u>	<u>Rt</u>	<u>Gradient</u>	<u>K20 (cm/sec)</u>
	1268.0	2.20	1.50	1.47	718.7	714.7	0.00559	1.002	93.6	9.01E-09
	1040.0	1.70	1.60	1.06	714.7	711.1	0.00496	1.005	93.1	9.77E-09
	455.0	0.80	0.80	1.00	711.1	709.4	0.00241	0.987	92.7	1.07E-08
	950.0	1.30	1.30	1.00	709.4	706.6	0.00393	0.995	92.4	8.38E-09
	495.0	0.80	0.80	1.00	706.6	704.9	0.00242	0.998	92.1	9.97E-09

Overall average: 9.56E-09

PERMEABILITY TEST (ASTM D5084-90, method C)

Client : Alameda County
 Project : SW Niles Cone MW Project
 Job # : 29748
 Boring # : Automall
 Sample # : D-1
 Depth (ft) : 603
 Date setup for test : 02/20/07
 Soil type : Olive gray clay

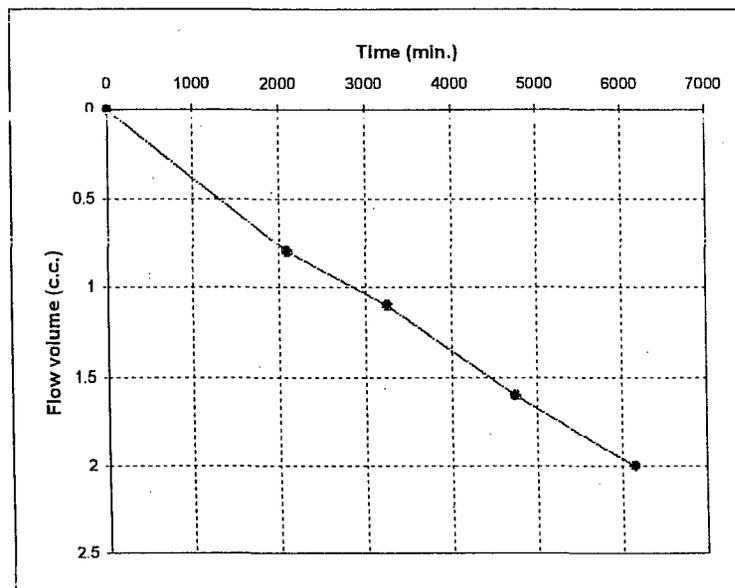
Specimen:

	Initial	Final	
Total wt. =	473.3	484.1	gms
Ht. =	3.050	3.046	in
Ave dia. =	2.407		in
Area =	4.551	4.538	sq.in
Volume =	227.5	226.5	c.c.
Moisture =	22.5	25.3	%
Total density =	129.9	133.4	pcf
Dry density =	106.0	106.5	pcf
Gs (Assumed) =	2.70		
Void ratio =	0.589	0.582	
% Saturation =	103.0	117.2	

	Head	Tail	
Area of pipettes =	0.877	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)
	2100.0	0.80	0.80	1.00	722.8	721.0	0.00253	1.000	93.3	2.32E-09
	1150.0	0.30	0.30	1.00	721.0	720.3	0.00095	1.002	93.2	1.60E-09
	1495.0	0.40	0.50	0.80	720.3	719.3	0.00143	0.987	93.0	1.82E-09
	1410.0	0.30	0.40	0.75	719.3	718.5	0.00111	0.974	92.9	1.48E-09
	1190.0	0.40	0.40	1.00	718.5	717.5	0.00127	0.990	92.8	2.04E-09



Overall average: 1.85E-09

PERMEABILITY TEST (ASTM D5084-90, method C)

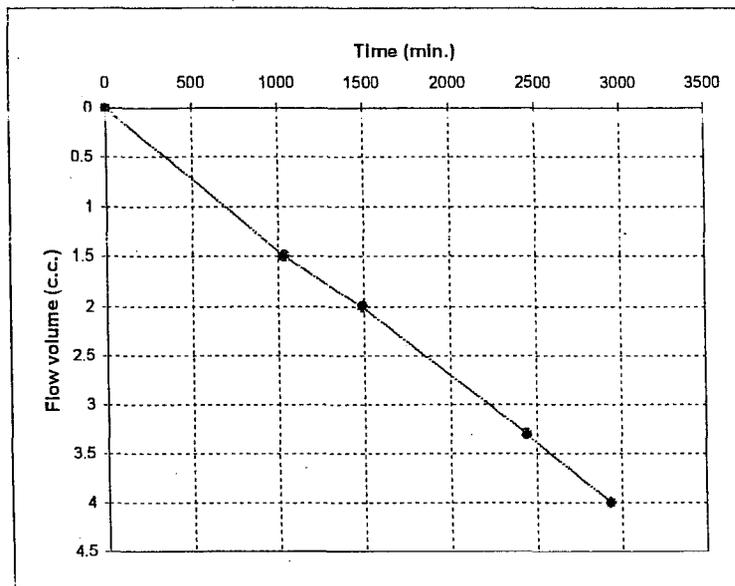
Client : Alameda County
 Project : SW Niles Cone MW Project
 Job # : 29748
 Boring # : Automall
 Sample # : F
 Depth (ft) : 330
 Date setup for test : 02/21/07
 Soil type : Olive gray clay

Specimen:

	Initial	Final	
Total wt. =	510.4	508.0	gms
Ht. =	3.140	3.136	in
Ave dia. =	2.407		in
Area =	4.551	4.538	sq.in
Volume =	234.2	233.2	c.c.
Moisture =	17.3	16.7	%
Total density =	136.0	136.0	pcf
Dry density =	115.9	116.4	pcf
Gs (Assumed) =	2.70		
Void ratio =	0.453	0.447	
% Saturation =	103.1	101.2	

	Head	Tail	
Area of pipettes =	0.877	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)
	1035.0	2.50	1.50	1.67	722.8	718.2	0.00633	1.005	90.5	1.22E-08
	455.0	1.00	0.50	2.00	718.2	716.5	0.00238	0.987	90.1	1.03E-08
	950.0	1.50	1.30	1.15	716.5	713.3	0.00447	0.995	89.8	9.30E-09
	495.0	0.70	0.70	1.00	713.3	711.7	0.00224	0.998	89.5	8.98E-09
	970.0	1.30	1.20	1.08	711.7	708.9	0.00401	1.006	89.2	8.27E-09

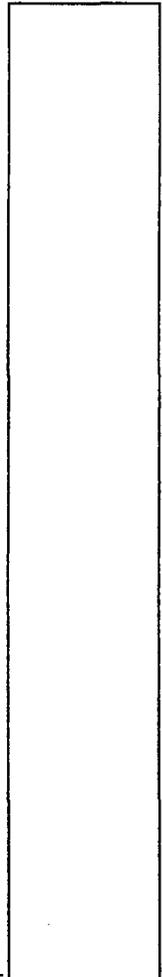
Overall average: 9.81E-09

Permeability Test

Lab No. 076032

Client : Alameda County
 Project Name : SW Niles Cone MW Project
 Project Number : 29748
 Boring Number : Automell
 Sample Number : F
 Depth (ft) : 330
 SigC = _____ psf = _____ 20 psi
 Date tested : 2-21-07
 Tested by : JH
 Visual Classification : olive gray clay

TOP



Tube Type : 2" x 6" 2.43 x 20" 2.87" x 36"
 2.43" x 20" (circle one)

Sample conditions : Undisturbed or Remolded
 (circle one)

	Before Test	After Test	Trimming
Specimen Wt (gm) =	510.39		
Specimen Ht (in) =	3.14		
Dia (in) - top =	2.40		
- mid =	2.41		
- bot =	2.41		
Dish # =		PSE-3	
Wet soil + dish (gm) =		675.41	
Dry soil + dish (gm) =		602.53	
Wt. of dish (gm) =		167.41	

Length of Tube _____

BOTTOM

if sample was 2.43" x 20" or 2.87" x 36" sketch where sample was taken from in the tube

CELL NO. E

STATION NUMBER
PP-5B

Be sure you mark where the soil started and ended if the tube was not completely full to each end

Laboratory Test Data

Client: Alameda County Lab No. 076032
 Project: SW Water Case New Project Job no.: 29748
 Boring No. Automa Sample No. F Depth. 320
 Classification: olive gray clay Type of test: Perm SigC = 20
 Cell No. E

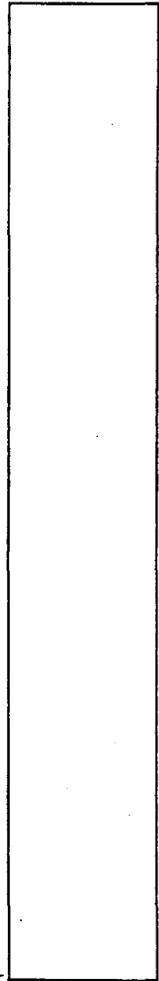
		Applied Pressure (psi)			Burette Readings (c.c.)			STATION NO. <u>PP-5B</u>				
Date	Time	Cell	Back (bot.)	Back (top)	Cell	Head <u>8.98</u>	Tail <u>8.98</u>	P.W.P. (psi)	Chg. in P.W.P.	Chg. in Cell P.	"B" Value	Notes
2-24	1200	0	0	0	0.7	0.0	0.0	F/K				
	1210	2	0	0	2.7	0.0	0.0	Seep				
2-22	815	2	0	0	6.2	0.5	0.0	F/R				
	825	2	0	0	6.4	0.9	0.8					
		12	10	10								
		<i>Leaked</i>										
	1245	0	0	0	0.5	0.0	0.0	F/R				
	1250	2	0	0	2.1	0.7	0.5					
	1355	12	10	10	9.5	1.0	1.0					
	1500	22	20	20	13.1	1.5	1.5					
	1600	32	30	30	15.5	1.7	1.7					
2-23	810	42	40	40	19.2	3.7	2.0					
2-24	1915	52	50	50	21.5	5.2	2.4	48.2	10	10	100	
		62						58.2				
		<i>Comp</i>										
	1920	70	50	50	5.7	2.7	19.7					
2-25	1420	70	50	50	12.7	18.9	16.4					
		<i>Perm</i>										
2-25	1425	70	60	50		4.0	21.0					20.0
2-26	740					6.5	19.5					20.0
2-26	1515					7.5	19.0					21.4
2-27	705					9.0	17.7					19.4
2-27	1520					9.7	17.0					21.1
2-28	730					11.0	15.8					18.8

Permeability Test

Lab No. 076032

Client : Alameda County
 Project Name : SW Niles Cone MW Project
 Project Number : 29748
 Boring Number : Automat
 Sample Number : C
 Depth (ft) : 265
 SigC = _____ psf = _____ 20 psi
 Date tested : 2-21-07
 Tested by : JH
 Visual Classification : oliv gray clay

TOP



Tube Type : 2" x 6" 2.43 x 8" 2.87" x 36"
 2.43" x 20" (circle one)

Sample conditions : Undisturbed or Remolded
 (circle one)

	Before Test	After Test	Trimming
Specimen Wt (gm) =	457.23		
Specimen Ht (in) =	3.02		
Dia (in) - top =	2.40		
- mid =	2.41		
- bot =	2.41		
Dish # =		DD	
Wet soil + dish (gm) =		559.97	
Dry soil + dish (gm) =		468.31	
Wt. of dish (gm) =		100.87	

Length of Tube _____

BOTTOM

if sample was 2.43" x 20" or 2.87" x 36" sketch where sample was taken from in the tube

CELL NO. A

STATION NUMBER
PP-6

Be sure you mark where the soil started and ended if the tube was not completely full to each end

Laboratory Test Data

Client: Alameda County Lab No. 076032
 Project: SW Niles Cone MW Project Job no.: 29748
 Boring No. Automall Sample No. C Depth. 265
 Classification: olive gray clay Type of test: Perm SigC = 20
 Cell No. A

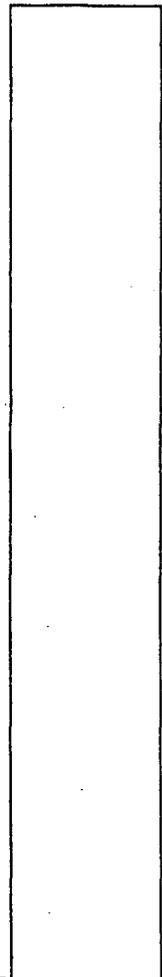
		Applied Pressure (psi)			Burette Readings (c.c.)			STATION NO. <u>PP-6</u>				
Date	Time	Cell	Back (bot.)	Back (top)	Cell	Head 8.98	Tail 7.86	P.W.P. (psi)	Chg. in P.W.P.	Chg. in Cell P.	"B" Value	Notes
2-21	1245	0	0	0	0.5	5.4	7.0	F/R				
	1255	2	0	0	1.5	0.0	0.0	Seep				
2-22	815	2	0	0	0.5	0.5	0.0	F/R				
	825	2	0	0	0.5	0.7	0.9					
	930	12	10	10	3.0	2.0	3.5					
	1040	22	20	20	5.5	2.5	4.7					
	1145	32	30	30	7.4	2.7	5.3					
	1245	42	40	40	9.1	2.9	5.7					
2-23	825	52	50	50	11.2	3.5	6.7	50.7	9.6	10	(.96)	
		62						60.3				
		<u>Consol</u>										
	830	70	50	50	3.0	2.7	2.5					
2-24	1910	70	50	50	11.3	18.3	17.7					
		<u>Perm</u>										
2-24	1912	70	60	50		5.0	21.0					20.2
2-25	1420					7.2	19.5					20.0
2-26	740					8.9	17.9					20.0
2-26	1515					9.7	17.1					21.4
2-27	705					11.0	15.8					19.4
2-27	1520					11.8	15.0					21.1

Permeability Test

Lab No. 079032

Client : Hameda County
 Project Name : SW Niles Cone MW Project
 Project Number : 29749
 Boring Number : Automat
 Sample Number : D-1
 Depth (ft) : 603
 SigC = _____ psf = 20 psi
 Date tested : 2-20-07
 Tested by : JH
 Visual Classification : olive gray clay

TOP



Tube Type : 2" x 6" 2.43 x 6 2.87" x 36"
 2.43" x 20" (circle one)

Sample conditions : Undisturbed or Remolded
 (circle one)

	Before Test	After Test	Trimming
Specimen Wt (gm) =	473.33		
Specimen Ht (in) =	3.05		
Dia (in) - top =	2.41		
- mid =	2.41		
- bot =	2.40		
Dish # =		PSA-9	
Wet soil + dish (gm) =		650.29	
Dry soil + dish (gm) =		552.68	
Wt. of dish (gm) =		166.20	

Length of Tube _____

BOTTOM

if sample was 2.43" x 20" or 2.87" x 36" sketch where sample was taken from in the tube

CELL NO. 1

STATION NUMBER

PP-5A

Be sure you mark where the soil started and ended if the tube was not completely full to each end.

Laboratory Test Data

Client: Alameda County Lab No. 076032
 Project: San Niles Canal MW Project Job no.: 29748
 Boring No. Automall Sample No. D-1 Depth. 603
 Classification: olive gray clay Type of test: K SigC = 20
 Cell No. 1

		Applied Pressure (psi)			Burette Readings (c.c.)			STATION NO. <u>PP-5A</u>				
Date	Time	Cell	Back (bot.)	Back (top)	Cell	Head 8.99	Tail 8.99	P.W.P. (psi)	Chg. in P.W.P.	Chg. in Cell P.	"B" Value	Notes
2-20-57	1415	0	0	0	0.5	3.7	3.3	F/K				
	1425	2	0	0	1.7	0.5	0.5	Seep				
2-21	915	2	0	0	2.4	1.0	0.0	F/R				
	955	2	0	0	2.2	1.0	1.0					
	1055	12	10	10	5.7	2.4	6.3					
	1155	22	20	20	6.5	3.7	7.9					
	1255	32	30	30	7.1	5.1	8.8					
	1405	42	40	40	7.4	6.4	9.5					
2-22	805	52	50	50	4.5	9.0	12.8	53.1	9.8	10	(19.8)	
		62						62.9				
		Consol										
	810	70	50	50	2.5	21.3	22.0					
2-23	805	70	50	50	9.7	18.3	19.2					
		Perm										
2-23	810	70	60	50		4.0	21.0				20.2	
2-24	1910					4.8	20.2				20.2	
2-25	1420					5.1	19.9				20.0	
2-26	1515					5.5	19.4				21.4	
2-27	1445					5.8	19.0				21.1	
2-28	1035					6.2	18.6				20.1	

October 16, 2006

OCT 20 2006

REPORT NO: 06G140

STL NO.: 0018092
PO NO.: 36409 OS

A.C.W.D.
ENGINEERING DEPT.

REPORT TO: ALAMEDA COUNTY WATER DISTRICT
MR. DOUG YOUNG
43885 SOUTH GRIMMER BOULEVARD
FREMONT, CA 94538

PROJECT: GEO LAB - DOUG YOUNG
43885 SOUTH GRIMMER BOULEVARD
FREMONT, CA

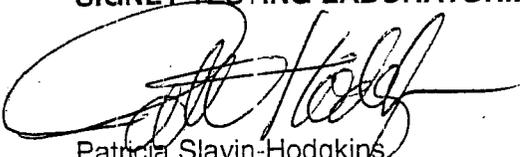
SUBJECT: GEOTECHNICAL LABORATORY TESTING

REPORT

Our firm has performed laboratory testing for the above referenced project. Please see the attached laboratory data sheets for test information.

We trust that this information will meet your needs at this time. If additional information is required, or if we can be of further assistance, please do not hesitate to contact our office.

Respectfully submitted,
SIGNET TESTING LABORATORIES, INC.



Patricia Slavin-Hodgkins
Geotechnical Laboratory Manager

PMH/kv

cc: ALAMEDA COUNTY WATER DISTRICT/MR. DOUG YOUNG
* FILE COPY*

PERMEABILITY TEST (ASTM D5084-90, method C)

Client : Alameda County
 Project : SW Niles
 Job # : 6269
 Boring # : DE-1
 Sample # :
 Depth (ft) : 450.5-451
 Date setup for test : 09/22/06
 Soil type : Olive gray clay

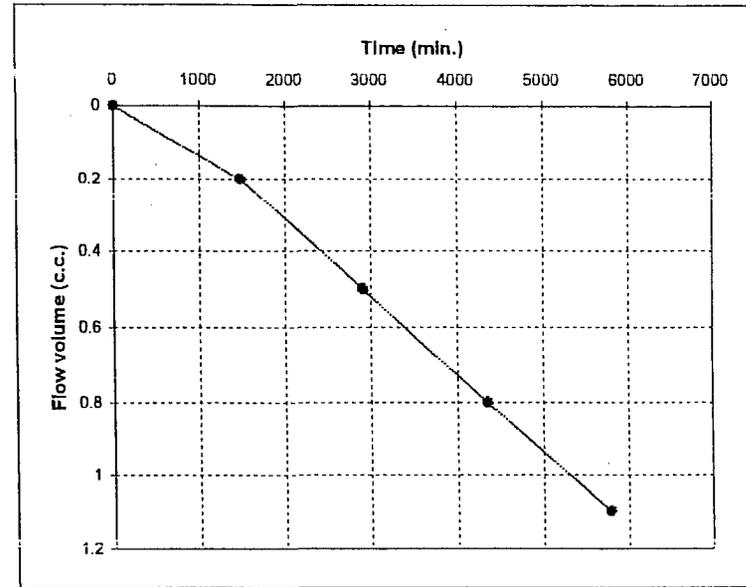
Specimen:

	<u>Initial</u>	<u>Final</u>	
Total wt. =	939.5	951.3	gms
Ht. =	5.980	5.976	in
Ave dia. =	2.417		in
Area =	4.589	4.582	sq.in
Volume =	449.7	448.7	c.c.
Moisture =	20.7	22.2	%
Total density =	130.4	132.3	pcf
Dry density =	108.0	108.2	pcf
Gs (Assumed) =	2.70		
Void ratio =	0.560	0.556	
% Saturation =	99.9	107.8	

	<u>Head</u>	<u>Tail</u>	
Area of pipettes =	0.992	0.878	sq. cm.

Sig3 = 20

Data reductions:	<u>Elapsed Time (min)</u>	<u>Inflow (c.c.)</u>	<u>Outflow (c.c.)</u>	<u>Inflow / Outflow</u>	<u>h1 (cm)</u>	<u>h2 (cm)</u>	<u>Ln(h1/h2)</u>	<u>Rt</u>	<u>Gradient</u>	<u>K20 (cm/sec)</u>
	1470.0	0.70	0.20	3.50	719.3	718.3	0.00130	0.937	47.4	3.30E-09
	1440.0	0.30	0.30	1.00	718.3	717.7	0.00090	0.924	47.3	2.29E-09
	1440.0	0.50	0.30	1.67	717.7	716.8	0.00118	0.926	47.3	3.02E-09
	1440.0	0.30	0.30	1.00	716.8	716.2	0.00090	0.926	47.2	2.30E-09
	1235.0	0.30	0.30	1.00	716.2	715.5	0.00090	0.930	47.2	2.70E-09



Overall average: 2.72E-09

PERMEABILITY TEST (ASTM D5084-90, method C)

Client : Alameda County
 Project : SW Niles
 Job # : 6269
 Boring # : DE-1
 Sample # :
 Depth (ft) : 590.5-591
 Date setup for test : 09/22/06
 Soil type : Olive gray clay

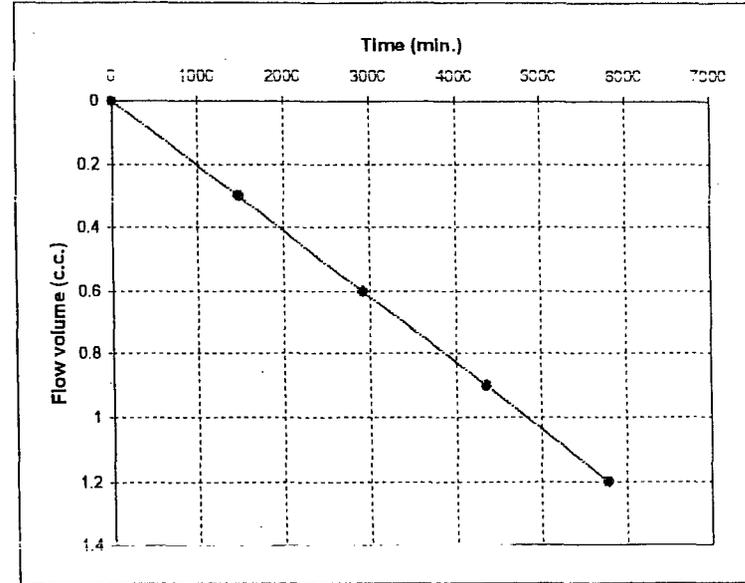
Specimen:

	<u>Initial</u>	<u>Final</u>	
Total wt. =	915.6	931.1	gms
Ht. =	5.980	5.976	in
Ave dia. =	2.410		in
Area =	4.564	4.557	sq.in
Volume =	447.2	446.2	c.c.
Moisture =	24.0	26.1	%
Total density =	127.8	130.2	pcf
Dry density =	103.0	103.3	pcf
Gs (Assumed) =	2.70		
Void ratio =	0.635	0.632	
% Saturation =	102.0	111.6	

	<u>Head</u>	<u>Tail</u>	
Area of pipettes =	0.875	0.875	sq. cm.

Sig3 = 20

Data reductions:	<u>Elapsed Time (min)</u>	<u>Inflow (c.c.)</u>	<u>Outflow (c.c.)</u>	<u>Inflow / Outflow</u>	<u>h1 (cm)</u>	<u>h2 (cm)</u>	<u>Ln(h1/h2)</u>	<u>Rt</u>	<u>Gradient</u>	<u>K20 (cm/sec)</u>
	1470.0	0.40	0.30	1.33	721.7	720.9	0.00111	0.937	47.5	2.66E-09
	1440.0	0.40	0.30	1.33	720.9	720.1	0.00111	0.924	47.5	2.68E-09
	1440.0	0.30	0.30	1.00	720.1	719.4	0.00095	0.926	47.4	2.31E-09
	1440.0	0.20	0.30	0.67	719.4	718.8	0.00079	0.926	47.4	1.92E-09
	1235.0	0.20	0.20	1.00	718.8	718.4	0.00064	0.930	47.3	1.80E-09



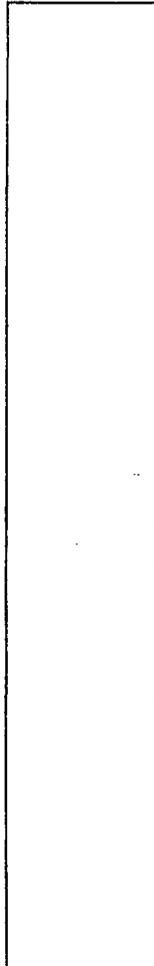
Overall average: 2.28E-09

Permeabilty Test

Lab No. 066140

Client : Alameda County
 Project Name : SW Niles
 Project Number : 6269
 Boring Number : DE-1
 Sample Number : _____
 Depth (ft) : 450.5 - 451.0
 SigC = _____ psf = 2.0 psi
 Date tested : 9-22-06
 Tested by : JH
 Visual Classification : olive gray clay

TOP



Tube Type : 2" x 6" 2.43 x 6" 2.87" x 36"
 2.43" x 20" (circle one)

Sample conditions : Undisturbed or Remolded
 (circle one)

	Before Test	After Test	Trimming
Specimen Wt (gm) =	939.5		
Specimen Ht (in) =	5.98		
Dia (in) - top =	2.41		
- mid =	2.42		
- bot =	2.42		
Dish # =		<u>LW-2</u>	
Wet soil + dish (gm) =		1117.7	
Dry soil + dish (gm) =		944.7	
Wt. of dish (gm) =		166.40	

Length of Tube _____

BOTTOM

if sample was 2.43" x 20" or 2.87" x 36" sketch where sample was taken from in the tube

CELL NO. J

STATION NUMBER
8P-2A

Be sure you mark where the soil started and ended if the tube was not completely full to each end

Laboratory Test Data

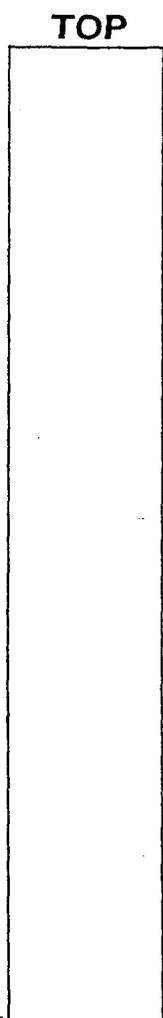
Client: Alameda County Lab No. 066140
 Project: SW 1219 Job no.: 6269
 Boring No. DE-1 Sample No. _____ Depth. 450.5 - 451.0
 Classification: fine gray clay Type of test: Perm SigC = 20
 Cell No. J (for perms only) Hydraulic Gradient= _____

		Applied Pressure (psi)			Burette Readings (c.c.)			STATION NO. <u>RP-2A</u>				
Date	Time	Cell	Back (bot.)	Back (top)	Cell	Head 794	Tail 897	P.W.P. (psi)	Chg. in P.W.P.	Chg. in Cell P.	"B" Value	Notes
9-22	1215	0	0	0	0.7	7.3	4.1					
	1305	2	0	0	3.0	0.5	0.5	F/R	Seep			
9-25	1025	2	0	0	3.2	0.7	0.5	F/R				
	1045	2	0	0	3.0	1.0	0.7					
	1145	12	10	10	7.3	2.6	1.8					
	1245	22	20	20	9.8	3.2	2.4					
	1255	32	30	30	11.8	3.7	2.7					
	1455	42	40	40	13.5	4.0	3.0					
9-26	1220	52	50	50	13.3	6.0	5.3	50.9	8.4	10	.84	
		62	60	60				59.3				
9-27	725	62	60	60	13.5	7.0	6.6	60.6	9.2	10	.92	
		72	70	70				69.8				
9-28	905	72	70	70	13.7	8.3	8.0	70.5	9.5	10	(.95)	
		82	Consol		13.7	8.3	8.0	80.0				
	910	62	42	42	4.0	21.5	21.5					
9-29	730	62	42	42	11.4	4.0	1.9					
		Perm										
	730	62	43	42	11.4	4.0	23.5				73.0	
		Perm										
10-2	1230	62	47	42	7.0	4.0	21.5				71.0	
10-3	730				7.2	4.3	21.5				70.5	
10-4	735				7.5	4.5	21.3				68.0	
10-5	800					4.7	21.1				71.0	
10-6	1145	72	57	52	9.4	4.9	21.0				69.0	
10-7	JOHN - increase the difference to 10 5070 62.52											

Permeability Test

Lab No. 065140

Client : Alameda County
 Project Name : SW Piles
 Project Number : 6257
 Boring Number : DE-1
 Sample Number : _____
 Depth (ft) : 590.5-591
 SigC = _____ psf = 20 psi
 Date tested : 7-22-06
 Tested by : JH
 Visual Classification : olive gray clay



Tube Type : 2" x 6" 2.43" x 6" 2.87" x 36"
 2.43" x 20" (circle one)

Sample conditions : Undisturbed or Remolded
 (circle one)

	Before Test	After Test	Trimming
Specimen Wt (gm) =	915.6		
Specimen Ht (in) =	5.98		
Dia (in) - top =	2.41		
- mid =	2.41		
- bot =	2.41		
Dish # =		FSM-7	
Wet soil + dish (gm) =		1097.7	
Dry soil + dish (gm) =		904.9	
Wt. of dish (gm) =		166.57	

Length of Tube _____

if sample was 2.43" x 20" or 2.87" x 36" sketch where sample was taken from in the tube

CELL NO. B-2

STATION NUMBER
PP-2B

Be sure you mark where the soil started and ended if the tube was not completely full to each end

Laboratory Test Data

Client: Alameda County Lab No. 066140
 Project: SW miles Job no.: 6269
 Boring No. DE-1 Sample No. _____ Depth. 590.5 - 591
 Classification: shale gray clay Type of test: perm SigC = 20
 Cell No. B2 (for perms only) Hydraulic Gradient= _____

		Applied Pressure (psi)			Burette Readings (c.c.)			STATION NO. <u>PP-2B</u>				
Date	Time	Cell	Back (bot.)	Back (top)	Cell	Head	Tail	P.W.P. (psi)	Chg. in P.W.P.	Chg. in Cell P.	"B" Value	Notes
9-12	1215	0	0	0	07	3.3	4.1					
	1235	2	0	0	3.4	0.5	0.5	F/R	5.0			
9-25	1025	2	0	0	27	1.7	0.5	F/R				
	1045	2	0	0	10	1.0	0.8					
	1145	12	10	10	4.0	2.7	2.0					
	1245	22	20	20	6.3	3.5	2.5					
	1255	32	30	30	8.0	3.9	2.8					
	1455	42	40	40	9.2	4.3	3.2					
9-26	1220	52	50	50	7.7	6.0	5.8	50.3	7.3	10	.73	
		62	60	60				57.6				
9-27	725	62	60	60	7.5	7.2	7.0	59.6	8.5	10	.85	
		72	70	70				68.1				
9-28	910	72	70	70	7.2	8.1	8.1	69.9	8.9	10	.89	
		82	80	80				73.8				
9-29	720	82	80	80	7.5	8.7	8.0	79.9	9.2	10	.92	
		92	90	90				89.1				
10-2	1220	92	90	90	4.5	11.7	11.5	90.5	9.7	10	(.97)	
		102	Control		4.5	11.7	11.5	100.2				
	1225	62	42	42	3.0	19.5	19.7					
10-3	730	62	42	42	10.5	15.8	15.3					
		Perm										
	735	62	47	42	6.5	5.0	20.5				70.5	
10-4	735				13.3	4.2	18.8				68.0	
10-5	805				14.8	3.7	17.8				71.0	
10-6	1150	92	77	72	19.0	3.5	17.1				69.0	
10-8	1100	92	77	72	4.0	10.0	10.0	92	82/72			

November 3, 2006

NOV - 8 2006

REPORT NO: 06G158

STL NO.: 0018092
PO NO.: 36409 OS
A.C.W.D.
ENGINEERING DEPT.

REPORT TO: ALAMEDA COUNTY WATER DISTRICT
MR. DOUG YOUNG
43885 SOUTH GRIMMER BOULEVARD
FREMONT, CA 94538

PROJECT: GEO LAB - DOUG YOUNG
43885 SOUTH GRIMMER BOULEVARD
FREMONT, CA

SUBJECT: GEOTECHNICAL LABORATORY TESTING

REPORT FOR PROJECT NO.29748

Our firm has performed laboratory testing for the above referenced project. Please see the attached laboratory data sheets for test information.

We trust that this information will meet your needs at this time. If additional information is required, or if we can be of further assistance, please do not hesitate to contact our office.

Respectfully submitted,
SIGNET TESTING LABORATORIES, INC.

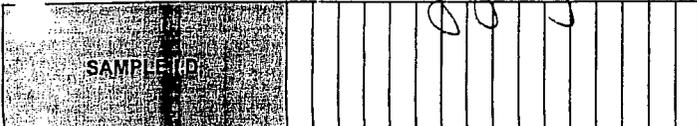

Patricia Slavin-Hodgkins
Geotechnical Laboratory Manager

PMH/kv

cc: ALAMEDA COUNTY WATER DISTRICT/MR. DOUG YOUNG
* FILE COPY*

PROJECT: Alameda County Water District STL NO: 0018092
 REQUESTED BY: Sung Young

DATE RECEIVED: 10-19-06
 DATE DUE: _____
 DATE COMPLETED: 11-2-06
 Client's P.O. #: _____
 Client's Project #: 29748
 Client's Project Name: SW Males Cone MW Project



Lab Use ONLY

Test Description	Work To Be Performed	Remarks	Code	QTY	Price	Subtotal
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Test Description	Work To Be Performed	Remarks	Code	QTY	Price	Subtotal
INDEX TESTS						
Moisture			2221			
Moisture/Density "U" Type			2222			
Moisture/Density Piston			2223			
Moisture/Density Shelby/Pitcher			2224			
Liquid & Plastic Limits (Dry)			2225			
Liquid & Plastic Limits (Wet)			2226			
% passing #200 sieve			2227			
Sieve (from 1/2" to #200)			2228			
Sieve (from 1" to #200)			2229			
Sieve (from 2" to #200)			2230			
Sieve plus Hydrometer			2231			
Specific Gravity			2232			
Organic Content			2233			
Visual Classification			2234			
Pinhole			2235			

COMPACTION TESTS						
Standard Proctor 4" mold			2237			
Standard Proctor 6" mold			2238			
Modified Proctor 4" mold			2239			
Modified Proctor 6" mold			2240			
Single Point 4" mold			2241			
Single Point 6" mold			2242			
Comp. Impact test (Call 216)			2243			
Relative Density (0.1 cu. ft.)			2244			

HYDRAULIC CONDUCTIVITY						
Rigid wall						
Constant head (spec ht. ~ 1")			2246			
Falling head (spec ht. ~ 1")			2247			
Additional stress level			2248			
Remold test specimen			2249			

Flexible wall						
Sandy soil			2250			
Clayey soil			2251			
Additional stress level			2252			
Remold test specimen			2253			
Compatibility			2254			

CONSOLIDATION PROPERTIES						
Consolidation (1 cycle 1 time rate)			2256			
Additional Time-Rate curve			2257			
Unload-Reload cycle			2258			
Trim to test from 3" sample			2259			
Remold test specimen			2260			
Expansion Index			2261			
% Swell			2262			
% Collapse			2263			
Shrink-Swell			2264			
Expansion pressure			2265			

STRENGTH TESTS						
R-Value			4232			
Unconfined compression			2267			
Plane shear w/MD			2268			
Triaxial Penetrometer			2269			

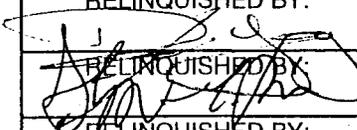
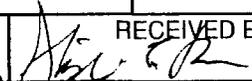
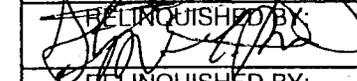
Triaxial Compression						
Unconsolidated-Undrained UU			2270			
Consolidated-Undrained CU			2271			
Consolidated-Undrained with PP			2272			
Consolidated-Drained CD (sandy)			2273			
Consolidated-Drained CD (clayey)			2274			
Prep. For 3" dia. Specimen			2275			
Remold for test specimen			2276			
Multi-stage, ea. Add. Stress level			2277			

Direct Shear						
Unconsolidated-Undrained UU			2278			
Consolidated-Undrained CU			2279			
Consolidated-Drained CD (sandy)			2280			
Consolidated-Drained CD (clayey)			2281			
Prep. For 3" dia. Specimen			2282			
Remold for test specimen			2283			
Multi-stage, ea. Add. Stress level			2284			
Re-load cycle			2285			

Billing Notes:					TOTAL	
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**Alameda County Water District
Chain of Custody**

066.58

Project: SW SW Niles Canal MW Project Project #: 29748 29748 Sampler ID: DE1-D1 @ 461 feet				Sample Matrix S= Soil W = Water	Type of Container	Number of Containers	Metals ACTM Methy D-508 Permeability Test	Comments
ID #	Date	Time	Sampling Location					
1	10/18/06	13:00	DE1-D1					
 (This section of the table is crossed out with a diagonal line.) 								
Field Conditions (weather, etc.)				Field Procedures (Preservation, Quality Control, etc.)				
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:		LABORATORY COMMENTS: (SAMPLE CONDITION, PRESERVATION, ETC.) Send Results D. Young @ acwd.			
	10/19/06	8:50 am						
	10/19/06	1455						
RELINQUISHED BY:	DATE:	TIME:	RECEIVED FOR LAB BY:					

PERMEABILITY TEST (ASTM D5084-90, method C ,--

Client : Alameda County
 Project : SW Niles Cone MW
 Job # : 29748
 Boring # : DE-1
 Sample # : D-1
 Depth (ft) : 461
 Date setup for test : 10/20/06
 Soil type : Olive gray clay

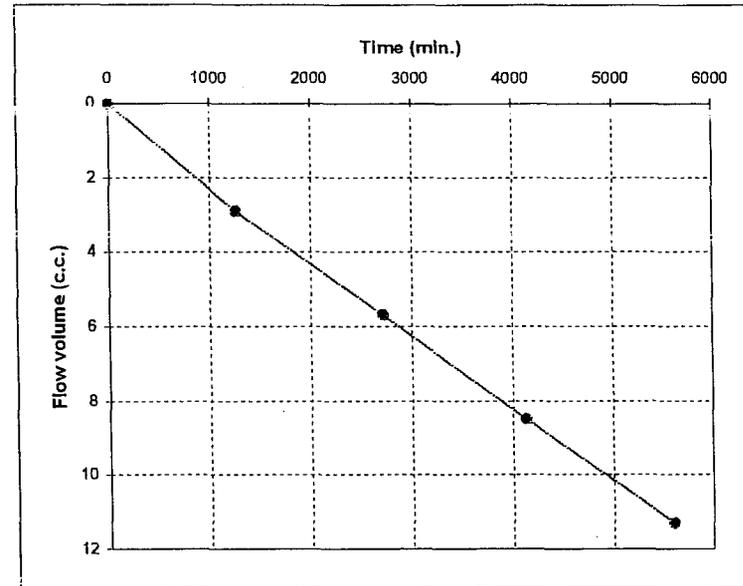
Specimen:

	<u>Initial</u>	<u>Final</u>	
Total wt. =	931.2	918.8	gms
Ht. =	6.000	5.996	in
Ave dia. =	2.410		in
Area =	4.564	4.557	sq.in
Volume =	448.7	447.7	c.c.
Moisture =	22.6	20.9	%
Total density =	129.5	128.1	pcf
Dry density =	105.7	105.9	pcf
Gs (Assumed) =	2.70		
Void ratio =	0.594	0.591	
% Saturation =	102.4	95.6	

	<u>Head</u>	<u>Tail</u>	
Area of pipettes =	0.865	0.875	sq. cm.

Sig3 = 20

Data reductions:	<u>Elapsed Time (min)</u>	<u>Inflow (c.c.)</u>	<u>Outflow (c.c.)</u>	<u>Inflow / Outflow</u>	<u>h1 (cm)</u>	<u>h2 (cm)</u>	<u>Ln(h1/h2)</u>	<u>Rt</u>	<u>Gradient</u>	<u>K20 (cm/sec)</u>
	1260.0	2.50	2.90	0.86	718.7	712.5	0.00867	0.953	47.0	2.46E-08
	1455.0	2.80	2.80	1.00	712.5	706.1	0.00907	0.974	46.6	2.28E-08
	1420.0	2.90	2.80	1.04	706.1	699.5	0.00932	0.987	46.2	2.43E-08
	1470.0	2.80	2.80	1.00	699.5	693.1	0.00924	0.974	45.7	2.30E-08
	1430.0	2.70	2.70	1.00	693.1	686.9	0.00900	0.960	45.3	2.27E-08



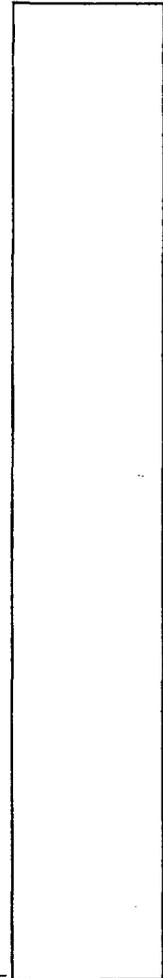
Overall average: 2.35E-08

Permeability Test

Lab No. 066158

Client : Alameda County
 Project Name : SW miles Case MW
 Project Number : 29748
 Boring Number : DE1
 Sample Number : D1
 Depth (ft) : 461
 SigC = _____ psf = 20 psi
 Date tested : 10-20-06
 Tested by : JH
 Visual Classification : olive gray clay

TOP



Tube Type : 2" x 6" 2.43 x 6" 2.87" x 36"
 2.43" x 20" (circle one)

Sample conditions : Undisturbed or Remolded
 (circle one)

	Before Test	After Test	Trimming
Specimen Wt (gm) =	931.2		
Specimen Ht (in) =	6.00		
Dia (in) - top =	2.41		
- mid =	2.41		
- bot =	2.41		
Dish # =		F50.7	
Wet soil + dish (gm) =		1085.4	
Dry soil + dish (gm) =		926.4	
Wt. of dish (gm) =		166.57	

Length of Tube _____

BOTTOM

if sample was 2.43" x 20" or 2.87" x 36" sketch where sample was taken from in the tube

CELL NO. 2

STATION NUMBER
PP-5P

Be sure you mark where the soil started and ended if the tube was not completely full to each end

Laboratory Test Data

Client: Alameda County Lab No. 066158
 Project: San Diego Canal MW Job no.: 29748
 Boring No. D1 Sample No. D1 Depth. 761
 Classification: olive gray clay Type of test: Perm SigC = 20
 Cell No. 3 (for perms only) Hydraulic Gradient =

		Applied Pressure (psi)			Burette Readings (c.c.)			STATION NO. <u>PP-SP</u>				
Date	Time	Cell	Back (bot.)	Back (top)	Cell	9.10 Head	9.00 Tail	P.W.P. (psi)	Chg. in P.W.P.	Chg. in Cell P.	"B" Value	Notes
10-20-06	915	0	0	0	0.6	1.2	3.1					
	925	2	0	0	4.7	0.5	0.5	F/R	Seep			
10-23	835	2	0	0	6.0	1.0	0.5	F/R				
	950	2	0	0	6.1	0.6	1.1					
	1000	12	10	10	7.9	2.1	3.0					
	1150	22	20	20	9.3	4.6	5.5					
	1200	32	30	30	10.7	5.3	6.0					
	1320	42	40	40	12.1	7.0	6.4					
10-24	810	52	50	50	13.5	9.3	7.5	50.8	9.1	10	.91	
		62	60	60				59.9				
10-25	805	62	60	60	15.2	15.4	8.5	60.7	4.5	10	(.95)	
		72	60	60				70.2				
	815	62	42	42	6.0	22.0	19.7					
10-26	730	62	42	42	23.0	17.0	13.7					
		Perm										
	735	62	53	52	9.0	7.0	21.0				72.5	
		Restart Perm										
10-26	1035	62	52	42	7.5	8.0	21.5				72.5	
10-27	735	62	52	42		10.5	18.6				71.0	
10-28	750					13.3	15.8				69.5	
10-29	730					16.2	13.0				69.0	
10-30	850					19.0	10.2				71.5	
10-31	750					21.7	7.5				71.0	

February 8, 2007

REPORT NO: 07G013

STL NO.: 0018092
PO NO.: 36409 OS

REPORT TO: ALAMEDA COUNTY WATER DISTRICT
MR. DOUG YOUNG
43885 SOUTH GRIMMER BOULEVARD
FREMONT, CA 94538

RECEIVED

FEB 13 2007

A.C.W.D.
ENGINEERING DEPT.

PROJECT: GEO LAB - DOUG YOUNG
43885 SOUTH GRIMMER BOULEVARD
FREMONT, CA

SUBJECT: GEOTECHNICAL LABORATORY TESTING

REPORT FOR PROJECT NO. 29748

Our firm has performed laboratory testing for the above referenced project. Please see the attached laboratory data sheets for test information.

We trust that this information will meet your needs at this time. If additional information is required, or if we can be of further assistance, please do not hesitate to contact our office.

Respectfully submitted,
SIGNET TESTING LABORATORIES, INC.



Patricia Slavin-Hodgkins
Geotechnical Laboratory Manager

PMH/kv

cc: ALAMEDA COUNTY WATER DISTRICT/MR. DOUG YOUNG
* FILE COPY*

SIGNET TESTING LAB
 ATTN: PATRICIA SLAVIN
 E-MAIL: PATRICIA_SLAVIN-HODGKINS@URSCORP.COM

3121 DIABLO AVENUE
 HAYWARD, CA 94545

(510) 887-3415
 FAX: (510) 732-5060
 LAB EXTENSION: 117

INFORMATION FROM CLIENT		DATES		SIGNET TESTING INFO	
Company Name <u>ALAMOR CO</u>		SAMPLES RECEIVED <u>1-17-07</u>		GEOTECH LAB NO <u>019013</u>	
Delivered By <u>Donna Young</u>		TEST REQUEST RECEIVED <u>1-17-07</u>		SOILS LAB NO _____	
Project Manager <u>Donna Young</u>		* PRELIMINARY NEEDED _____		STL NUMBER _____	
Phone Number <u>510-480-5152</u>		* FINALS NEEDED _____		PAGE <u>1</u> OF <u>1</u>	
Fax Number _____					
Email Address _____					
Project Name <u>SW New Center MUD Project</u>					
Project Number <u>29748</u>					

BORING NO	SAMPLE NO	DEPTH (ft)	Baggie 2.43 X 6"	SHELBY TUBE 2.43 X 20" 1.93 X 6"	Moisture Content	MC with Dry Density	% Passing No 200 Sieve	Sieve (No. 4-No.200)	Hydrometer	Plasticity Index	Unconfined Compression	Direct Shear	Consolidation with 1 TR	Triaxial-UU	Triaxial CU	Triaxial Perm	Compaction	R-value	LVS	Remold	Specific Gravity	Organic Content	Log Tube	
Atlanta (D)	D1	38.5																						
D1	N	9.5																						
D1		0.5																						
PAGE TOTALS					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PROJECT TOTALS																								
SIGNET BILLING					2221	2222	2227	2228	2231	2226	2267		2256	2270	2272	2251	4232				2232	2233		

SPECIAL INSTRUCTIONS:
 TXUU'S = Confining Pressure (PSF),
 DIRECT SHEAR = Normal Loads,
 CONSOLS = Time Rate Load,
 REMOLDING INSTRUCTIONS (i.e. ##% of MDD at OMC +##%), etc

20 psi conf gradient 10

**Alameda County Water District
Chain of Custody**

Project: SW Niles Core MW Project Project #: 29748 Sampler ID: Doug Young				Sample Matrix S = Soil W = Water	Type of Container	Number of Containers	Method D-584 Pice well perm Test. II	Comments									
ID #	Date	Time	Sampling Location	S	W	Type	No.	Meth.	Perm.	Test.	Other	Other	Other	Other	Other	Other	
AM-385	1/11/07	11:00	AutoMall DI-385	S			1										
DEI-N@ 91.5	1/16/07	9:38	DEI-N@ 91.5	S			1										
AM-512	1/16/07	12:15	AutoMall DI-512	S			1										
Field Conditions (weather, etc.) clear, cold.				Field Procedures (Preservation, Quality Control, etc.) None													
RELINQUISHED BY: _____			DATE: 1/17/07 TIME: 11:20		RECEIVED BY: _____			LABORATORY COMMENTS: (SAMPLE CONDITION, PRESERVATION, ETC.) Report results to Doug Young @ 510-668-4452									
RELINQUISHED BY: _____			DATE: TIME:		RECEIVED BY: _____												
RELINQUISHED BY: _____			DATE: TIME:		RECEIVED FOR LAB BY: _____												

DEI-N@
AM-512

PERMEABILITY TEST (ASTM D5084-90, method C)

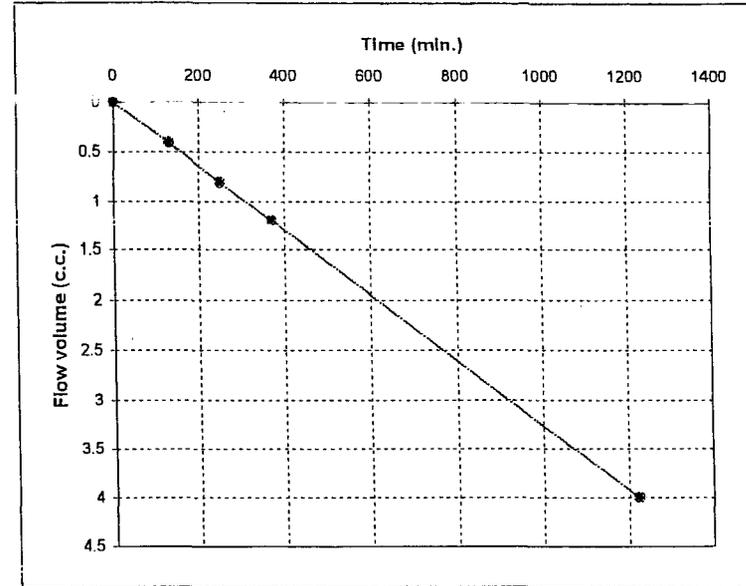
Client : Alameda County
 Project : SW Niles Cone MW
 Job # : 29748
 Boring # : Automall
 Sample # : D-1
 Depth (ft) : 385
 Date setup for test : 01/20/07
 Soil type : Olive gray clay

Specimen:

	<u>Initial</u>	<u>Final</u>	
Total wt. =	623.0	656.7	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 =	12.4	18.5	%
Total density =	130.0	137.5	pcf
Dry density =	115.6	116.0	pcf
Gs (Assumed) =	2.70		
Void ratio =	0.457	0.453	
% Saturation =	73.3	110.4	

	<u>Head</u>	<u>Tail</u>	
Area of pipettes =	0.869	0.865	sq. cm.

Sig3 = 20



Data reductions:	<u>Elapsed Time (min)</u>	<u>Inflow (c.c.)</u>	<u>Outflow (c.c.)</u>	<u>Inflow / Outflow</u>	<u>h1 (cm)</u>	<u>h2 (cm)</u>	<u>Ln(h1/h2)</u>	<u>Rt</u>	<u>Gradient</u>	<u>K20 (cm/sec)</u>
	130.0	0.50	0.40	1.25	723.9	722.8	0.00143	0.981	71.3	2.70E-08
	120.0	0.30	0.40	0.75	722.8	722.0	0.00112	0.968	71.2	2.25E-08
	120.0	0.50	0.40	1.25	722.0	721.0	0.00144	0.964	71.1	2.88E-08
	855.0	2.80	2.80	1.00	721.0	714.5	0.00900	0.984	70.7	2.58E-08
	150.0	0.40	0.40	1.00	714.5	713.6	0.00129	1.002	70.4	2.15E-08

Overall average: 2.52E-08

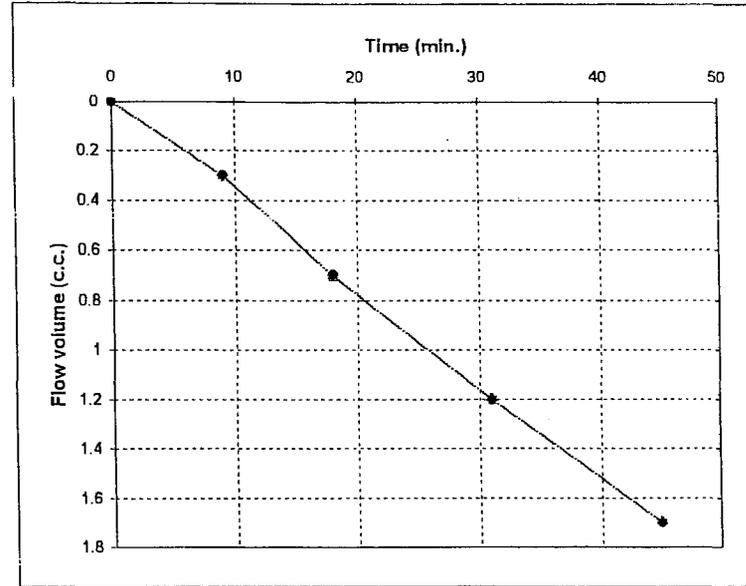
PERMEABILITY TEST (ASTM D5084-90, method C)

Client : Alameda County
 Project : SW Niles Core MW
 Job # : 29748
 Boring # : Automall
 Sample # : D1
 Depth (ft) : 512
 Date setup for test : 01/23/07
 Soil type : Dark grayish brown sandy silt with clay

Specimen:

	<u>Initial</u>	<u>Final</u>	
Total wt. =	426.3	423.5	gms
Ht. =	2.710	2.706	in
Ave dia. =	2.413		in
Area =	4.576	4.561	sq.in
Volume =	203.2	202.2	c.c.
Moisture =	21.5	20.7	%
Total density =	130.9	130.7	pcf
Dry density =	107.7	108.2	pcf
Gs (Assumed) =	2.70		
Void ratio =	0.564	0.556	
% Saturation =	103.0	100.6	
	<u>Head</u>	<u>Tail</u>	
Area of pipettes =	0.877	0.877	sq. cm.

Sig3 = 20



Data reductions:	<u>Elapsed Time (min)</u>	<u>Inflow (c.c.)</u>	<u>Outflow (c.c.)</u>	<u>Inflow / Outflow</u>	<u>h1 (cm)</u>	<u>h2 (cm)</u>	<u>Ln(h1/h2)</u>	<u>Rt</u>	<u>Gradient</u>	<u>K20 (cm/sec)</u>
	9.0	0.50	0.30	1.67	722.8	721.9	0.00126	1.029	105.1	2.46E-07
	9.0	0.50	0.40	1.25	721.9	720.8	0.00142	1.028	105.0	2.77E-07
	13.0	0.50	0.50	1.00	720.8	719.7	0.00158	1.025	104.8	2.13E-07
	14.0	0.50	0.50	1.00	719.7	718.6	0.00159	1.019	104.6	1.97E-07
	14.0	0.50	0.50	1.00	718.6	717.4	0.00159	1.013	104.5	1.96E-07

Overall average: 2.26E-07

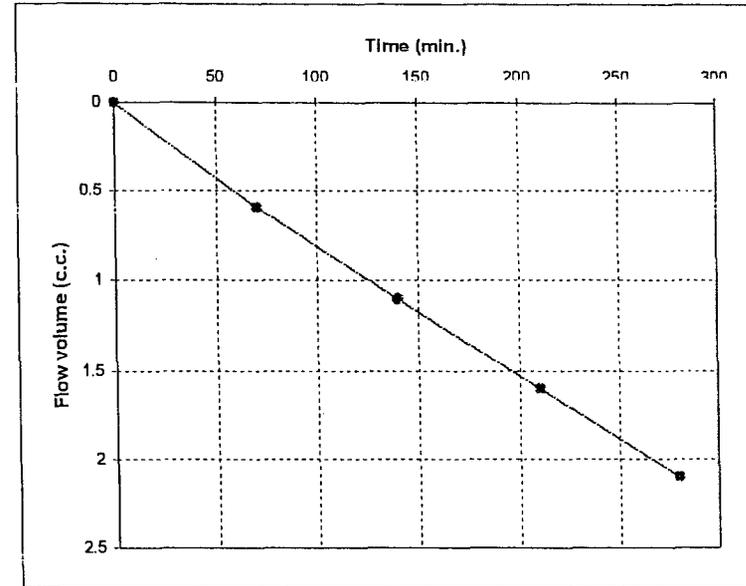
PERMEABILITY TEST (ASTM D5084-90, method C)

Client : Alameda County
 Project : SW Niles Cone MW
 Job # : 29748
 Boring # : DE1
 Sample # : N
 Depth (ft) : 91.5
 Date setup for test : 01/22/07
 Soil type : Olive gray clay

Specimen:

	<u>Initial</u>	<u>Final</u>	
Total wt. =	289.6	275.1	gms
Ht. =	1.800	1.796	in
Ave dia. =	2.407		in
Area =	4.551	4.528	sq.in
Volume =	134.2	133.2	c.c.
Moisture =	28.2	21.7	%
Total density =	134.6	128.9	pcf
Dry density =	105.1	105.8	pcf
Gs (Assumed) =	2.70		
Void ratio =	0.604	0.592	
% Saturation =	126.0	99.2	
	<u>Head</u>	<u>Tail</u>	
Area of pipettes =	0.969	0.971	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)
	70.0	0.60	0.60	1.00	691.5	690.3	0.00179	1.003	151.5	3.24E-08
	70.0	0.50	0.50	1.00	690.3	689.2	0.00150	0.992	151.2	2.67E-08
	70.0	0.50	0.50	1.00	689.2	688.2	0.00150	0.981	151.0	2.65E-08
	70.0	0.50	0.50	1.00	688.2	687.2	0.00150	0.974	150.8	2.63E-08
	70.0	0.50	0.50	1.00	687.2	686.1	0.00150	0.970	150.6	2.63E-08

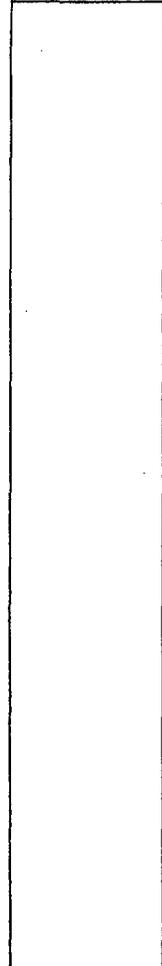
Overall average: 2.76E-08

Permeability Test

Lab No. 09G013

Client : Alameda Co. Water District
 Project Name : SW Nitrate Control Project
 Project Number : 29748
 Boring Number : Autumn
 Sample Number : 21
 Depth (ft) : 345'
 SigC = _____ psf = 20 psi
 Date tested : 1-20-07
 Tested by : JH
 Visual Classification : olive gray clay

TOP



Tube Type : 2" x 6" (2.43 x 6") 2.87" x 36"
 2.43" x 20" (circle one)

Sample conditions : (Undisturbed) or Remolded
 (circle one)

	Before Test	After Test	Trimming
9345 Specimen Wt (gm) =	623.0 ✓		
6.00 Specimen Ht (in) =	4.00 ✓		
Dia (in) - top =	2.41 ✓		
- mid =	2.41 ✓		
- bot =	2.41 ✓		
Dish # =		VXS	
Wet soil + dish (gm) =		879.4 ✓	
Dry soil + dish (gm) =		776.83 ✓	
Wt. of dish (gm) =		222.66 ✓	

Length of Tube _____

BOTTOM

if sample was 2.43" x 20" or 2.87" x 36" sketch where sample was taken from in the tube

CELL NO. _____

STATION NUMBER

PP-14P

Be sure you mark where the soil started and ended if the tube was not completely full to each end

Laboratory Test Data

Client: Am... Lab No 076013
 Project: ... Job no.: 20112
 Boring No. ... Sample No. 01 Depth 325'
 Classification: olive gray clay Type of test: Perm SigC = 20
 Cell No.: _____ (for permission only) Hydraulic Gradient = _____

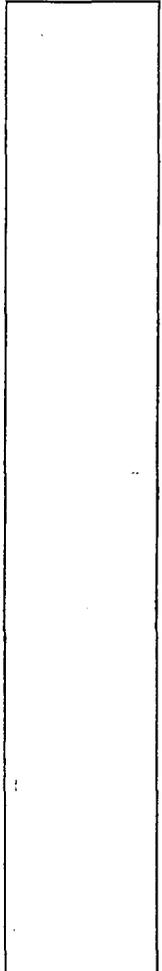
		Applied Pressure (psi)			Burette Readings (c.c.)			STATION NO. <u>PP-14P</u>				
Date	Time	Cell	Back (bot.)	Back (top)	Cell	Head 9.06	Tail 9.10	P.W.P. (psi)	Chg. in P.W.P.	Chg. in Cell P.	"B" Value	Notes
1-20	840	0	0	0	15	24	35					
	910	2	0	0	54	05	05	F/R	Seep			
1-22	700	2	0	0	92	10	05	F/R				
	740	2	0	0	40	05	09					
	840	12	10	10	6.2	3.5	2.0					
	940	22	20	20	7.8	4.7	2.2					
	1040	32	30	30	9.5	5.5	2.5					
	1140	42	40	40	10.9	6.0	2.6					
1-23	720	52	50	50	13.8	7.0	2.9	50.9	8.7	10	87	
	730	52	60	60	14.0	7.1	3.0	59.6				
1-24	715	62	60	60	14.2	7.7	3.1	60.9	9.3	10	93	
		72	70	70				70.2				
1-25	745	72	70	70	15.8	8.3	3.3	70.8	9.5	10	95	
		82						80.3				
		Consol										
	750	72	52	52	47	20.0	20.5					
1-26	840	72	52	52	16.2	12.0	17.3					
		Perm										
	842	72	62	52	16.2	3.0	22.0					20.0 c
	1035					4.0	21.7					20.5 v
	1245					4.5	21.3					21.4 v
	1445					4.8	20.9					21.6 v
	1645					5.3	20.5					21.7 v
1-27	700					8.1	17.7					20.0 v
	930					8.5	17.3					20.2 v
1-28	900					13.0	13.0					19.8

Permeability Test

Lab No. 079013

Client : Alameda Co. Water District
 Project Name : San Nicas Court MLW Project
 Project Number : 29748
 Boring Number : 907013
 Sample Number : 21
 Depth (ft) : 5.2
 SigC = _____ psf = 20 psi
 Date tested : 1-23-07
 Tested by : PHBC
 Visual Classification : DARK BROWN SANDY SILT W/CLAY

TOP



Tube Type : 2" x 6" 2.43 x 6" 2.87" x 36"
 2.43" x 20" (circle one)

Sample conditions : Undisturbed or Remolded
 (circle one)

	Before Test	After Test	Trimming
Specimen Wt (gm) =	<u>426.38</u>		
Specimen Ht (in) =	<u>2.71</u>		
Dia (in) - top =	<u>2.42</u>		
- mid =	<u>2.40</u>		
- bot =	<u>2.42</u>		
Dish # =		<u>12</u>	
Wet soil + dish (gm) =		<u>719.48</u>	
Dry soil + dish (gm) =		<u>646.73</u>	
Wt. of dish (gm) =		<u>295.94</u>	

Length of Tube _____

BOTTOM

if sample was 2.43" x 20" or 2.87" x 36" sketch where sample was taken from in the tube

Be sure you mark where the soil started and ended if the tube was not completely full to each end

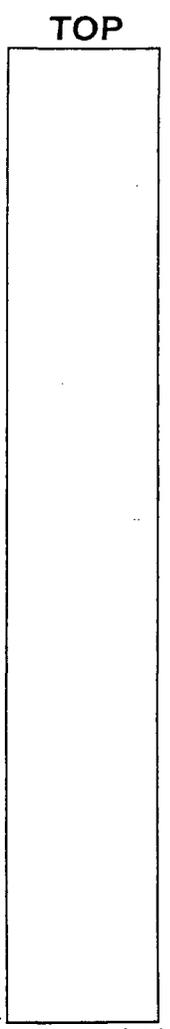
CELL NO. _____

STATION NUMBER _____

Permeability Test

Lab No. 07G013

Client : Alameda Co. Water District
 Project Name : SW Niles Coal Field Project
 Project Number : 209742
 Boring Number : DS1
 Sample Number : N
 Depth (ft) : 0.15
 SigC = _____ psf = 2.0 psi
 Date tested : 1-22-07
 Tested by : JH
 Visual Classification : olive gray clay



Tube Type : 2" x 6" 2.43 x 6" 2.87" x 36"
 2.43" x 20" (circle one)

Sample conditions : Undisturbed or Remolded
 (circle one)

556.4
 5.80
 → 566.76

	Before Test	After Test	Trimming
Specimen Wt (gm) =	289.6		
Specimen Ht (in) =	1.80		
Dia (in) - top =	2.40		
- mid =	2.41		
- bot =	2.41		
Dish # =		16	
Wet soil + dish (gm) =		578.51	
Dry soil + dish (gm) =		529.36	
Wt. of dish (gm) =		303.37	

Length of Tube _____

if sample was 2.43" x 20" or 2.87" x 36" sketch where sample was taken from in the tube

CELL NO. 1
 STATION NUMBER
PP-1

Be sure you mark where the soil started and ended if the tube was not completely full to each end

