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June 30, 2006

Mr. Chris Guerre
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Subject: Interim Measures 2006 Well Drilling Investigation Report
Pacific Gas and Electric Company, Topock Project

Dear Guerre:

This letter transmits the *Interim Measures 2006 Well Drilling Investigation Report* for the well installation, sampling, and hydraulic testing activities conducted from February through May 2006 at the Pacific Gas and Electric Company (PG&E) Topock site. The primary objective of the 2006 IM drilling and investigation program was to provide additional monitoring wells to assess hydraulic gradients associated with the expanded IM groundwater extraction system and to provide further characterization of the hydrogeology in the floodplain and performance monitoring area. During the 2006 IM drilling program, 17 new wells were installed at eight locations on the floodplain and adjoining area at the Topock site.

If you have any questions, please do not hesitate to contact me. I can be reached at (805) 546-5243.

Sincerely,

cc: Kate Burger/DTSC

Interim Measures 2006 Well Drilling Investigation Report

**PG&E Topock Compressor Station
Needles, California**

Prepared for
**California Department of Toxic Substances
Control**

On Behalf of
Pacific Gas and Electric Company

June 30, 2006

CH2MHILL
155 Grand Avenue, Suite 1000
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Interim Measures 2006 Well Drilling Investigation Report

PG&E Topock Compressor Station Needles, California

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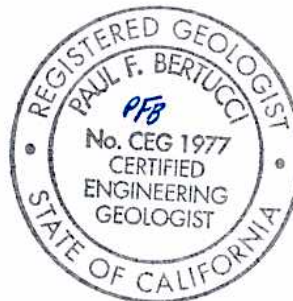
On Behalf of
Pacific Gas and Electric Company

June 30, 2006

This report was prepared under the supervision of a
California-certified Engineering Geologist



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Acronyms and Abbreviations

µg/L	micrograms per liter
µS/cm	microSiemens per centimeter
bgs	below ground surface
BLM	United States Bureau of Land Management
BTOC	below top of casing
CACA	Corrective Action Consent Agreement
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	constituent of concern
Cr(T)	total dissolved chromium
Cr(VI)	hexavalent chromium
DTSC	California Department of Toxic Substances Control
ft	feet
GMP	groundwater and surface water monitoring program
gpm/ft	gallons per minute per foot
HNWR	Havasu National Wildlife Refuge
IM	Interim Measures
MCL	maximum contaminant level
mg/L	milligrams per liter
MLU	Multi-Layer Unsteady state software
msl	mean sea level
ORP	oxidation-reduction potential
PG&E	Pacific Gas and Electric Company
PMP	Performance Monitoring Program
PST	Pacific Standard Time

PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act of 1976
RFI	RCRA facility investigation
RI	Remedial Investigation
TDS	total dissolved solids
TOC	total organic carbon
TSS	total suspended solids
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is implementing an Interim Measure (IM) to address chromium concentrations in groundwater at PG&E's Topock Compressor Station near Needles, California. The IM consists of groundwater extraction for hydraulic control of the plume boundaries near the Colorado River floodplain and management of extracted groundwater. The groundwater extraction, treatment, and injection systems are collectively referred to as Interim Measure No. 3 (IM No. 3). The IM No. 3 facilities include a groundwater extraction system, conveyance piping, a groundwater treatment plant, and an injection well field for the discharge of the treated groundwater. Figure 1-1 shows the location of the Topock site and the IM extraction, conveyance, treatment, and injection facilities.

In a letter dated October 17, 2005, the California Department of Toxic Substances Control (DTSC) directed PG&E to prepare a well installation work plan that addressed modifications to the IM performance monitoring program (DTSC 2005). Specific objectives for the work plan included the installation of additional monitoring wells for hydraulic gradient evaluation of the expanded IM extraction system and additional plume characterization in the floodplain area of the Topock site. The IM drilling, well installation, hydrogeologic investigation, sampling, and testing activities are collectively referred to as the 2006 IM performance monitoring well drilling investigation (2006 IM drilling program).

The well drilling and hydrogeologic investigations were conducted during February through May 2006 following DTSC approval of the work plan and supplements. This report summarizes the 2006 IM drilling program and presents the results of the drilling, well installation, initial groundwater sampling, and hydraulic testing activities.

1.1 Project Documents and Approvals

PG&E submitted a *Well Installation Work Plan for Interim Measures Performance Monitoring Program* (IM Work Plan) on November 30, 2005 (CH2M HILL 2005a), in compliance with DTSC's October 2005 letter, which described the objectives, scope and rationale for modifications to the IM performance monitoring well network. The drilling program described in the work plan involved the installation of monitoring well clusters at three locations (A, B, and C) on the western floodplain of the Colorado River near the PG&E Topock Compressor Station.

The scope of work presented in the IM Work Plan was conditionally approved by DTSC in a letter dated January 6, 2006 (hereafter referred to as the "DTSC approval letter") (DTSC 2006a). DTSC's conditional approval required further groundwater investigation, and installation of wells at up to five additional locations in the IM performance monitoring area. Their approval indicated that the activities were covered by California Environmental Quality Act (CEQA) emergency exemptions issued by DTSC previously on February 10, 2004 and June 30, 2004.

Technical Addendum No. 1: Well Installation Work Plan for Interim Measures Performance Monitoring was submitted on January 27, 2006 (CH2M HILL 2006a); it described the five proposed additional well locations (Locations 1-5), well drilling/completion plan, and the anticipated schedule for the field work, in compliance with Condition 9 of DTSC's approval letter. Conditional approval was granted by DTSC in a February 8, 2006 letter (DTSC 2006b). Similar to the January 6, 2006 letter, DTSC approval was provided consistent with prior CEQA exemptions.

In compliance with Condition 10 of DTSC's approval letter, a *Technical Addendum No. 2: Well Installation Work Plan for Interim Measures Performance Monitoring* was submitted on February 7, 2006 that described the proposed hydraulic testing activities for wells installed at Locations 1, 2, and 4 (CH2M HILL 2006b). DTSC provided conditional approval of the Technical Addendum No. 2 on May 3, 2006 (DTSC 2006c).

A *Supplement to Technical Addendum No. 2: Well Installation Work Plan for Interim Measures Performance Monitoring* was submitted on March 15, 2006 (CH2M HILL 2006c) which presented the plan for initial characterization sampling and laboratory analysis for new monitoring wells installed at Locations 1 through 5. This supplement fulfilled Condition No. 7 in the February 8, 2006 DTSC letter. DTSC provided approval to the supplement in an e-mail dated March 17, 2006.

1.2 Additional Authorizations and Approvals

Planning for this drilling effort involved coordination with the U.S. Bureau of Land Management (BLM), California Department of Fish and Game (CDFG), U.S. Fish and Wildlife Service Havasu National Wildlife Refuge (HNWR), and the County of San Bernardino. The BLM authorized the well installation at locations A, B, and C in a letter dated January 24, 2006 (BLM 2006a) consistent with the November 2005 work plan (CH2M HILL 2005a). BLM authorized the well installation at locations 1, 2, 3, 4, and 5 in a letter dated February 21, 2006 (BLM 2006b), which also provided approval for activities on the HNWR (well sites 4 and 5). As noted in the BLM approval letters, the well installations were within the scope of Action Memorandum No. 3, dated September 17, 2004, by which BLM authorized a time critical removal action pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

An excavation permit for work affecting the National Trails Highway was submitted on February 24, 2006 to the San Bernardino County Department of Public Works for well installation work at Location 4 (MW-51) and pump tests at Locations 2 and 4.

PG&E provided after-the-fact notification to the CDFG consistent with the CEQA emergency exemptions issued by DTSC on February 10, 2004 and June 30, 2004. In addition, San Bernardino County well permits were obtained before work started at each new monitoring well location.

Prior to moving equipment onto BLM and Havasu National Wildlife Refuge properties, the drilling sites and the access routes were surveyed for biological and cultural resources, and mitigation measures were established to protect these resources during the drilling activities.

1.3 Purpose and Objectives

The primary objectives of the 2006 IM drilling program were to install new groundwater monitoring wells to address expansion and modifications to the IM performance monitoring network in the floodplain area of the Topock site. In addition, initial water quality characterization was performed at all of the new wells, and hydraulic testing was conducted at several wells. The purpose of this report is to present the results and document the hydrogeologic logging, groundwater quality sampling, installation, development, and testing of 15 new monitoring wells and two test wells that were installed for the 2006 IM drilling program. Figure 1-2 shows the locations of eight investigation sites where the new groundwater wells were installed: MW-44, MW-45, MW-46, MW-47/TW-4, MW-48, MW-49, MW-50/TW-5, and MW-51.

The 2006 IM drilling program was conducted from February through May 2006. This report fulfills the deliverable requirements of the November 2005 IM Work Plan and subsequent addendums and supplement by providing documentation of:

- Soil boring logs and monitoring well completion logs.
- Results of borehole depth-specific groundwater sampling and field logging.
- Cased-hole geophysical logging in selected wells.
- Groundwater analytical results of the initial water quality characterization sampling.
- Results from hydraulic testing of selected wells.

2.0 Background

This section provides brief descriptions of the floodplain study area and the general site hydrogeology as background for this report.

2.1 Site Description

The 2006 IM drilling program was conducted in and adjacent to the Colorado River floodplain. The floodplain is located northeast of the PG&E Topock Compressor Station and east of the station access road. Figures 1-1 and 1-2 show the site features and locations of the wells and facilities in the floodplain and adjoining areas.

As directed by the DTSC under IM No. 3, PG&E is currently pumping groundwater from two extraction wells (PE-1 and TW-3D). The combined pumping rate from the two extraction wells is approximately 135 gallons per minute (gpm). PE-1 is located on the floodplain approximately 250 feet from the Colorado River. TW-3D is located on a topographic bench along the station access road and above the Colorado River floodplain (Figure 1-2). The bench, referred to as the monitoring well MW-20 bench, is owned by the U.S. Bureau of Reclamation and is managed by the BLM. All of the new IM monitoring wells are located on BLM property, with the exception of Locations 4 and 5 (MW-48 and MW-51), which are located on HNWR property.

2.2 Previous Investigations and Monitoring Activities

From 1997 through June 2004, five phases of the RCRA (Resource Conservation and Recovery Act of 1976) facility investigation (RFI) investigations were completed at the Topock site. A total of 56 groundwater monitoring wells and three groundwater test/extraction wells were installed. A summary and results of the RFI hydrogeologic studies, including the RFI drilling investigations in the IM-3 Injection Area, are presented in PG&E's *Draft RCRA Facility Investigation/Remedial Investigation Report* (the RFI/RI Report; CH2M HILL 2005b).

As part of the IM, groundwater and hydrogeologic investigations in the floodplain area were conducted by PG&E in April-May 2004 (Phase 1) and January-February 2005 (Phase 2). Twenty-two monitoring wells were installed at 8 locations in Phase 1 (MW-28, MW-31 and MW-35 through MW-40). The results of the Phase 1 investigation were reported in the February 2005 RFI/RI Report (CH2M HILL 2005b). After the sampling results from the Phase 1 wells became available, potential data gaps were identified. The Phase 2 wells installed to address those data gaps consisted of eleven monitoring wells installed in five locations (MW-27, MW-33, MW-34, MW-42, and MW-43). The results of the Phase 2 investigation and associated installation of IM extraction well PE-1 were presented in separate well installation reports (CH2M HILL 2005c, 2005d).

Monitoring wells on and around the floodplain are routinely sampled under the Groundwater and Surface Water Monitoring Program (GMP) and the IM Performance

Monitoring Program (PMP). The GMP and IM Performance Monitoring Reports (CH2M HILL 2006d, 2006e) present the groundwater sampling results and groundwater level data collected from monitoring wells in the floodplain and 2006 IM drilling area.

2.3 Site Hydrogeology and Hydrostratigraphic Units

For background to this report, the following hydrogeologic summary has been excerpted from the February 2005 Draft RFI/RI Report (CH2M HILL 2005b).

The geology at the Topock site is characterized by bedrock basement formations (pre-Tertiary metamorphic/igneous rocks and consolidated Miocene Conglomerate) overlain by younger sedimentary deposits. Near-surface sedimentary units include Tertiary and Quaternary to Recent-age alluvial fan deposits, Pliocene lacustrine deposits, and Tertiary and Quaternary to Recent-age fluvial deposits of the Colorado River. Table 2-1 presents a summary of the bedrock and alluvial and fluvial hydrostratigraphic units at the Topock site. The overall site hydrostratigraphic units and terminology summarized in Table 2-1 is consistent with the site hydrogeology discussion presented in the 2005 Draft RFI/RI report (CH2M HILL 2005b). However, the results of the recent 2006 IM drilling program have been used to refine and clarify the terminology and characteristics of some of the Tertiary Alluvium and fluvial hydrostratigraphic units. The specific changes and updates to the site hydrostratigraphy are discussed in the investigation results Section 4.1.

Groundwater occurs under unconfined to semi-confined conditions within the alluvial fan and fluvial sediments beneath most of the Topock site. The saturated portion of the alluvial fan and fluvial sediments are collectively referred as the Alluvial Aquifer. In the floodplain area adjacent to the Colorado River, the fluvial deposits interfinger with, and are hydraulically connected to, the alluvial fan deposits. The unconsolidated alluvial and fluvial deposits are underlain by the Miocene Conglomerate and pre-Tertiary metamorphic and igneous bedrock with very low permeability; therefore, groundwater movement occurs primarily in the overlying unconsolidated deposits.

The water table in the Alluvial Aquifer is very flat throughout the site and typically equilibrates to an elevation within two to three feet of the river level. Due to the variable topography at the site, the depth to groundwater ranges from as shallow as five feet below ground surface (bgs) in floodplain wells next to the river to approximately 170 feet bgs at the upland alluvial terrace areas.

The Colorado River has a strong influence on groundwater levels at the Topock site. The effects are most notable in the floodplain area, the IM extraction area, and adjacent inland area. The stage of the Colorado River varies both daily and seasonally in response to upstream dam discharges regulated for resource management and electricity production. The fluctuations in river stage cause the surface water-groundwater interaction in the floodplain to be very dynamic.

3.0 Summary of Field Activities

This section summarizes the drilling, well installation, and field sampling activities performed for the 2006 IM drilling program in the floodplain area. The drilling investigation included drilling, hydrogeologic logging/sampling of exploratory borings, geophysical logging, and the installation and groundwater sampling of 15 groundwater monitoring wells and two test wells at eight drilling sites. Figure 1-2 shows the locations of the new monitoring wells and test wells installed for this drilling program. The drilling and well installation activities were conducted from February 7 through May 4, 2006. The hydraulic testing activities at three well locations were conducted during May 10-13, 2006. The initial groundwater quality sampling, as defined in the IM Work Plan, was performed during the drilling and testing activities; and confirmation and follow-up groundwater sampling was conducted at the new wells as directed during the investigation by DTSC.

The well drilling and data collection activities completed for the 2006 IM drilling program included:

- Drilling, borehole logging, and depth-specific groundwater sampling in the pilot borings at seven locations: MW-44, MW-46, MW-47, MW-48, MW-49, MW-50, and MW-51. Selected logging was performed at the eighth location (MW-45).
- Installing, developing, and completing 15 new groundwater monitoring wells and two test wells at eight well locations: MW-44, MW-45, MW-46, MW-47, MW-48, MW-49, MW-50, and MW-51.
- Conducting initial groundwater sampling and analysis for water quality characterization of all new monitoring wells.
- Collecting cased-well geophysical logs at five of the well locations (MW-44, MW-46, MW-47, MW-49, and MW-50).
- Performing hydraulic tests of the aquifer at well locations TW-4, TW-5, and MW-51/MW-26.

The well drilling, installation, sampling activities, and hydraulic testing were conducted following the November 2005 IM Work Plan (CH2M HILL 2005a) and subsequent technical addendums and supplements (CH2M HILL 2006a, 2006b, 2006c).

Table 3-1 summarizes the drilling, logging, well installation, and sampling activities completed for this investigation. The drilling logs, well construction logs, survey results, hydrogeologic logging results, geophysical logging results, and hydraulic testing results are summarized and presented in Appendices A, B, and C. The results of the borehole depth-specific groundwater sampling and initial characterization groundwater sampling results are presented in Section 4.0.

3.1 Drilling and Borehole Logging

The primary objective of the drilling program was to establish a more comprehensive monitoring well network and further characterize the hydrogeology and water quality conditions in the floodplain area. Continuous coring and geologic logging were performed at the deepest borings at each of the drilling sites to provide detailed information on the hydrogeology in the investigation area.

Drilling was accomplished using roto-sonic drilling methods that involved advancing a rotating and vibrating drill head or core barrel through the subsurface. This method was selected because it produces a continuous core from the land surface to the target drilling depth; generates minimal drilling wastes; and typically can drill through gravel, cobble, and competent bedrock formations. The continuous cores obtained from sonic drilling were used to prepare core logs and collect subsurface soil samples, and were subsequently added to the IM drilling program core archive.

Lithologic descriptions for each of the deep borings were prepared under the supervision of a California-registered geologist based on visual inspection of the retrieved core.

Selected core samples were collected during drilling at approximately 10-foot intervals within the saturated zone, sealed in aluminized Mylar sleeves inside a nitrogen-filled glove box, and archived for potential future testing or analysis. This sample collection followed the *Work Plan for Collection of Additional Anaerobic Core Samples*, submitted to DTSC on February 7, 2006 (CH2M HILL 2006f) and conditionally approved in an e-mail from DTSC on February 9, 2006. Core samples for preservation were selected based on lithology, with zones that were different from the norm being targeted. Any obvious gray- or black-colored potential reducing zones were sampled along with any obvious aerobic zones. One core sample from the unsaturated zone was also preserved. These cores are being stored in a freezer for potential future studies of floodplain geochemistry or microbiology. Shelf life of the frozen samples preserved in this way is indefinite (CH2M HILL 2006f).

3.2 Borehole Depth-Specific Groundwater Sampling

3.2.1 Borehole Depth-Specific Groundwater Sampling

During drilling at the eight borings, groundwater samples were collected from the open borehole using the Isoflow® aquifer vertical profiling system, a special sampling system designed by the drilling contractor, Prosonic. Samples were collected by retracting the outer sonic casing to allow pumping from a 10-foot open borehole. Isoflow® samples were collected at intervals as short as 20 feet, the length of a joint of sonic pipe. Where feasible, a sample was collected from the zone just above the bedrock.

Depth-specific samples were obtained from an open section of borehole below the drive casing either by bailing or by pumping using the Isoflow® profiling system. The sampling pump incorporates a packer that is placed in the bottom of the temporary casing to isolate the open hole below the casing. Attached below the packer is a submersible pump enclosed in a short section of well screen. By using a packer to hydraulically isolate the sampling interval from the water standing in the temporary casing above, the purge volumes can be

minimized and representative samples can be obtained from a discrete section of the borehole.

Purging involved pumping one to three borehole volumes from the open borehole interval being sampled and monitoring the field parameters (temperature, pH, electrical conductivity, and oxidation-reduction potential [ORP]). After the field parameters stabilized and at least one borehole volume was removed, groundwater samples were collected for hexavalent chromium (Cr[VI]) analysis. The Cr(VI) analyses were conducted at the onsite field laboratory set up at the IM No. 3 treatment plant using the Hach colorimetric method. A sufficient quantity of sample was collected and filtered in the field so that confirmation samples could be sent to a certified laboratory if Cr(VI) was detected in any of the grab samples. Because the time of field sample collection and screening precluded laboratory analysis of these samples within the Cr(VI) 24-hour holding time, the confirmation samples were run for total dissolved chromium (Cr[T]) only. All groundwater grab samples were filtered in the field prior to preservation and analysis.

3.2.2 Borehole Water Level Measurements

Additional characterization of the Alluvial Aquifer was conducted as part of the depth-specific sampling activity. The Isoflow® sampling system was configured with a casing “segregation-block” (as opposed to an inflatable packer) to allow the measurement of water levels during 10-foot open hole intervals for qualitative assessment of aquifer permeability. The recording of drawdown response for each zone purged allowed for distinguishing low, medium, and higher permeability zones within the boreholes tested. Drawdown was measured during pumping with an electronic sounder. Pumping rate was measured by timing the filling of a bucket or measuring the depth of water in the purge tank. An estimate of specific capacity was obtained that can provide a relative measure of the permeability of the borehole at the depth of the sample. These data are considered screening level data for use in selecting more permeable zones for well screens. They are not considered suitable for more quantitative purposes such as model calibration.

3.3 Monitoring Well Installation and Installment

The well installation procedures were the same at each of the 15 monitoring wells and two test wells. After reaching total depth at each of the eight drilling locations, PG&E’s drilling team conferred with DTSC and the involved stakeholders regarding screen selection and gravel pack and screen size for the deep monitoring well. The selection of shallower screened intervals (if applicable) for that location and modifications of the gravel pack were also selected at the same time.

With three exceptions, the monitoring wells were constructed of 2-inch-diameter PVC well casing and screen. Well MW-49-135 was constructed of 1.5-inch-diameter PVC well casing so that 3 well casings could fit in one 10-inch borehole. A “paired dual-screen” well installation was completed at MW-45-95, which included a 2-inch diameter sampling well and a 1-inch diameter piezometer (for pressure transducer installation), both screened at the same interval. Monitoring well MW-51 was constructed of 4-inch PVC so that it could be used for hydraulic testing in addition to functioning as a groundwater monitoring well.

Two 4-inch-diameter test wells, TW-4 and TW-5, were installed at the MW-47 and MW-50 locations, respectively.

The well casing and screens were installed in the borehole through the sonic drill casing (approximate 10-inch outside diameter). The well completion logs, screen intervals, and other well information for these wells are summarized in Table 3-1 and in Appendix A2. Refer to the *Sampling, Analysis, and Field Procedures Manual* (CH2M HILL 2005e) for installation methods and field procedures.

Following well construction and annular seal placement, the monitoring wells were developed using a surge block, bailer, and submersible pump. During development, temperature, pH, specific conductance, and turbidity were measured using field instruments. Well development was continued until field parameters stabilized and turbidity was reduced to less than 50 nephelometric turbidity units.

3.4 Monitoring Well Groundwater Sampling

All new monitoring wells were sampled within 10 days after well development using a temporary adjustable-rate submersible pump, inertial pump (1.5-inch well), or a peristaltic pump (1-inch well). The pump intake was placed in the middle of the screened interval. The wells were purged and sampled using the casing-volume method purge rates to obtain representative groundwater samples from the aquifer zone and to be consistent with the existing monitoring wells in the floodplain.

Groundwater samples collected from the new monitoring wells were analyzed for Cr(VI), Cr(T), pH, specific conductance, total dissolved solids (TDS), alkalinity, cations (calcium, magnesium, potassium, sodium, boron, manganese, and iron), anions (chloride, nitrate, and sulfate), stable isotopes (oxygen 18 and deuterium), ammonia, and total organic carbon. Field water quality parameters (temperature, pH, specific conductance, ORP, dissolved oxygen, and turbidity) were also measured and recorded.

Groundwater sampling activities followed the procedures, analytical methods, reporting limits, and quality control plan used for the Topock groundwater and surface water monitoring program (GMP), as described in the *Sampling, Analysis, and Field Procedures Manual* (CH2M HILL 2005e). The Cr(VI) samples were filtered in the laboratory before analysis, while the Cr(T) and metal samples were filtered and preserved in the field, consistent with the GMP procedures.

3.5 Geophysical and Hydrogeological Logging

Following well development, geophysical logs were collected in the deepest 2-inch monitoring well or 4-inch test well completed at Site A (MW-44-125), Site C (MW-46-205), Location 1 (MW-50-200), Location 2 (TW-4), and Location 3 (MW-49-365). The geophysical logs run on the cased wells included natural gamma ray and induction/resistivity. Appendix B presents the geophysical logs along with sand-gravel logs and diagrams of the screened intervals installed in the wells.

The purpose of the geophysical logging was to further assess the hydrogeologic characteristics of the hydrostratigraphic units in the investigation area and supplement the hydrogeologic data set for site conceptual model.

3.6 Hydraulic Testing

Four-inch diameter wells TW-4, TW-5, and MW-51 were installed during the 2006 drilling program to conduct hydraulic tests and determine aquifer properties at three selected locations in the IM performance monitoring area (CH2M HILL 2006b). TW-4 was installed at the MW-47 well site, TW-5 was installed at the MW-50 well site, and MW-51 was installed south of the MW-20 bench, adjacent to monitoring well MW-26 (see Figure 1-2 for well locations and Table 3-1 for well construction data).

Hydraulic tests conducted May 10-13, 2006 included step drawdown and constant rate aquifer testing. During these days, temporary submersible pumps were installed in the wells and portable generators were used to conduct the pumping tests. The pumps and down-hole piping were installed into TW-5 and MW-51 using a truck-mounted hoist and winch. At TW-4, which is located on the floodplain and not truck-accessible, the pumps and down-hole piping were installed with a portable tripod/winch. Water was discharged into 4,800-gallon truck trailers, staged on secondary containment, as close to the wellhead as possible. The trailers then transported the discharged water to the IM No. 3 plant for treatment.

Discharge from the wells was routinely monitored in the field for sand content, pH, specific conductance, ORP, total dissolved solids and dissolved oxygen. Samples were also collected from the wells for laboratory analysis (see Section 3.4). The wells were sampled as follows:

- TW-5 was sampled following the step drawdown test on May 10, 2006.
- MW-51 was sampled following the constant rate test on May 12, 2006 (note that the test did not run to completion due to excessive drawdown).
- TW-4 was purged and sampled on May 18, 2006 as part of the GMP sampling program.

Additional details and the results of the hydraulic testing are provided in Section 4.4.

4.0 Investigation Results

This section presents the results of the drilling, hydrogeologic logging, water quality sampling, and hydraulic testing completed for the 2006 IM drilling program. More detailed analysis and interpretation of the investigation results, as well as integration of the data in the Topock site hydrogeologic conceptual model, will be provided in the upcoming *Groundwater Model Report* (CH2M HILL 2006g) and Volume 2 of the RFI/RI Report: *Hydrogeologic Characterization and Results of Groundwater and Surface Water Investigations* (submittal scheduled for September 2006).

4.1 Hydrogeology and Bedrock Characterization

One of the primary objectives of the 2006 IM drilling program was to further characterize the hydrogeologic and groundwater conditions of the Alluvial Aquifer and bedrock formation in the IM performance monitoring area. The pilot borings at each of the eight investigation sites were drilled to depths to encounter and confirm the depth/elevation and characteristics of the Miocene Conglomerate, the bedrock unit underlying the Alluvial Aquifer. The core and grain-size logs for the pilot borings (Appendices A and B) provide detailed logging information on the lithologic characteristics of the alluvial and fluvial units (comprising the Alluvial Aquifer) and the Miocene Conglomerate bedrock.

The results of the drilling investigation are illustrated on two hydrogeologic cross-sections. Figure 4-1 shows the locations of the monitoring/test wells installed for this investigation and the locations of two hydrogeologic sections: floodplain Cross-section A (oriented parallel to the river shoreline) and interior Cross-section B (oriented parallel to Park Moabi Road and the MW-20 bench).

Cross-section A (Figure 4-2) shows the hydrogeology in the eastern portion of the floodplain and the new monitoring wells installed at the MW-44, MW-45, MW-46, and MW-49 well cluster locations. Along Cross-section A, the Miocene bedrock is encountered at depths ranging from 95 feet bgs at MW-45-95 to 370 feet bgs at the MW-49 cluster. The Alluvial Aquifer consists of a sequence of older Tertiary alluvium (hydrostratigraphic units Toa and Toa0; see Table 2-1) overlain by younger Quaternary alluvium (Qoa) and fluvial deposits (Qr1, Qr2, Qr3). As illustrated on Cross-section A (Figure 4-2), the lower deposits of the Tertiary alluvium are now defined as the Basal Alluvium (Toa0 unit). This hydrostratigraphic unit was encountered in early drilling in the floodplain (previously referred as “reworked Miocene Conglomerate”), but the new drilling indicates that this unit is thicker and more extensive than previously mapped. The sand and gravel deposits believed to be Quaternary alluvium (Qoa unit) in the north portion of the floodplain are less consolidated compared to the older Toa alluvial deposits.

Cross-section B (Figure 4-3) shows the hydrostratigraphy in the interior portion of the IM area, the new monitoring and test wells installed at the MW-50 and MW-47 well clusters, and IM extraction wells at TW-3D/TW-2D. In the wells shown on Cross-section B, the Miocene bedrock is encountered at depths ranging from 150 feet bgs at TW-2D to 280 feet bgs at MW-47 cluster. The Alluvial Aquifer underlying the MW-20 bench and Park Moabi

Road consists primarily of the older Tertiary alluvium (Toa and Toa0 units). A thin interval of Quaternary alluvium is present in the shallow portion of the saturated zone at the MW-47 cluster. As shown on Section B, hydraulic test well TW-5 is installed in the Toa deposits at an elevation equivalent to the IM pumping wells at TW-3D/2D. Hydraulic test well TW-4, located 400 feet north of TW-5, is installed at a deeper elevation in the Alluvial Aquifer (compared to TW-5 and TW-3D) in the Basal Alluvium hydrostratigraphic unit (Toa0). It should be noted, however, that the divisions between hydrostratigraphic units do not correspond to any aquitards dividing the aquifer. The floodplain aquifer is considered to be hydraulically undivided.

Figure 4-4 shows the updated structure elevation contours of the Miocene Conglomerate bedrock surface that underlies Alluvial Aquifer in the IM performance monitoring area. Refer to Table 2-1 and the boring logs in Appendix A for description and characteristics of the Miocene Conglomerate. In the southern and central areas, the Miocene bedrock surface was encountered in the new boring MW-44, MW-45, MW-48, and MW-51 at elevations comparable to pre-drilling estimates. However, bedrock was encountered up to 50 feet deeper in the northern locations (e.g., MW-46, MW-47, MW-50), and 130 feet deeper at MW-49. The bedrock surface has therefore changed significantly from previous interpretations, especially in the northwestern area of the site.

The 2006 drilling information regarding the hydrostratigraphy and depth/elevation of Miocene bedrock have been incorporated into the site hydrogeologic conceptual model for application in the groundwater model and final RFI/RI reports.

4.2 Borehole Depth-Specific Groundwater Results

4.2.1 Groundwater Quality

As described in Section 3.2.1, depth-specific groundwater samples were collected during borehole drilling using the Isoflow® system for Cr(VI) field laboratory analysis and for field water quality measurement. Since the groundwater samples were obtained from open boreholes during drilling (i.e., grab samples), the sampling results are considered screening-level data for qualitative assessment of water quality conditions in the aquifer.

Fifty-one groundwater grab samples were collected from the following seven boring locations:

- Seven samples from MW-44 (47 to 124.5 feet bgs)
- Nine samples from MW-46 (46 to 216 feet bgs)
- Twelve samples from MW-47 (46 to 277 feet bgs)
- Three samples from MW-48 (41 to 137 feet bgs)
- Eight samples from MW-49 (96 to 378 feet bgs)
- Nine samples from MW-50 (48 to 218 feet bgs)
- Three samples from MW-51 (52 to 114 feet bgs)

The locations of the borings sampled are shown on Figure 1-2.

Table 4-1 summarizes the results of Cr(VI) field testing of the borehole Isoflow® groundwater samples and the temperature, pH, specific conductance, and ORP data

measured during the Isoflow® sampling. Cr(VI) was detected in 16 of the 51 groundwater samples analyzed by the IM No. 3 field laboratory (screening level data). The Cr(VI) screening results from several samples from borings at MW-47 and MW-50 were anomalous due to matrix interferences or possibly solids penetrating the sample-preparation filter. The Isoflow® samples with field test detections of Cr(VI), and the samples with suspected matrix interference, were sent to a certified laboratory for dissolved Cr(T) analyses for confirmation analysis. The results of the confirmation analyses are listed in Table 4-1.

Field measurements of specific conductance in the Isoflow® groundwater samples ranged from 2,670 microSiemens per centimeter ($\mu\text{S}/\text{cm}$) to 26,500 $\mu\text{S}/\text{cm}$ (samples from MW-49). A trend of increasing specific conductance with depth was observed in the Isoflow® samples at all locations (Table 4-1). Water temperatures in the grab samples ranged from 22.4°C to 34.0°C. There was a minor trend observed of increasing temperature with depth at all locations.

4.2.2 Hydraulic Measurements and Specific Capacity Estimates

Pumping rates and drawdowns were monitored in the boreholes during each Isoflow® sampling as described in Section 3.2.2. Evaluation of these data provides a qualitative or relative assessment of aquifer permeability of the borehole interval.

Table 4-2 presents the results of the borehole depth-specific hydraulic measurements and specific capacity estimates. Higher specific capacities indicate higher relative permeability within the portion of the borehole that was open during testing. The specific capacities ranged over nearly two orders of magnitude and as high as 7.3 gallons per minute per foot (gpm/ft) of drawdown and as low as 0.1 gpm/ft. In general, the highest specific capacity estimates were in the shallower portions of the saturated zone tested in the boreholes. The estimates of specific capacity were consistently lower in the deeper borehole intervals of the Alluvial Aquifer (Toa and Toa0 hydrostratigraphic units) that were tested. The Isoflow® tests in borehole intervals solely within Miocene bedrock either did not produce sufficient water or yielded very low specific capacity estimates (Table 4-2).

4.3 Monitoring Well Groundwater Sampling

The initial groundwater sampling of the new IM monitoring wells was conducted concurrently with the well installation and testing activities. Table 4-3 presents the results of the Cr(VI) and Cr(T) analyses from the initial and subsequent groundwater sampling of the new IM wells, through May 31, 2006. Table 4-3 also lists the field water quality parameter measurements during the sampling of the new wells. General chemistry results from the initial water quality sampling of the new IM wells are presented in Table 4-4.

One round of initial groundwater sampling was performed from March through May 2006 for all newly installed monitoring wells and test wells in accordance with the approved work plan and supplement (CH2M HILL 2005a, 2006c). In the initial groundwater sampling, Cr(VI) was detected in wells MW-44-115, MW-44-125, MW-45-95, MW-46-175, MW-47-55, MW-50-95, MW-50-200, MW-51, TW-4, and TW-5. In the initial groundwater sampling, Cr(VI) and Cr(T) were not detected in any groundwater samples collected from wells MW-44-70, MW-46-205, MW-48, MW-49-135, MW-49-275, and MW-49-365 (Table 4-3).

Figure 4-5 presents the maximum Cr(VI) concentrations for groundwater samples collected from March through May 2006 for the 17 new IM wells. For initial results reporting, the set of new IM wells is subdivided into three groups based on well screen elevation. Intermediate depth wells are screened from 425 to 395 feet above mean sea level (msl). The deeper wells installed in the 2006 IM drilling program are subdivided into screen elevations between 395 to 330 feet msl, and screen elevations deeper than 330 feet msl. This subdivision of the deep wells into two groups is not based on different hydrostratigraphic criteria, but rather serves to separate the deep wells into two approximately equal elevation intervals (see the cross-sections on Figures 4-2 and 4-3 for the relative screen elevations of the new wells). Further analysis and evaluation of water quality and hydraulic data from the new IM wells screened in the deeper portions of the Alluvial Aquifer in the IM area will be pursued as part of the ongoing IM performance monitoring program.

The initial groundwater sampling general chemistry results are shown in Table 4-4. TDS concentrations measured in the initial characterization samples ranged from 2,160 milligrams per liter (mg/L) at the shallow well MW-47-55, to a maximum of 24,800 mg/L at the deep well MW-49-365. The cation and anion data summarized in Table 4-4 indicate that the dissolved solids are predominantly chloride and sodium, with lesser sulfate concentrations. The results of stable isotope analyses oxygen 18 and deuterium are listed in Table 4-4. The stable isotope results for five of the new IM wells have not been received as of this reporting date. These results will be reported in the next quarterly GMP monitoring report. All of the initial groundwater quality analytical data from the new IM wells (through June 16, 2006) will be evaluated and presented in the upcoming Volume 2 of the RFI/RI Report - *Hydrogeologic Characterization and Results of Groundwater and Surface Water Investigations*.

The maximum Cr(VI) results from groundwater sampling of the new wells from March through May 2006 sampling are displayed on the hydrogeologic cross-sections introduced in Section 4.1. The Cr(VI) sampling results for other wells plotted on the cross-sections are also presented. On Cross-section A (Figure 4-2), Cr(VI) was detected in four of the new IM wells, with a maximum concentration of 1,710 micrograms per liter ($\mu\text{g/L}$) at well MW-44-115. Cr(VI) was not detected in the initial sampling of the deep well at MW-46 and the new wells at MW-49. The initial Cr(VI) sampling results for the four new monitoring wells and two test wells at well locations MW-47 and MW-50 are posted on Cross-section B (Figure 4-3). The maximum Cr(VI) concentration (7,750 $\mu\text{g/L}$) was detected in the initial sampling of MW-50-200. Refer to Table 4-3 for the complete listing of chromium sampling results for the new IM wells through May 30, 2006.

4.4 Hydraulic Testing

Hydraulic testing was completed at the test wells installed for the 2006 IM drilling program at well locations MW-50, MW-47, and MW-51 (Figure 4-1). Constant-rate aquifer tests were conducted at TW-4, TW-5 and MW-26, and a step drawdown test was conducted at TW-5. These tests are summarized in Table 4-5 and described in the following sections. All reported times are in Pacific Standard Time (PST).

Additional analyses and evaluation of the hydraulic test data will be conducted using water level data that has undergone deconvolution (removal of groundwater level fluctuations

due to river level changes). Analyses will include calculating aquifer properties using Multi-Layer Unsteady state software (MLU) (Hemker 1999), and adjusting these estimates during calibration of the Topock groundwater flow model. Analyses by the U.S. Geological Survey (USGS) (applying deconvolution analysis) and MLU are ongoing and results will be presented in the upcoming *Groundwater Model Report* (CH2M HILL 2006g; submittal of remaining components scheduled August 2006) and the RFI/RI Report in the fall of 2006.

4.4.1 TW-5 Variable Rate (Step Drawdown) Test

A variable rate or step drawdown test was conducted at TW-5 (Location 1) on May 10, 2006 at 12:30 a.m. This well was pumped at flow rates of 18, 40, 60 and 77 gpm for 30 minutes each (Table 4-5). The duration of pumping for the final flow rate (77 gpm) was extended to 60 minutes in an attempt to achieve stabilized drawdown in nearby monitoring wells (data from this test were analyzed in field to assist in the design of the constant-rate test at this well).

The results of the TW-5 step drawdown test are plotted on Figure C-1. The specific capacity of the well ranged from 2.9 to 4.5 gpm/ft with specific capacity decreasing as the flow rate increased. The results of this test indicated that the constant rate test could be conducted at the maximum flow rate of the pump (i.e., >70 gpm).

4.4.2 TW-5 Constant Rate Test

A constant rate test was conducted at TW-5 on May 11, 2006 at 10:00 a.m. The well was pumped for 135 minutes at 70.1 gpm. Drawdown was monitored in the pumping well and nearby monitoring well using pressure transducers, and the results are plotted on Figures C-2 through C-4 in Appendix C.

Flow was momentarily stopped 111 minutes into the test (the pump was accidentally deadheaded for approximately 20 seconds as the discharge was switched into a different truck). This stoppage resulted in a sudden, but short duration rise in water level in the pumping well and some of the nearest monitoring wells (e.g., MW-50-95 and MW-31-135). The drawdown in the pumping well following the stoppage was also approximately 0.2 feet less than before the stoppage, though no change in flow rate was noted.

The maximum drawdown at the pumping well was 24.1 feet corresponding to a specific capacity of 2.9 gpm/ft. An initial estimate of transmissivity can be calculated from the specific capacity using the methods described by Driscoll (1986) and Kruseman and de Ridder (1991):

$$Transmissivity (gpd / ft) = SpecificCapacity (gpm / ft) * 2000$$

$$Transmissivity (ft^2 / day) = \frac{Transmissivity (gpd / ft)}{7.48 (gal / ft^3)}$$

The transmissivity estimated by this method is 780 ft²/day. Because this transmissivity estimate is based on the pumping well data only, it should be considered approximate. Better estimates of transmissivity will be computed from the deconvoluted multi-well data, which will be reported under separate cover.

4.4.3 MW-51/MW-26 Constant Rate Test

Well MW-51 was completed at Location 4 adjacent to MW-26. This location was originally planned to have a 4-inch test well with a 40-foot screen installed, but shallow bedrock at this location resulting in a thin aquifer only allowed for a 4-inch well with a 15-foot screen. Pumping during development suggested that this well would have low yield, so a step test was not conducted at this location. A pump test was attempted on May 12, 2006 at 10:40 a.m. at MW-51, but the well dewatered at the minimum operational pumping rate of four gpm.

Adjacent well MW-26 has a longer screen, deeper pump placement and greater available drawdown; therefore, the hydraulic tests at this location were conducted at MW-26. A constant rate test was conducted at MW-26 on May 12, 2006 at 1:55 p.m. The well was pumped for 85 minutes at 4.8 gpm. The test was scheduled for 180 minutes, but stabilized drawdown was never achieved and the well screen began to dewater approximately 75 minutes into the test (cascading water was noted in the well with a more rapid decline in water level in the pumping well at about 75 minutes). The drawdown at the pumping well is shown in Figure C-5.

Drawdown was monitored with pressure transducers in the pumping well and nearby monitoring wells. No drawdown was observed at the monitoring wells.

The maximum drawdown observed in the pumping well was approximately 18 feet, though stabilized drawdown was not observed. The specific capacity for this well, therefore, is less than 0.3 gpm/ft. The transmissivity calculated from this specific capacity (Driscoll 1986; Kruseman and de Ridder 1991) is 80 ft²/day.

4.4.4 TW-4 Constant Rate Test

TW-4 is a 4-inch test well clustered with the MW-47 monitoring wells. TW-4 is located on the floodplain, and is inaccessible to trucks due to sand and sensitive habitat concerns. As a result, a tripod and winch were used to install the pump in this well by hand. Limitations on the length of winch cable prevented the installation of the pump as deep as would have been optimal. The pump was installed at approximately 70 feet below the water surface.

A step test was scheduled for TW-4; however, due the depth limitation of the test pump installation, 28 gpm was the maximum pumping rate available for hydraulic testing. Therefore, only a constant rate test was conducted at TW-4 at the maximum possible flow rate.

A 3-hour constant rate test (28 gpm) was conducted at TW-4 on June 13, 2006 at 1 p.m. The initial flow rate was approximately 70 gpm; however, the well dewatered (below the pump at 100 feet below top of casing [BTOC]) so the flow rate was reduced to 28 gpm within 2 minutes. Following the reduction in flow rate to 28 gpm, the water level in the pumping well stabilized at approximately 43.4 feet below the static water level.

Water levels in the MW-47 and nearby monitoring wells were monitored using pressured transducers recording the level every minute. Plots of drawdown at the pumping well and nearby monitoring wells are shown in Figures C-6 through C-8.

The calculated specific capacity for this well is 0.65 gpm/ft. The transmissivity calculated from this specific capacity (Driscoll 1986; Kruseman and de Ridder 1991) is 175 ft²/day.

4.5 Data Quality Assessment

The laboratory analytical data generated during the 2006 IM drilling program were independently reviewed to assess data quality and identify deviations from analytical requirements. Detailed review of data quality for all sampling data are summarized in the data validation reports, which are kept in the project file and are available upon request. The results of the data quality review are summarized below.

All 2006 IM drilling program groundwater sample analyses that were performed by a State of California-certified laboratory were validated. As noted in Tables 4-1, 4-3, and 4-4, several chromium and general chemistry results were qualified as estimated detections or non-detects (J-flag results) based on exceedances of quality control acceptance criteria. The Cr(VI) and Cr(T) results for the initial, March 9, 2006 sampling of MW-44-125 were rejected because the well was not fully developed at the time the groundwater sample was collected. The laboratory pH result for MW-49-135 exceeded acceptance criteria and was rejected. The rejected values should not be used for project decision-making. However, no significant analytical deficiencies were identified in the 2006 IM drilling program data, and the data are considered acceptable for the intended purpose of characterizing groundwater conditions at the sampling locations.

As noted in Section 4.2.1, the depth-specific groundwater Isoflow® samples analyzed for Cr(VI) at the IM No. 3 field laboratory using Hach analytical instrumentation are used only as screening-level quality data and do not undergo independent review or validation. The documentation and analytical records for the field laboratory analyses are maintained for project records.

5.0 Summary

The 2006 IM performance monitoring drilling investigation was conducted at the PG&E Topock Compressor Station during February through May 2006. The primary objectives of the well drilling and investigation program were to provide additional monitoring wells to assess hydraulic gradients associated with the expanded IM groundwater extraction system and to provide further characterization of the hydrogeology and groundwater quality conditions in the floodplain and performance monitoring area.

The hydrogeologic and groundwater investigations completed in the IM area during 2006 IM drilling program included:

- Drilling and logging of hydrogeologic investigation borings at eight locations.
- Depth-specific groundwater sampling and hydraulic measurements collected during drilling at seven of the characterization borings.
- Installing a total of 17 new wells (15 groundwater monitoring wells and two hydraulic test wells) at the eight investigation locations.
- Initial groundwater sampling and analyses for Cr(VI), Cr(T), and general chemistry parameters for water quality characterization at the new monitoring locations.
- Collecting cased-hole geophysical logs at five selected locations.
- Performing step drawdown and/or constant rate pumping tests at three of the investigation sites to assess hydraulic properties of the Alluvial Aquifer.

The 2006 IM drilling program accomplished the Work Plan objectives for installing additional wells for performance monitoring and completing further hydrogeologic characterization in the floodplain and adjoining area at the Topock site. The new drilling program generally confirmed the overall site hydrogeologic framework in the IM area and the hydrostratigraphic units defined in prior drilling investigations. Results of the recent 2006 IM drilling program have been used to update and refine the terminology and characteristics of the site hydrostratigraphy, primarily the Tertiary-age Basal Alluvium unit. The new drilling data indicate that the Basal Alluvium hydrostratigraphic unit is thicker and more extensive in the IM area than previously mapped. The 2006 drilling investigation has provided additional hydrogeologic data on the depth, structure, and characteristics of the Miocene Conglomerate bedrock which underlies the Alluvial Aquifer at the Topock site.

The initial results of groundwater sampling and analysis of the new IM monitoring wells have improved the understanding and delineation of Cr(VI) and groundwater geochemistry in the IM area, particularly in the lower portion of the Alluvial Aquifer. Although only preliminary analyses of the aquifer tests have been completed as of this investigation report, the data and results of the 2006 IM hydraulic testing will be used to refine the hydrogeologic conceptual model for the Topock site.

6.0 References

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Tables

TABLE 2-1
Site Hydrostratigraphic Units, June 2006 Update
Interim Measures 2006 Well Drilling Investigation Report
PG&E Topock Compressor Station

Stratigraphic Age	Site Hydrostratigraphic Units					
	Alluvial Deposits		Characteristics	Fluvial Deposits		Characteristics
Holocene	Younger Alluvium	Qya	unconsolidated sandy gravel & silty/clayey gravel (youngest alluvial deposits and surficial deposits, undifferentiated)	Upper Fluvial Sand & Silt (Floodplain Area)	Qr3	unconsolidated sand & silty sand (no gravel), massive-bedded, very well-sorted; contains fine-gr. organic matter
				Middle Fluvial Deposits (Floodplain Area)	Qr2	unconsolidated sand, clay & minor gravelly sand, interbedded; clay/silt lenses exhibit both brown and gray (reduced) appearance
				Lower Fluvial Deposits (Floodplain Area)	Qr1	unconsolidated sandy gravel & gravelly sand, minor silty gravel (gravel content >15%); subrounded to very well-rounded pebbles & cobbles from distant sources & fluvial transport
				Colorado River Channel Fill fluvial deposits in paleo-channel	Qr0	fluvial channel-fill sediments that occur below elevation 360' MSL (deepest river deposits encountered in floodplain borings). Per Caltrans I-40 bridge borings includes moderately consolidated to dense, fine to coarse sand & sandy gravel
Pleistocene	Older Quaternary Alluvium	Qoa	unconsolidated sandy gravel & silty/clayey gravel (alluvial fan deposits). Comprises moderately-dissected alluvial terraces; terrace/wash slopes are moderate-angle (i.e., 45 degrees)	Older Fluvial Sediments (surface outcrop)	Qrs	pinkish to tan, weakly to moderately consolidated fine sand, silt/clay, with minor pebble gravel; contains root casts (paleosol); outcrops occur as remnants on alluvial terraces as high as elevation 670' MSL (Old Ponds site)
				Older River Gravels (surface outcrop)	Qrg	moderately consolidated to cemented, sandy pebble to boulder gravel; subrounded to very well-rounded clasts from distant sources & fluvial transport (unit outcrops west of MW-20 bench)
Pliocene	Bouse Formation (Tb)		pre-Colorado River lacustrine & deltaic deposits: well-bedded, moderately indurated, green clay, siliceous claystone, sandstone & basal marl			
Pliocene to Late Miocene	Tertiary Alluvium - Upper	Toa2	Moderately consolidated sandy gravel, gravelly sand & silty/clayey gravel (oldest alluvial fan deposits). Comprises deeply-dissected alluvial terraces; terrace canyon walls are vertical/steep	= Tertiary Fanglomerate of Metzger & Loeltz, 1973	Note: Toa1 and Toa2 are subdivisions based on contrasts in hydraulic permeability observed in the Tertiary Alluvium sequence in TW-1, TW-2D, and IW-2 well-flow spinner logs.	
Late Miocene	Tertiary Alluvium - Lower	Toa1				
	Basal Alluvium	Toa0	Moderately consolidated silty sand, clayey/silty gravel & minor gravelly sand. Consists of 100% reddish detritus of Miocene conglomerate unit (reworked Tmc deposits) in floodplain area. In other site areas, Toa0 is well-consolidated alluvium, lacks reddish color, and exhibits high-induction geophysical log response			
angular unconformity (post-extension erosion)						
Middle Miocene	Miocene Conglomerate	Tmc	consolidated conglomerate & sandstone containing rock fragments & megabreccia derived from Chemehuevi Mtns. bedrock			
unconformity & detachment faulting						
Pre-Tertiary	Metamorphic / Igneous Bedrock	pTbr	metadiorite, gneiss & granitic bedrock exposed in Chemehuevi Mountains & underlies the groundwater basin			

- Notes:
- 1. Hydrostratigraphic units that comprise the Alluvial Aquifer in study area are shaded yellow
 - 2. Bedrock formations, grey shaded, are essentially impermeable but locally yield water where fractured
 - 3. Within site investigation area, Younger Alluvium, Older River Deposits, and Bouse Formation occur above the water table
 - 4. Stratigraphic age assignments from published geologic reports and are generalized for units in study area

TABLE 3-1

Summary of Well Drilling, Installation, and Testing Details
Interim Measures 2006 Well Drilling Investigation Report
PG&E Topock Compressor Station

Boring ID & Drill Site Location	Boring Depth (ft bgs)	Borehole Logging	Wells Installed	Approx. Water Level (ft bgs)	Screen Interval (ft bgs)	Well Logging and Testing
MW-44 (Site A)	134	Continuous core log	MW-44-125	19	115-125	Cased-well geophysical
	117		MW-44-115	19	103-113	--
			MW-44-70	19	61-71	--
MW-45 (Site B)	97	Continuous core log	MW-45-95a (2-inch well)	17	83-93	--
			MW-45-95b (1-inch well)	18	83-93	--
MW-46 (Site C)	217	Continuous core log	MW-46-205	30	196.5-206.5	Cased-well geophysical
			MW-46-175	29	165-175	--
MW-47 (Location 2)	288	Continuous core log	TW-4	29	210-250	Cased-well geophysical and hydraulic testing
	117	--	MW-47-115	30	105-115	--
			MW-47-55	29	45-55	
MW-48 (Location 5)	153 1st boring	Continuous core log 1st boring	MW-48	29	124-134	--
MW-49 (Location 3)	384	Continuous core log	MW-49-365	31	346-366	Cased-well geophysical
			MW-49-275	29	255-275	--
			MW-49-135	28	125-135	--
MW-50 (Location 1)	248	Continuous core log	MW-50-200	40	190-200	Cased-well geophysical
			TW-5	41	110-150	Hydraulic testing
			MW-50-95	40	85-95	--
MW-51 (Location 4)	114	Continuous core log	MW-51	45	97-112	Hydraulic testing

Notes:

Refer to Figure 1-2 for well locations.

Ft bgs = feet below ground surface

(--) = not applicable for the location

TABLE 4-1

Borehole Depth-Specific Groundwater Analytical Results, Chromium and Field Water Quality Parameters
Interim Measures 2006 Well Drilling Investigation Report
PG&E Topock Compressor Station

Location ID	Sample Date	Sample Depth (ft bgs)	Concentrations in µg/L		Field Water Quality Parameters			
			Field Test Analysis	Certified Lab Data	Temperature (° Celsius)	pH (pH units)	Specific Conductance (µS/cm)	ORP (mV)
			Hexavalent Chromium (µg/L)	Dissolved Total Chromium (µg/L)				
MW-44	22-Feb-06	47-57	ND (10) S	---	23.1	7.42	6700	-162
MW-44	22-Feb-06	66-76	53.0 S	ND (1.0)	24.4	7.18	8490	-118
MW-44	09-Mar-06	76-86	ND (10) S	---	26.6	7.53	7570	-25
MW-44	24-Feb-06	86-96	ND (10) S	---	25.5	7.15	5170	1.00
MW-44	09-Mar-06	96-106	ND (10) S	---	28.2	7.60	11600	-218
MW-44	25-Feb-06	106-116	800 S	790	27.6	7.31	13600	-3.0
MW-44	28-Feb-06	117-124.5	2800 S	2660	25.7	8.19	15500	-132
MW-46	08-Feb-06	46-56	ND (10) S	---	23.5	7.16	6820	-190
MW-46	09-Feb-06	66-76	ND (10) S	---	22.4	6.64	6990	-102
MW-46	09-Feb-06	86-96	ND (10) S	---	24.0	6.87	9140	-117
MW-46	09-Feb-06	106-116	ND (10) S	---	25.3	6.77	12200	-108
MW-46	09-Feb-06	126-136	ND (10) S	---	26.6	6.89	13800	-163
MW-46	10-Feb-06	146-156	32.0 S	34.6	26.4	7.23	15700	-232
MW-46	10-Feb-06	166-176	150 S	138	27.2	7.45	17300	-319
MW-46	10-Feb-06	186-196	47.0 S	48.6	27.9	7.44	18900	-294
MW-46	10-Feb-06	206-216	ND (10) S	---	29.7	7.45	18900	-358
MW-47	28-Feb-06	46-56	28.0 S	ND (1.0)	30.8	7.30	3720	-220
MW-47	01-Mar-06	66-76	---	ND (1.0)	31.2	8.63	5280	-204
MW-47	01-Mar-06	86-96	ND (10) S	---	31.2	8.59	8910	-238
MW-47	02-Mar-06	106-116	24.0 S	ND (1.0)	29.1	9.25	9600	-402
MW-47	02-Mar-06	126-136	ND (10) S	---	30.0	8.98	13100	-306
MW-47	06-Mar-06	147-157	21.0 S	5.30	29.8	7.37	14600	-246
MW-47	08-Mar-06	167-177	ND (10) S	---	28.6	7.63	12700	-274
MW-47	08-Mar-06	187-197	ND (10) S	---	31.7	7.20	17100	-269
MW-47	08-Mar-06	207-217	23.0 S	ND (1.0)	31.2	7.17	20100	-139
MW-47	09-Mar-06	227-237	ND (10) S	---	29.5	9.26	16100	-357
MW-47	09-Mar-06	247-257	---	ND (1.0)	28.6	8.67	12900	-296
MW-47	10-Mar-06	267-277	ND (10) S	---	28.0	9.11	19100	-268
MW-48	01-Mar-06	41-46	1040 S	1150	28.5	7.73	5600	37.0
MW-48	06-Mar-06	87-96	ND (10) S	---	30.4	7.36	7180	-138
MW-48	07-Mar-06	127-137	ND (10) S	---	32.4	9.25	12500	-359
MW-49	15-Mar-06	96-106	42.0 S	ND (1.0)	27.2	9.36	9090	-303
MW-49	22-Mar-06	137-147	ND (10) S	---	28.7	7.48	13100	-334
MW-49	23-Mar-06	177-187	ND (10) S	---	28.9	7.43	9050	-507
MW-49	24-Mar-06	216-226	ND (10) S	---	31.0	7.76	18800	-407
MW-49	25-Mar-06	257-267	ND (10) S	---	31.9	7.90	17100	-559
MW-49	26-Mar-06	297-307	ND (10) S	---	31.2	8.13	6290	-560
MW-49	27-Mar-06	337-347	ND (10) S	---	33.5	8.82	22000	-403
MW-49	30-Mar-06	367-378	ND (10) S	---	30.4	8.82	26500	-549
MW-50	13-Apr-06	48-58	1180 S	1200	31.6	7.62	2670	50.0
MW-50	18-Apr-06	68-78	209 S	355	29.9	8.42	3690	86.0
MW-50	18-Apr-06	88-98	ND (10) S	---	31.8	8.88	6250	-378
MW-50	18-Apr-06	108-118	ND (10) S	---	31.0	9.24	12400	-204
MW-50	18-Apr-06	128-138	ND (10) S	---	31.8	8.34	13300	-469

TABLE 4-1

Borehole Depth-Specific Groundwater Analytical Results, Chromium and Field Water Quality Parameters
Interim Measures 2006 Well Drilling Investigation Report
PG&E Topock Compressor Station

			Concentrations in µg/L		Field Water Quality Parameters			
Location ID	Sample Date	Sample Depth (ft bgs)	Field Test Analysis	Certified Lab Data	Temperature (° Celsius)	pH (pH units)	Specific Conductance (µS/cm)	ORP (mV)
			Hexavalent Chromium (µg/L)	Dissolved Total Chromium (µg/L)				
MW-50	19-Apr-06	148-158	---	---	32.8	8.28	13500	-470
MW-50	19-Apr-06	168-178	ND (10) S	---	34.0	8.44	15900	-338
MW-50	19-Apr-06	188-198	2800 S	2680	33.7	8.66	20300	-85
MW-50	20-Apr-06	208-218	ND (10) S	---	32.7	8.72	23300	-368
MW-51	09-Apr-06	52-62	ND (10) S	---	36.0	7.24	3560	-244
MW-51	10-Apr-06	77-87	ND (10) S	---	27.8	6.77	6470	-267
MW-51	12-Apr-06	104-114	2360 S	4090	31.8	7.64	---	-19

Notes:

µg/L results in micrograms per liter

µS/cm microSiemens per centimeter

mV milli volts

ND parameter not detected at the listed reporting limit.

--- data not collected or not available or rejected

S screening level data

J concentration or reporting limit estimated by laboratory or data validation

Per the Well Installation Workplan for Interim Measures Performance Monitoring Program (CH2M 2005), certified lab analysis for total chromium were used to verify Field Test results greater than the detection limit of 10 µg/L.

March isoflow samples for MW-44 were taken from the second borehole that was installed adjacent to the first.

Field screening samples from certain depths in MW-47 and MW-50 reported anomalous results due to matrix interference or solids that were passed through the inline filter. Samples with detections or known matrix interference were subsequently sent to a certified laboratory for dissolved chromium analyses.

TABLE 4-2

Borehole Depth-specific Hydraulic Measurements and Specific Capacity Estimates
Interim Measures 2006 Well Drilling Investigation Report
PG&E Topock Compressor Station

Sample/Test Collection Data				Hydraulic Measurements			
Borehole Depth (ft bgs)	Date	Time	Boring & Isoflow Sample ID	Volume Purged (gallons)	Pumping Rate (gpm)	Drawdown (feet)	Specific Capacity (gpm/ft)
47-57	22-Feb-06	11:11	MW-44-PB-56GW	325	9.5	1.9	5.0
66-76	22-Feb-06	16:25	MW-44-PB-76GW	150	6.0	8.8	0.7
76-86	9-Mar-06	10:30	MW-44INT-PB-86GW	270	2.6	40.0	0.1
86-96	24-Feb-06	10:00	MW-44-PB-96GW	108	2.9	1.6	1.8
96-106	9-Mar-06	15:38	MW-44INT-PB-106GW	46	2.2	8.9	0.2
106-116	25-Feb-06	11:55	MW-44-PB-116GW	249	1.4	3.7	0.4
117-124.5*	28-Feb-06	10:03	MW-44-PB-125GWA	288	1.8	17.3	0.1
46-56	8-Feb-06	16:15	MW-46-PB-56GW	250	11.9	5.5	2.2
66-76	9-Feb-06	8:00	MW-46-PB-76GW	220	9.5	14.3	0.7
86-96	9-Feb-06	9:55	MW-46-PB-96GW	220	10	10.5	1.0
106-116	9-Feb-06	12:10	MW-46-PB-116GW	275	12	5	2.4
126-136	9-Feb-06	16:00	MW-46-PB-136GW	275	10	18	0.6
146-156	10-Feb-06	8:50	MW-46-PB-156GW	250	10	6	1.7
166-176	10-Feb-06	11:00	MW-46-PB-176GW	250	11	13	0.8
186-196	10-Feb-06	14:35	MW-46-PB-196GW	240	---	---	---
206-216	10-Feb-06	17:00	MW-46-PB-216GW	220	---	---	---
46-56	28-Feb-06	17:00	MW-47-PB-56GW	48	2.5	0.5	5.0
66-76	1-Mar-06	10:25	MW-47-PB-76GW	71	3.5	0.5	7.3
86-96	1-Mar-06	15:00	MW-47-PB-96GW	74	4.5	0.7	6.7
106-116	2-Mar-06	7:52	MW-47-PB-116GW	87	4.4	1.6	2.8
127-137	2-Mar-06	10:51	MW-47-PB-137GW	64	4.0	7.6	0.5
147-157	6-Mar-06	13:58	MW-47-PB-157GW	38	4.0	7.8	0.5
167-177	8-Mar-06	---	MW-47-PB-177GW	48	1.5	6.6	0.2
187-197	8-Mar-06	13:00	MW-47-PB-197GW	45	1.8	0.3	6.0
207-217	8-Mar-06	16:10	MW-47-PB-217GW	58	2.0	4.7	0.4
226-236	9-Mar-06	11:20	MW-47-PB-237GW	50	1.3	1.0	1.3
247-257	9-Mar-06	16:46	MW-47-PB-257GW	41	1.3	6.5	0.2
41-46	1-Mar-06	16:43	MW-48-PB-46GW	66	2.6	6.3	0.4
87-96	6-Mar-06	9:20	MW-48-PB-96GW	38	2.0	40	0.1
127-137	7-Mar-06	10:52	MW-48-PB-137GW	52	---	---	---
106-116	15-Mar-06	8:32	MW-49-PB-106GW	43	---	---	---
137-147	22-Mar-06	10:13	MW-49-PB-147GW	43	1.4	25.2	0.1
177-187	23-Mar-06	10:27	MW-49-PB-187GW	70	2.7	5.0	0.5
216-226	24-Mar-06	11:51	MW-49-PB-226GW	56	2.0	2.2	0.9
257-267	25-Mar-06	12:40	MW-49-PB-267GW	107	3.9	8.8	0.4
297-307	26-Mar-06	12:07	MW-49-PB-306GW	64	3.0	8.1	0.4
337-347	27-Mar-06	15:35	MW-49-PB-347GW	110	4.6	10.0	0.5
367-378	30-Mar-06	18:30	MW-49-PB-378GW	130	3.8	41.0	0.1

TABLE 4-2

Borehole Depth-specific Hydraulic Measurements and Specific Capacity Estimates

*Interim Measures 2006 Well Drilling Investigation Report**PG&E Topock Compressor Station*

Sample/Test Collection Data				Hydraulic Measurements			
Borehole Depth (ft bgs)	Date	Time	Boring & Isoflow Sample ID	Volume Purged (gallons)	Pumping Rate (gpm)	Drawdown (feet)	Specific Capacity (gpm/ft)
Samples from Boring MW-51 (initially labeled TW-5)							
52-62	9-Apr-06	14:10	TW-5-PB-62GW	68	1	14.9	0.1
77-87	10-Apr-06	18:03	TW-5-PB-87GW	170	1	2.9	0.3
104-114	12-Apr-06	13:10	TW-5-PB-114GW	167	1	5.2	0.2
48-58	13-Apr-06	8:36	MW-50-PB-58GW	90	2.5	1.1	2.2
68-78	18-Apr-06	11:00	MW-50-PB-78GW	107	5	5.0	1.5
88-98	18-Apr-06	13:10	MW-50-PB-98GW	177	7	3.8	2.6
108-118	18-Apr-06	16:01	MW-50-PB-118GW	300	10	8.5	1.3
128-138	18-Apr-06	18:01	MW-50-PB-138GW	293	12	30.2	0.7
148-158	19-Apr-06	9:25	MW-50-PB-158GW	293	7	23.4	0.3
168-178	19-Apr-06	11:48	MW-50-PB-178GW	293	5	20.9	0.2
188-198	19-Apr-06	16:06	MW-50-PB-198GW	293	2.5	32.4	0.1
208-218	20-Apr-06	9:00	MW-50-PB-218GW	293	1.6	13.5	0.1

Notes:

bgs = below ground surface

gpm = gallons per minute

gpm/ft = gallons per minute per foot

(---) denotes data not collected or available

* An extended screen had to be used to position the Isoflow pump within the rat hole. The effective screen was 117-124.5 ft bgs. No appreciable flow was observed from bedrock below 124.5 ft depth.

TABLE 4-3

Groundwater Analytical Results for New Monitoring Wells, Chromium and Field Water Quality Parameters
Interim Measures 2006 Well Drilling Investigation Report
PG&E Topock Compressor Station

Location ID	Sample Date	Hexavalent Chromium (µg/L)	Dissolved Total Chromium (µg/L)	Field Water Quality Parameters			
				Temperature (° Celsius)	pH (pH units)	Specific Conductance (µS/cm)	ORP (mV)
MW-44-070	09-Mar-06	ND (1.0)	ND (1.0)	24.0	8.0	6,970	-393
MW-44-070	23-Mar-06	ND (1.0) J	ND (1.0)	25.5	7.5	7,600	-166
MW-44-070	04-Apr-06	ND (1.0)	ND (1.0)	25.3	8.2	9,200	-96
MW-44-070	04-May-06	ND (1.0)	ND (1.0)	25.5	7.9	10,000	-156
MW-44-115	14-Mar-06	735 J	730	25.4	7.5	16,500	-11
MW-44-115	22-Mar-06	1,440	1,970	25.9	8.5	30,400 R	-74
MW-44-115 FD	04-Apr-06	1,570	1,570	FD	FD	FD	FD
MW-44-115	04-Apr-06	1,550	1,620	26.7	8.6	15,800	37.0
MW-44-115 FD	20-Apr-06	1,680	1,610	FD	FD	FD	FD
MW-44-115	20-Apr-06	1,680	1,650	26.7	6.9	11,400	-38
MW-44-115	26-Apr-06	1,560	1,580	25.8	7.7	15,800	-27
MW-44-115	04-May-06	1,710	1,870	26.4	8.3	17,300	-21
MW-44-115	10-May-06	1,490	1,550	27.0	7.6	22,700	7.0
MW-44-115	17-May-06	1,560	1,880	26.7	7.7	19,600	-10
MW-44-115	31-May-06	1,610	1,580	34.8	6.8	13,100	-11
MW-44-115 FD	31-May-06	1,610	1,600	FD	FD	FD	FD
MW-44-125	09-Mar-06	66.6 R	67.5 R	24.7	8.7	13,500	-419
MW-44-125	22-Mar-06	362	430	26.0	9.1	15,000	-280
MW-44-125	04-Apr-06	372	374	28.9	9.2	15,600	10.0
MW-44-125	20-Apr-06	461	504	26.8	7.8	11,400	-138
MW-44-125	26-Apr-06	480	485	27.0	8.2	16,200	-147
MW-44-125 FD	26-Apr-06	479	493	FD	FD	FD	FD
MW-44-125	04-May-06	584	592	27.7	9.0	17,200	-144
MW-44-125	10-May-06	634 J	667	29.7	8.1	23,000	-96
MW-44-125	17-May-06	612	740	27.6	8.1	19,700	-103
MW-44-125	31-May-06	413	398	34.5	7.3	13,600	-95
MW-45-095a	24-Mar-06	259	216	23.8	7.5	16,100	-20
MW-45-095b	24-Mar-06	332	327	22.9	7.5	16,700	-12
MW-46-175	14-Mar-06	287	279	26.3	8.1	19,500	-44
MW-46-175	24-Mar-06	213	173	25.6	9.2	19,900	-93
MW-46-175	07-Apr-06	208 J	186	23.4	8.8	18,500	-116
MW-46-175	04-May-06	222	237	27.4	8.9	20,800	-27
MW-46-175	18-May-06	227	268	28.2	8.1	20,500	-17
MW-46-175	31-May-06	139 J	169	36.3	7.3	15,900	37.0
MW-46-205	14-Mar-06	ND (1.0)	ND (1.0)	26.3	8.0	22,600	-117
MW-46-205	24-Mar-06	ND (1.0)	ND (1.0)	26.4	9.1	24,000	-202

TABLE 4-3

Groundwater Analytical Results for New Monitoring Wells, Chromium and Field Water Quality Parameters
Interim Measures 2006 Well Drilling Investigation Report
PG&E Topock Compressor Station

Location ID	Sample Date	Hexavalent Chromium (µg/L)	Dissolved Total Chromium (µg/L)	Field Water Quality Parameters			
				Temperature (° Celsius)	pH (pH units)	Specific Conductance (µS/cm)	ORP (mV)
MW-46-205	07-Apr-06	ND (1.0) J	ND (1.0)	26.2	8.7	22,400	-200
MW-46-205	04-May-06	ND (1.0)	ND (1.0)	27.5	8.8	25,900	-177
MW-47-055	23-Mar-06	10.9 J	7.9	28.8	7.7	5,800	-94
MW-47-055	16-May-06	24.0	27.3	29.5	7.3	4,430	22.0
MW-47-115	23-Mar-06	ND (2.0) J	ND (1.0)	29.5	7.8	15,600	-161
MW-47-115	16-May-06	1.4	5.1	29.6	7.2	18,400	-67
MW-48	18-May-06	ND (1.0)	ND (1.0)	34.5	7.0	12,300	-39
MW-49-135	25-Apr-06	ND (1.0) J	ND (1.0)	25.7	7.5	18,800	-167
MW-49-135	18-May-06	ND (1.0)	ND (1.0)	26.7	7.2	17,100	-178
MW-49-275	25-Apr-06	ND (1.0)	ND (1.0)	29.1	7.9	29,400	-143
MW-49-275	18-May-06	ND (1.0)	ND (1.0)	29.9	7.7	26,700	-214
MW-49-365	26-Apr-06	ND (2.0)	ND (1.0)	29.0	7.8	37,600	-244
MW-49-365	16-May-06	ND (2.0)	ND (1.0)	32.1	7.7	44,900	-192
MW-50-095	09-May-06	199	194	31.2	7.2	5,480	30.0
MW-50-095	24-May-06	218	221	31.1	7.4	13,800 R	50.0
MW-50-200	09-May-06	7,750	7,360	33.3	7.3	20,200	-11
MW-50-200	24-May-06	5,810	5,910	32.3	7.1	37,000	60.0
MW-51	12-May-06	4,370	4,630	34.3	6.3	12,100	92.0
MW-51	30-May-06	4,130	4,530	33.2	7.4	10,600	17.0
TW-04	18-May-06	1.0	6.4	32.7	7.0	15,600	-97
TW-05	10-May-06	1.1 J	1.3	32.6	7.1	15,100	-161

Notes:

µg/L results in micrograms per liter

µS/cm microSiemens per centimeter

mV milli volts

ND parameter not detected at the listed reporting limit.

--- data not collected or not available

J concentration or reporting limit estimated by laboratory or data validation

FD field duplicate sample

R result exceeded analytical criteria for precision and accuracy; should not be used for project decision-making

TABLE 4-4
Groundwater Analytical Results for New Monitoring Wells, General Chemistry Parameters
Interim Measures 2006 Well Drilling Investigation Report
PG&E Topock Compressor Station

Location ID	Sample Date	pH (pH units)	Specific Conductance (µS/cm)	Total Dissolved Solids (mg/L)	Oxygen (0/00)	Deuterium (0/00)	Alkalinity Bicarbonate (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Nitrate (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Boron (mg/L)	Manganese (mg/L)	Iron (mg/L)	Ammonia (mg/L)	Total Organic Carbon (mg/L)	Silica (mg/L)
MW-44-070	23-Mar-06	7.23	7,960	4,430	-10.5	-71.0	190	1,920	589	ND (0.5)	188	27.3	15.9	1,340	1.07	1.37	0.600	ND (0.5)	1.47	11.9
MW-44-115	14-Mar-06	7.76	13,900	7,930 J	-10.1	-86.3	89.3	3,680	798	0.787	198	15.6	28.1	2,890	1.85	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	19.3
MW-44-125	22-Mar-06	8.41	12,200	7,250	-9.8	-72.0	62.3	3,760	766	1.72	126	7.89	27.1	2,590	1.70	0.729	ND (0.5)	ND (0.5)	ND (1.0)	12.7
MW-45-095a	24-Mar-06	7.86	14,000	8,160	-10.7	-78.0	192	3,670	949	0.508	279	25.5	21.4	2,540	1.86	ND (0.5)	ND (0.5)	ND (0.5)	1.89	23.9
MW-45-095b	24-Mar-06	7.92	15,000	8,800	-10.3	-77.0	180	3,900	960	0.604	286	22.7	25.6	2,810	1.98	ND (0.5)	ND (0.5)	ND (0.5)	1.95	23.4
MW-46-175	14-Mar-06	8.30	17,700	10,100 J	-10.0	-76.1	47.2	5,140	741	1.57	73.6	2.58	35.2	3,940	2.08	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	14.4
MW-46-205	14-Mar-06	8.15	22,000	12,700 J	-10.4	-100.0	49.6	6,540	868	0.573	88.7	3.19	44.5	5,030	3.22	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	14.6
MW-47-055	23-Mar-06	7.50	3,650	2,160	-9.3	-65.0	79.8	986	231	1.31	150	24.3	11.0	578	0.576	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	12.5
MW-47-115	23-Mar-06	7.65	14,200	7,800	-10.2	-72.0	57.4	4,130	710	1.23	334	30.9	24.1	2,850	1.21	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	11.4
MW-48	18-May-06	7.57	16,800	9,860	---	---	53.2	5,220	475	ND (0.5)	307	49.0	55.0	3,090	1.02	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	13.9
MW-49-135	25-Apr-06	5.50 R	16,100	8,780	-10.9	-71.0	63.2	4,250	643	1.31	312	40.6	18.6	2,910	0.867	2.16	0.655	ND (0.5)	ND (1.0)	15.1
MW-49-275	25-Apr-06	7.25	27,700	15,700	-11.6	-76.0	38.4	7,720	1,260	0.745	191	8.76	56.6	5,860	2.46	1.000	0.973	ND (0.5)	1.21	11.9
MW-49-365	26-Apr-06	7.36	43,200	24,800	-11.8	-78.0	33.0	13,900	1,280	ND (0.5)	374	11.7	98.9	9,530	4.17	ND (0.5)	ND (0.5)	ND (0.5)	1.98	11.7
MW-50-095	09-May-06	7.95	5,530	2,650	---	---	61.2	1,430	326	2.20	133	16.7	10.1	1,030	1.02	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	18.3
MW-50-200	09-May-06	8.13	22,800	13,000	---	---	39.9	6,670	1,390	6.06	530	33.1	45.4	4,700	2.00	ND (0.5)	ND (0.5)	ND (0.5)	21.8	17.6
MW-51	12-May-06	7.68	10,900	6,190 J	---	---	106	3,020	934	14.1	265	19.0	28.0	2,090	1.62	ND (0.5)	ND (0.5)	ND (0.5)	1.37	22.9
TW-04	18-May-06	7.71	21,900	13,300	---	---	55.9	6,760	1,140	1.43	464	56.7	40.7	4,310	1.63	0.703	ND (0.5)	ND (0.5)	1.73	18.2
TW-05	10-May-06	8.05	13,600	7,780	-9.6	-74.7	34.6	3,190	420	0.542	319	21.2	22.1	2,690	1.42	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	16.6

Notes:

mg/L milligrams per liter
µS/cm microSiemens per centimeter
J concentration or reporting limit estimated by laboratory or data validation
--- data not collected or not available
R result exceeded analytical criteria for precision and accuracy; should not be used for project decision-making

Results in milligrams per liter (mg/L), except Oxygen-18 and Deuterium, which are expressed as differences from global standards in parts per thousand (0/00).

Alkalinity reported as bicarbonate. Nitrate reported as Nitrogen (N).

All metal results are dissolved concentrations.

Stable isotope results for five of the new IM wells have not been received as of the reporting date and will be reported in the next GMP quarterly report.

TABLE 4-5

Hydraulic Testing Summary

*Interim Measures 2006 Well Drilling Investigation Report**PG&E Topock Compressor Station*

Pumping Well / Test	Test Start	Test End	Test Duration (minutes)	Pumping Rate (gpm)	Maximum Drawdown (feet)
TW-5					
Step Test					
Step #1	5/10/06 12:30	5/10/06 13:00	30	18	4.0
Step #2	5/10/06 13:00	5/10/06 13:30	30	40	11.1
Step #3	5/10/06 13:30	5/10/06 14:00	30	60	20.4
Step #4	5/10/06 14:00	5/10/06 15:00	60	77	26.2
Constant Rate Test	5/11/06 10:00	5/11/06 12:15	135	70.1	24.1
MW-51 / MW-26					
MW-51 Constant Rate Test	5/12/06 9:40	5/12/06 10:05	25	4	NA
MW-26 Constant Rate Test	5/12/06 13:55	5/12/06 15:20	85	4.8	18.3*
TW-4					
Constant Rate Test	5/13/06 13:00	5/13/06 16:00	180	28	43.4

Notes:

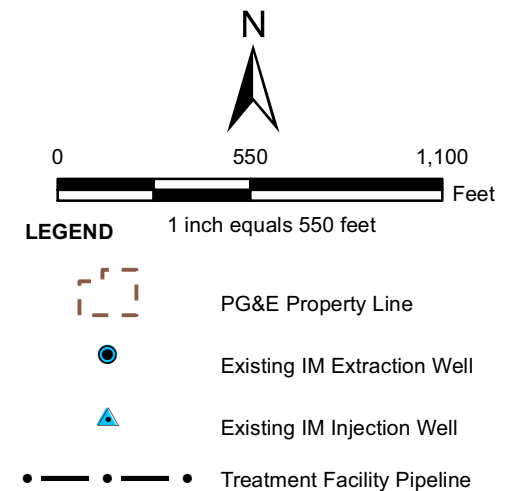
All times are in Pacific Standard Time (PST).

gpm - gallons per minute

NA - Data not available because well quickly dewatered.

(*) - Drawdown did not stabilize during test.

Figures



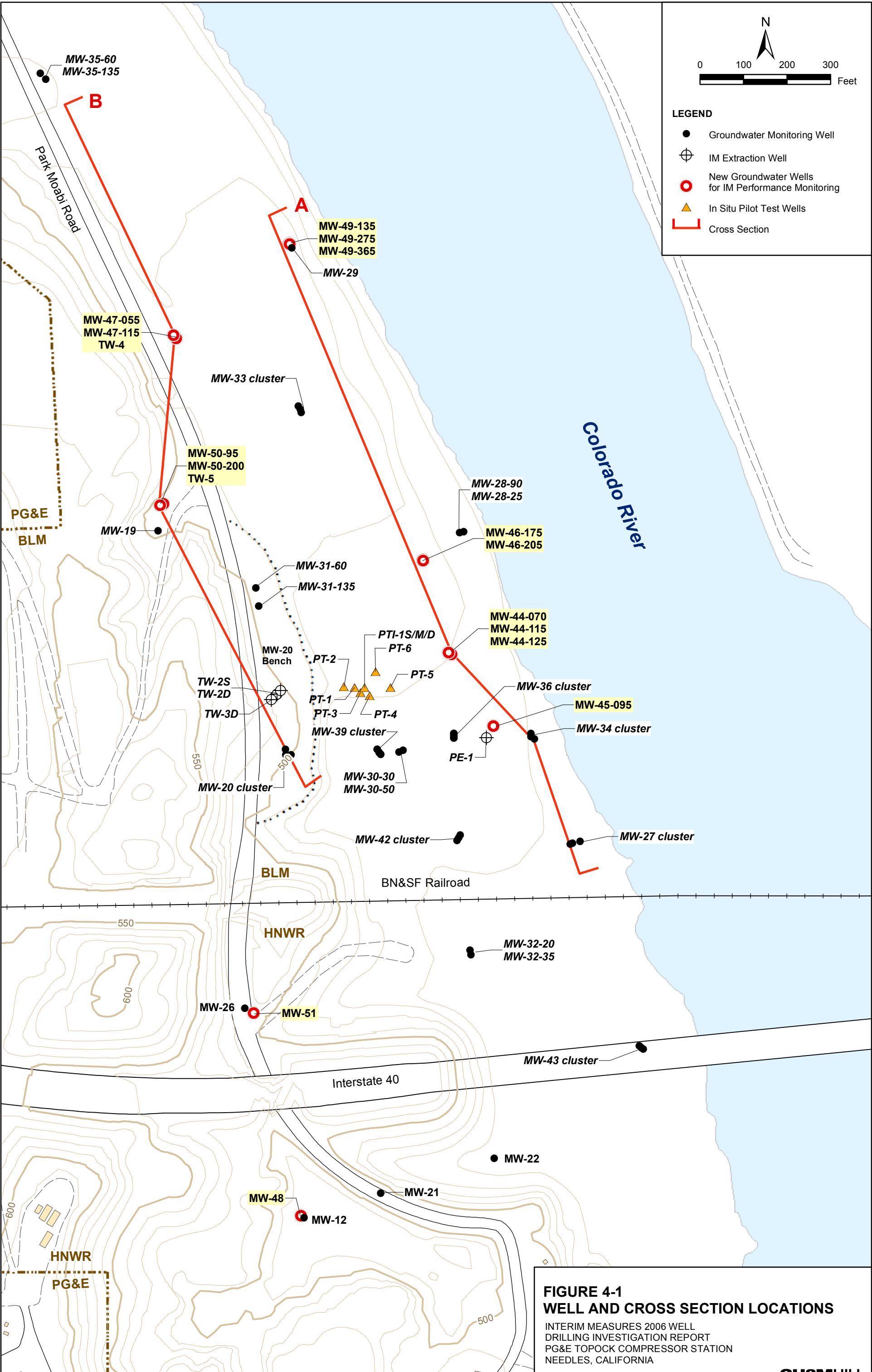
Notes: Location map shows Interim Measures No.3 (IM-3) facilities as of January 2006. Aerial photography taken May 2005.

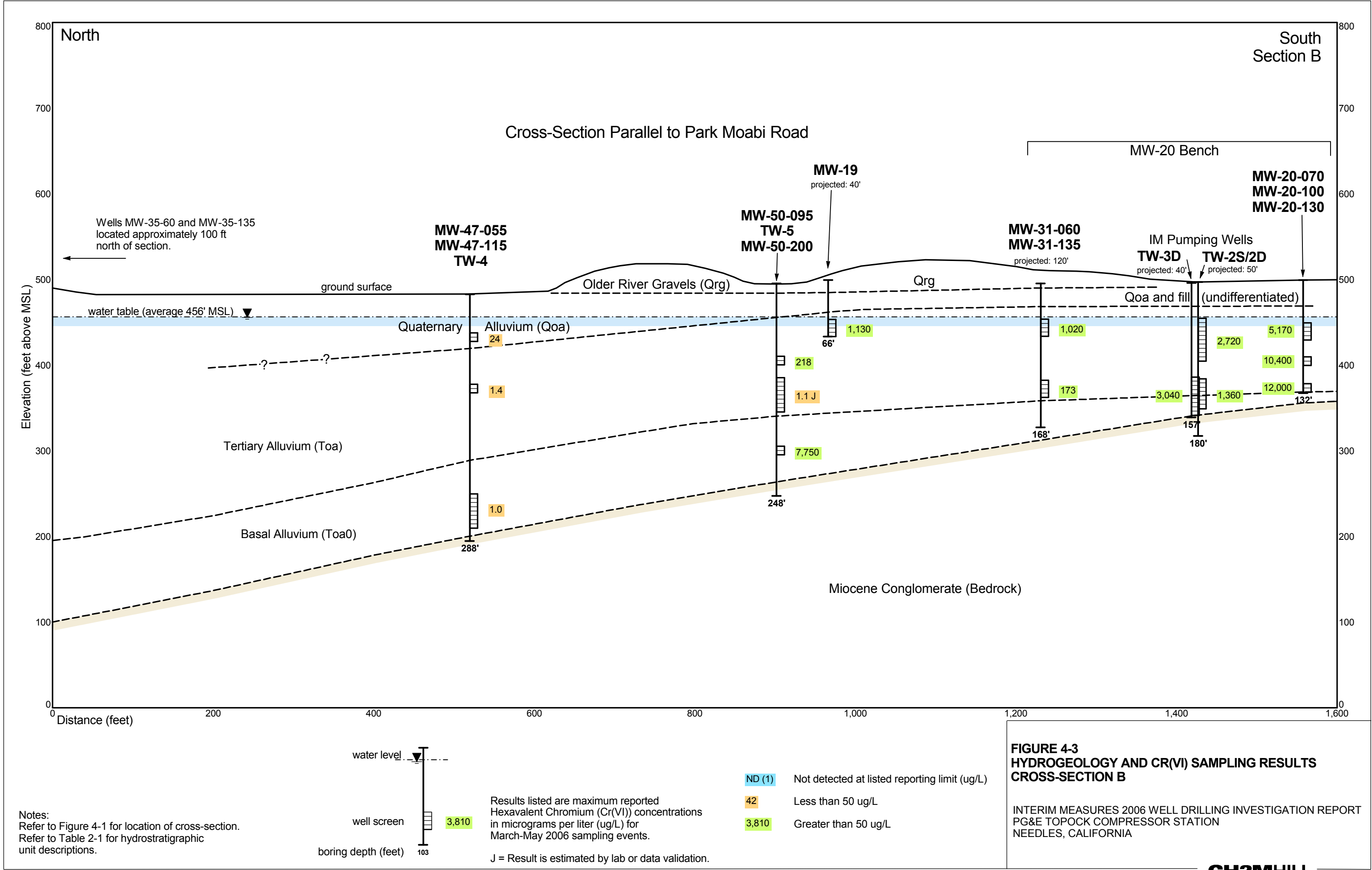
FIGURE 1-1 SITE LOCATION AND LAYOUT

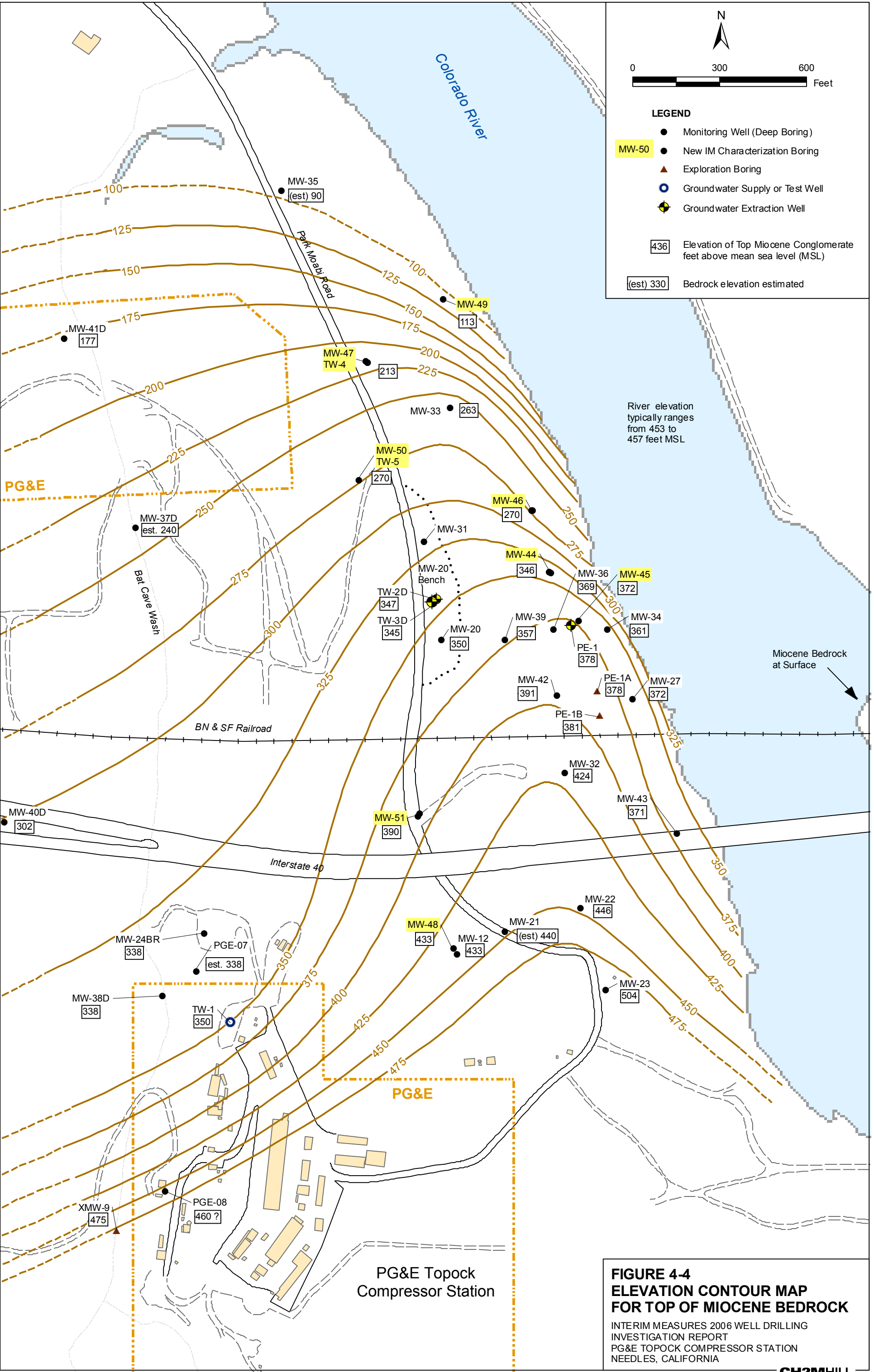
INTERIM MEASURES 2006 WELL
DRILLING INVESTIGATION REPORT
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

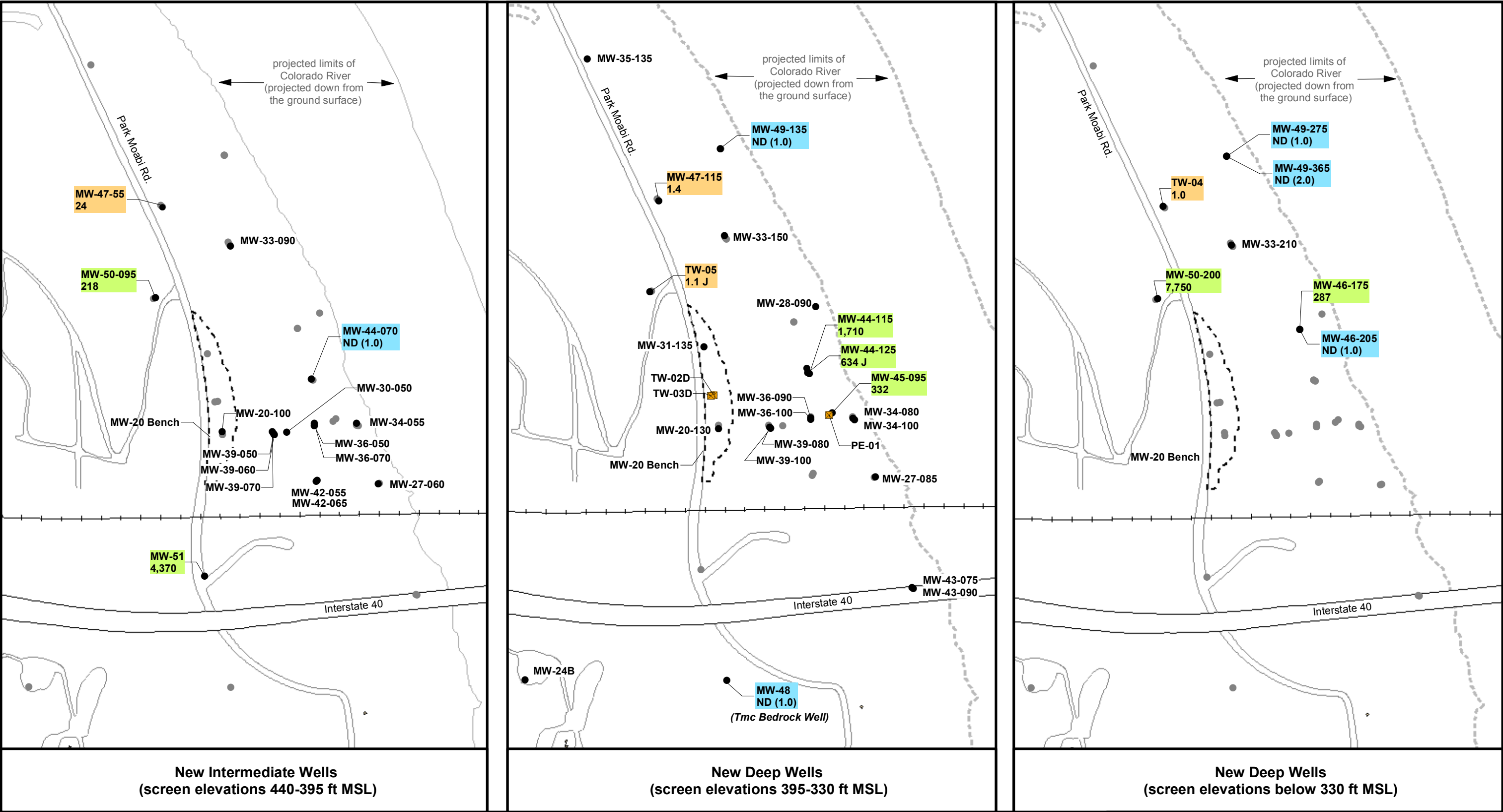
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LEGEND

- IM Extraction Well
- Groundwater Monitoring Well

Refer to Table 4-3 for additional sampling results and the May 2006 Performance Monitoring Report for Cr(VI) results and concentration contours for all Alluvial Aquifer wells in IM area.
MSL = Mean Sea Level

Maximum Hexavalent Chromium [Cr(VI)] Concentration Detected in New IM Monitoring Wells, March-May 2006

Concentrations in micrograms per liter (µg/L)

- ND (1) Not detected at listed reporting limit (µg/L)
- 41 Less than 50 µg/L
- 3,810 Greater than 50 µg/L

J = concentration estimated by laboratory or data validation

**FIGURE 4-5
CR(VI) SAMPLING RESULTS FOR NEW WELLS
IN PERFORMANCE MONITORING AREA,
MARCH - MAY 2006**

INTERIM MEASURES 2006 WELL
DRILLING INVESTIGATION REPORT
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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Appendix A
Drilling and Well Construction Records

SOIL BORING LOG


PROJECT NAME: IMPM Drill Program		HOLE DEPTH (ft): 134.0	DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 470.8 ft. MSL	NORTHING (CCS NAD 27 Z 5): 2,102,729.79	EASTING (CCS NAD 27 Z 5): 7,616,251.64	DATE STARTED: 3/6/2006	DATE COMPLETED: 3/7/2006
DRILLING METHOD: Rotosonic			DRILLING EQUIPMENT: Track Mounted Rotosonic	
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			LOGGED BY: R. Tweidt	

DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
5				SP	SAND (SP) - brn (10YR4/3), 95% f sand, <5% silt, 0% gravel, poorly sorted, non-plastic, wet, no odor	Hand augured to 5' bgs
10						
15						
20						
25			7			
30						
35			10			


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SHEET 2 of 5				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-44	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 134.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 470.8 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,102,729.79		EASTING (CCS NAD 27 Z 5): 7,616,251.64		DATE STARTED: 3/6/2006	
						DATE COMPLETED: 3/7/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Track Mounted Rotosonic			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: R. Tweidt			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
					SAND (SP) - brn (10YR4/3), 95% f sand, <5% silt, 0% gravel, poorly sorted, non-plastic, wet, no odor	Drill Rate = 10' / min	
40			10		- 95% sand, <5% silt, 0% gravel, <2% black organic specks, gravel up to 2 cm		
45					- 95% sand, <5% silt, <5% gravel, <2% black organic specks, gravel up to 2 cm, subrnd to rnd, chert & other sed rks present - sand coarsening downward, mostly m sand - local mottled black organic strings		
50			10		- 95% sand, <5% silt, <5% gravel, <2% black organic specks, <2% coarse sand	Drill Rate = 10' / min	
55					- sand coarsening downward, mostly m to c sand		
60				GW	SANDY GRAVEL (GW) - dk yellowish brn (10YR4/4), 35% sand, <5% silt, 60% gravel, well graded, subrnd to rnd up to 10 cm, wet, no odor, mostly sed with minor mm gravel		
65			10	SW	GRAVELLY SAND(SW) - dk yellowish brn (10YR4/4), 70% sand, <5% silt, 30% gravel, well grd, subrnd to rnd up to 9 cm, wet, no odor - gravelly lens, 35% sand, <5% silt, 60% gravel - 70% sand, <5% silt, 25% gravel, max dia 7 cm, trace black organic specks - 55% sand, <5% silt, 40% gravel, trace black organic specks - 85% sand, <5% silt, 10% gravel, gravel fining downward, max dia 5 cm, mostly sed - 85% sand, <5% silt, 10% gravel - 60% sand, <5% silt, 35% gravel, increased gravel, max dia 7 cm - clayey silt layer, brn (7.5YR4/3), low plasticity, slow dilatancy, soft	Drill Rate = 10' / min	
70							


SHEET 3 of 5				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-44		
SOIL BORING LOG								
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 134.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ		
SURFACE ELEVATION: 470.8 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,102,729.79		EASTING (CCS NAD 27 Z 5): 7,616,251.64		DATE STARTED: 3/6/2006		
						DATE COMPLETED: 3/7/2006		
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Track Mounted Rotosonic				
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: R. Tweidt				
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS		
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.		
75			10	ML	GRAVELLY SAND(SW) - dk yellowish brn (10YR4/4), 70% sand, <5% silt, 30% gravel, well grd, subrnd to rnd up to 9 cm, wet, no odor - 75% f to m grd sand, 10% silt, 15% gravel up to 7 cm - 10% sand, 75% silt, 15% gravel, iron-oxide layering	Drill Rate = 10' / min		
					SILT (ML) - dk yellowish brn (10YR4/4), 5% f sand, 95% silt, 5% gravel, gravel very ang to subang up to 4 cm, stiff, very moist to wet alluvial unit with fluvial package - mostly clay lenses with black organic material - 15% sand, 85% silt, <5% gravel, increased f sand, decreased gravel, strong Fe-ox	Drill Rate = 3.3' / min		
80			10	SP	SAND (SP) yellowish brn (10YR5/4), 70% m sand, <2% silt, 30% gravel, poorly graded, subrnd to rnd up to 8 cm, wet, no odor, distal rock suite assemblage - 65% sand, <5% silt, 30% gravel, rnd to subrnd, max dia 11 cm - 90% sand, <5% silt, 10% gravel, max dia for gravel 8 cm			
85								
90			10			- 55% m sand, 5% silt, 40% gravel, subrnd to well rnd with max dia 9 cm - Distal Derived Rock Assemblage		
95				GW	SANDY GRAVEL (GW) - brn (10YR4/3), 35% sand, <5% silt, 60% gravel, well graded, subrnd to well rnd up to 12 cm, wet, no odor, mostly sed to met - 20% sand, 0% silt, 80% gravel, max dia 11 cm			
100					SILTY GRAVELLY SAND (SM) - dk brn (7.5YR3/4), 70% sand, 15% silt, 15% gravel, well graded, subang to subrnd up to 3cm, wet, no odor, mostly met gravel - 40% sand, 25% silt, 15% gravel, subang to subrnd, max dia 3 cm, met gravel			
105								


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SHEET 4 of 5				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-44	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 134.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 470.8 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,102,729.79		EASTING (CCS NAD 27 Z 5): 7,616,251.64		DATE STARTED: 3/6/2006	
						DATE COMPLETED: 3/7/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Track Mounted Rotosonic			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: R. Tweidt			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
110			20	SM	SILTY GRAVELLY SAND (SM) - dk brn (7.5YR3/4), 70% sand, 15% silt, 15% gravel, well graded, subang to subrnd up to 3cm, wet, no odor, mostly met gravel - 50% sand, 20% silt, 30% gravel, subang to subrnd, max dia 4 cm, met gravel - 65% sand, 15% silt, 20% gravel, subang to subrnd, max dia 3 cm, met gravel - very dk gray (7.5YR3/1), 55% sand, 25% silt, 20% gravel, max dia 2 cm, slightly musty-sulphur odor, appears to contain organic material - dk brn (7.5YR3/3), 30% sand, 20% silt, 50% gravel, subang to subrnd, max dia 4 cm, highly weathered met gravel	Top of Reworked Bedrock (?)	
115							
120							
			ML	GRAVELLY SILT WITH SAND (ML) - dr reddish brn (5YR3/4), 25% sand, 45% silt, 30% gravel up to 8 cm, well graded, subang to subrnd up to 2 cm, wet, no odor, decomposed			
			SM	SILTY SAND (SM) - dr reddish brn (5YR3/4), 75% sand, 15% silt, 10% gravel, well graded, subang to subrnd up to 2 cm, wet, no odor			
125			BR	MIOCENE CONGLOMERATE (BR) - reddish brn (5YR4/4), 65% sand, 25% silt, 10% gravel, hard, clasts up to 10 cm, dry			
130							
					Boring Terminated at 134 ft ABBREVIATIONS cc = continuous core run brn = brown lt = light dk = dark vf = very fine-grained		

SHEET 5 of 5				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-44			
SOIL BORING LOG									
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 134.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ			
SURFACE ELEVATION: 470.8 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,102,729.79		EASTING (CCS NAD 27 Z 5): 7,616,251.64		DATE STARTED: 3/6/2006		DATE COMPLETED: 3/7/2006	
DRILLING METHOD: Rotosonic					DRILLING EQUIPMENT: Track Mounted Rotosonic				
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California					LOGGED BY: R. Tweidt				
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS			
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.			
					<i>f = fine-grained</i> <i>m = medium-grained</i> <i>c = coarse-grained</i> <i>vc = very coarse-grained</i> <i>ang = angular</i> <i>subang = subangular</i> <i>subrnd = subrounded</i> <i>rnd = rounded</i> <i>br = bedrock formation</i> <i>ss = sandstone</i> <i>conglom = conglomerate</i> <i>comptd = compacted</i> <i>qtz = quartz</i>				
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SHEET 1 of 4				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-45			
SOIL BORING LOG									
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 97.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ			
SURFACE ELEVATION: 466.6 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,102,559.75		EASTING (CCS NAD 27 Z 5): 7,616,358.13		DATE STARTED: 2/13/2006		DATE COMPLETED: 2/15/2006	
DRILLING METHOD: Rotosonic					DRILLING EQUIPMENT: Sonic AT (track mounted)				
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California					LOGGED BY: R. Tweidt				
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS			
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.			
5				SM	SILTY SAND (SM) - very pale brn (10YR7/4), 85% mostly f sand, 15% silt, <2% gravel, well sorted, non-plastic, dry, no odor				
10									
15									
20				SP	SAND (SP) - brn (10YR4/3), 95% mostly f to m sand, 5% silt, <2% gravel, well sorted, non-plastic, no odor - grades finer, increased (10% silt), f sand, - coarsening downward, mostly f to m sand, 5% silt				
25									
30									
35									

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SHEET 2 of 4				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-45		
SOIL BORING LOG								
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 97.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ		
SURFACE ELEVATION: 466.6 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,102,559.75		EASTING (CCS NAD 27 Z 5): 7,616,358.13		DATE STARTED: 2/13/2006		
						DATE COMPLETED: 2/15/2006		
DRILLING METHOD: Rotasonic				DRILLING EQUIPMENT: Sonic AT (track mounted)				
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: R. Tweidt				
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS		
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.		
40					SAND (SP) - brn (10YR4/3), 95% mostly f to m sand, 5% silt, <2% gravel, well sorted, non-plastic, no odor - black organic specks, sand fining, mostly f sand - coarsening downward, 60% med sand, 35% f sand, 5% silt, and black organic specks - f sand w/ clayey silt, very dk grayish brn (10YR3/2)			
45				SW/GW				GRAVELLY SAND/ SANDY GRAVEL (SW/GW) - dk grayish brn (10Yr4/2), 70% m sand, <5% silt, 5% gravel, poorly sorted, subrnd to rnd up to 8 cm, non-plastic, wet, no odor
50								SAND (SP) - dk yellowish brn (10YR 4/4), 95% mostly f to m sand, <2% f gravel, well sorted, subrnd to rnd up to 2 cm, wet, no odor, abundant black organic specks - mostly m sand, 5% gravel
55					- 15% gravel, rnd to subrnd up to 5 cm - layer of clayey silt with f sand, brown (7.5YR4/3) - fining downward, 5% mostly f gravel up to 1.5 cm - layer of silty clay with sand			
60								
65				SP				
70					- 90% mostly m sand, 5% silt, 5% gravel			


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SHEET 3 of 4				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-45	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 97.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 466.6 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,102,559.75		EASTING (CCS NAD 27 Z 5): 7,616,358.13		DATE STARTED: 2/13/2006	
						DATE COMPLETED: 2/15/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Sonic AT (track mounted)			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: R. Tweidt			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
75					SAND (SP) - dk yellowish brn (10YR 4/4), 95% mostly f to m sand, <2% f gravel, well sorted, subrnd to rnd up to 2 cm, wet, no odor, abundant black organic specks - silty clay lenses intermittent with sand, dk yellowish brn (10YR3/4), - increased gravel (15%) up to 5 cm		
80							
85							
90				ML	SANDY SILT (ML) - yellowish brn (10YR 5/4), 30% mostly c to m sand, 70% silt, 0% gravel - coarse river gravel deposit		
95				GW	SANDY GRAVEL (GW) - brn (10YR4/3), 25% c to m grained sand, 15% silt, 60% gravel, poorly sorted, rnd to subrnd up to 10 cm, low plasticity, wet, no odor		
				BR	Miocene Conglomerate (BR) - top 0.5' to 1.0' weathered - BR is competent		
					Boring Terminated at 97 ft ABBREVIATIONS cc = continuous core run brn = brown lt = light dk = dark vf = very fine-grained f = fine-grained m = medium-grained c = coarse-grained		


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SHEET 4 of 4				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-45			
SOIL BORING LOG									
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 97.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ			
SURFACE ELEVATION: 466.6 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,102,559.75		EASTING (CCS NAD 27 Z 5): 7,616,358.13		DATE STARTED: 2/13/2006		DATE COMPLETED: 2/15/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Sonic AT (track mounted)					
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: R. Tweidt					
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS			
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.			
					vc = very coarse-grained ang = angular subang = subangular subrnd = subrounded rnd = rounded br = bedrock formation ss = sandstone conglom = conglomerate comptd = compacted qtz = quartz				

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SHEET 1 of 7				PROJECT NUMBER:		BORING NUMBER: MW-46	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 217.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 480.8 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,102,942.15		EASTING (CCS NAD 27 Z 5): 7,616,194.03		DATE STARTED: 2/7/2006	
						DATE COMPLETED: 2/13/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Sonic AT (track mounted)			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: R. Tweidt			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
5		GB	5	SM	SILTY SAND (SM) - v pale brn (10YR7/4), 0% gravel, 85% f sand, 15% silts, well sorted, dry, no odor		
10		GB	5				
15		GB	5	SP	SAND (SP) - pale brn (10YR6/3), 0% gravel, 95% f sand, 5% fines, slightly moist, no odor		
20		GB	5				
25		GB	5				
30		GB	5				
35		GB	5	SP	- encountered groundwater		
				SM	- color change to dr yellowish brn (10YR4/4)		
				SM	SILTY SAND (SM) - dk yellowish brn (10YR3/4), 0% gravel, 85% f sand, 15% fines, well sorted, rapid dilatency, low strength, non-plastic, saturated, no odor		
				SP	SAND (SP) - brn (10YR4/3), 0% gravel, 90% f sand, 10% fines, well sorted, rapid dilatency, low strength, saturated, no odor		
				ML	SILT (ML) - v dk gray (10YR3/1), 0% gravels, 5% f sand, 90% fines,		


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SHEET 2 of 7				PROJECT NUMBER:		BORING NUMBER: MW-46				
SOIL BORING LOG										
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 217.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ				
SURFACE ELEVATION: 480.8 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,102,942.15		EASTING (CCS NAD 27 Z 5): 7,616,194.03		DATE STARTED: 2/7/2006				
						DATE COMPLETED: 2/13/2006				
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Sonic AT (track mounted)						
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: R. Tweidt						
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS				
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.				
40		GB	5	SM	well sorted, lateral layering, coarsening downward, saturated, no odor SILTY SAND (SM) - v dk greyish brn(10YR3/2), 0% gravel, 80% f sand, 20% fines, wells sorted, rapid dilatency, non-plastic, saturated, no odor	Stop drilling for day (02/07/06) Harder drilling at 37'				
				SP	SAND (SP) - brn (10YR4/3), 0% gravel, 90% f sand, 10% fines, well sorted, rapid dilatency, non-plastic, saturated, no odor					
45		GB	5	ML	SILT w/ CLAY (ML) - v dk grayish brn (10YR3/2), slow dilatency, high dry strength, m plasticity, wet, no odor					
				SM	SILTY SAND (SM) - v dk grayish brn (10YR3/2), 0% gravel, 80% f sand, 20% fines, well sorted, saturated, no odor SAND (SP) - v dk grayish brn (10YR3/2), 0% gravel, 90% f sand, 10% fines, well sorted, saturated					
50		GB	5	SP	- dk grayish brn (10YR4/2), thin layer of silt with clay, trace vf sand - subrnd chert pebble (1.5cm), coarsening downwards - 40% m sand, 60% f sand, <2% trace fines, coarsening downward - subang pebbles up to 2.5cm, <5% met schist fluvial material - subrnd chert up to 1cm, 65% m sand, 35% f sand, <5% pebbles - 85% f sand, 13% m sand, 2% fines, trace subang met pebbles up to 1.5cm - increased gravel, subrnd to subang up to 4cm, chert and met, coarsening downwards, 50% m sand, 45% f sand, <2% fines - fining downwards, 15% m sand, 80% f sand, <5% gravel, trace fines, gravel up to 5cm, subang met - >20% gravel layer, subang to subrnd					
55		GB	5							
60		GB	5							
65		GB	5							
70		GB	5		SW	- gravel layer >20%, subang to subrnd, chert WELL GRADED SAND w/ GRAVEL - dk yellowish brn (10YR4/4) (changes to 10YR3/2 at 71'), sand (c/m/f) (50/40/5), 5% subrnd to subang gravel up to 8cm, wet, no odor - begin fining down sequence, sand (c/m/f) (20/70/5), 5% gravel				


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SHEET 3 of 7				PROJECT NUMBER:		BORING NUMBER: MW-46		
SOIL BORING LOG								
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 217.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ		
SURFACE ELEVATION: 480.8 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,102,942.15		EASTING (CCS NAD 27 Z 5): 7,616,194.03		DATE STARTED: 2/7/2006		
						DATE COMPLETED: 2/13/2006		
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Sonic AT (track mounted)				
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: R. Tweidt				
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS		
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.		
75		GB	5		WELL GRADED SAND w/ GRAVEL - dk yellowish brn (10YR4/4) (changes to 10YR3/2 at 71'), sand (c/m/f) (50/40/5), 5% subrnd to subang gravel up to 8cm, wet, no odor	Stop drilling for day (02/08/06)		
				ML	CLAYEY SILT w/ GRAVEL (ML) - yellowish brn (10YR5/4), 10% subang to subrnd gravel, slow dilatency, high dry strength, m plasticity, wet, no odor - gravelly sand with silt layer			
80		GB	5	GM	CLAYEY SILT w/ GRAVEL (ML) - yellowish brn (10YR3/4), 10% subang to subrnd gravel up to 6cm, sand (20/30/20), 20% fines, poorly sorted, m dilatency, low dry strength, low plasticity, wet, no odor			
				85				GB
90		GB	5					
				95				GB
100		GB	5					
				105				GB


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SHEET 4 of 7				PROJECT NUMBER:		BORING NUMBER: MW-46			
SOIL BORING LOG									
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 217.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ			
SURFACE ELEVATION: 480.8 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,102,942.15		EASTING (CCS NAD 27 Z 5): 7,616,194.03		DATE STARTED: 2/7/2006			
						DATE COMPLETED: 2/13/2006			
DRILLING METHOD: Rotasonic				DRILLING EQUIPMENT: Sonic AT (track mounted)					
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: R. Tweidt					
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS			
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.			
110		GB	5	ML	SANDY SILT w/ GRAVEL (ML) - brn (7.5YR4/4), 10% subang f gravel up to 4cm, sand (c/m/f) (5/5/20), 60% fines, poorly sorted, low to med dilatency, med dry strength, low to med plasticity, moist, no odor	Drilling Rate Slows			
115		GB	5	SM	SILTY SAND w/ GRAVEL (SM) - brn (7.5YR4/4), 10% subang met gravel up to 5cm, sand (10/60/5), 15% fines, mostly met gravel, poorly sorted, med dilatency, non-plastic, wet, no odor				
120		GB	5	ML	SILT w/ GRAVEL (ML) - brn (7.5YR4/4), <10% subang to ang gravel up to 8cm, met sand (5/5/5), rapid dilatency, high dry strength, low plasticity, moist, no odor				
125		GB	5		- decomposed halos around met gravel evident - increased silt content (>80%), max gravel up to 3cm, trace clay				
130		GB	5						
135		GB	5	GM	SILTY GRAVEL (GM) - yellowish brn (10YR5/4), 50% ang to subang gravel up to 7cm, 10% c sand, 40% fines, poorly sorted, dry - increased c gravel (>30%), ang to subang up to 7cm, met				
		GB	5	SM	SILTY SAND w/ GRAVEL (SM) - brn (10YR4/3), 10% ang to subang met gravel up to 5cm, sand(10/60/5), 15% fines, poorly sorted, rapid dilatency, non-plastic, wet, no odor				
140						- increased fines (25%) - decreased fines (25%) - increased fines (30%), sand (15/15/30), 10% ang to subang met			


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SHEET 5 of 7				PROJECT NUMBER:		BORING NUMBER: MW-46	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 217.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 480.8 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,102,942.15		EASTING (CCS NAD 27 Z 5): 7,616,194.03		DATE STARTED: 2/7/2006	
						DATE COMPLETED: 2/13/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Sonic AT (track mounted)			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: R. Tweidt			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
145		GB	5	ML	gravel up to 3cm, decomp halos around some met gravel	Blue clay starts at 142'	
150		GB	5				
155		GB	5				
160		GB	5	SM	SILTY SAND w/ GRAVEL (SM) - v dk brn (10YR2/2), 10% ang to subang met gravel up to 3cm, stiff sand (5/50/20), 15% fines, poorly sorted. rapid dilatency, non-plastic, slightly moist, no odor SILT w/ GRAVEL (ML) - brn (7.5YR4/4), 15% ang to subang met gravel up to 8cm, 5% c sand, 80% fines, rapid dilatency, high dry strength, low plasticity, slightly moist, no odor. Possible top of reworked conglomerate?	Possible top of reworked Miocene Conglomerate	
165		GB	5				
170		GB	5				
175							


SOIL BORING LOG

PROJECT NAME: IMPM Drill Program		HOLE DEPTH (ft): 217.0	DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 480.8 ft. MSL	NORTHING (CCS NAD 27 Z 5): 2,102,942.15	EASTING (CCS NAD 27 Z 5): 7,616,194.03	DATE STARTED: 2/7/2006	DATE COMPLETED: 2/13/2006
DRILLING METHOD: Rotosonic			DRILLING EQUIPMENT: Sonic AT (track mounted)	
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			LOGGED BY: R. Tweidt	

DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
180				ML	SILT w/ GRAVEL (ML) - brn (7.5YR4/4), 15% ang to subang met gravel up to 8cm, 5% c sand, 80% fines, rapid dilatency, high dry strength, low plasticity, slightly moist, no odor. Possible top of reworked conglomerate? - decreased gravel (max dia 2cm), highly decomposed met gravel, dk reddish brn (5YR3/3) - soil becomes moist to wet, increased sand (5/10/15), 15% gravel - increased gravel size (up to 6cm)	
185						
190						
195						
200						
205						
210					- increased fines, decreased sand & gravel, trace clay, strong brn (7.5YR4/4) - increased sand & gravel gravel size increases up to 5cm, mod to highly weathered - soil becoming harder and more stiff, 75% fines (increase), sand (<5/5/10), 10% gravel, pebble size up to 4cm	

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SHEET 7 of 7				PROJECT NUMBER:		BORING NUMBER: MW-46	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 217.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 480.8 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,102,942.15		EASTING (CCS NAD 27 Z 5): 7,616,194.03		DATE STARTED: 2/7/2006	
						DATE COMPLETED: 2/13/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Sonic AT (track mounted)			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: R. Tweidt			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)				
215						DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
				BR	MIOCENE CONGLOMERATE (BR) - reddish brn (5YR4/4), mod to strong, matrix supported, gravel size up to 4cm, slightly mosit - bedrock becomes dry and more competent		
					Boring Terminated at 217 ft ABBREVIATIONS <i>cc = continuous core run</i> <i>brn = brown</i> <i>lt = light</i> <i>dk = dark</i> <i>vf = very fine-grained</i> <i>f = fine-grained</i> <i>m = medium-grained</i> <i>c = coarse-grained</i> <i>vc = very coarse-grained</i> <i>ang = angular</i> <i>subang = subangular</i> <i>subrnd = subrounded</i> <i>rnd = rounded</i> <i>br = bedrock formation</i> <i>ss = sandstone</i> <i>conglom = conglomerate</i> <i>comptd = compacted</i> <i>qtz = quartz</i>		


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SOIL BORING LOG

PROJECT NAME: IMPM Drill Program		HOLE DEPTH (ft): 288.0	DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL	NORTHING (CCS NAD 27 Z 5): 2,103,450.05	EASTING (CCS NAD 27 Z 5): 7,615,629.49	DATE STARTED: 2/27/2006	DATE COMPLETED: 3/13/2006
DRILLING METHOD: Rotosonic			DRILLING EQUIPMENT: Sonic AT (track mounted)	
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			LOGGED BY: B. Moayyad, K. Ebel	


DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
5			6	SP	POORLY GRADED SAND (SP) - very lt brn (10YR7/3), =2% fines, 98% f to m lithic quartz sand, subang to subrnd, dry - fine roots, iron staining, some iron oxide coating on grains	Hand augured to 5' bgs
10			10		- slightly moist - dry	Rapid drill rate, no chatter
15						
20			SW	WELL GRADED SAND w/ GRAVEL (SW) - lt yellowish brn (10YR6/4), 45% gravel up to 7cm, 50% f to m sand, 5% fines, loose, met subang gravel, dry(moist@ 17") - cobble present in slough - one subrnd chert gravel - Possible Fluvially Reworked Alluvium - lt grey (10YR7/2), subang to rnd met gravel up to 9cm, 2% to 5% fines - dk yellowish brn (10YR4/4), mostly c sand subang to ang, met, some Miocene conglomerate gravel - 65% sand, 30% gravel up to 4cm, 5% fines		
25				16	WELL GRADED SAND w/ GRAVEL (SW) - dk yellowish brn (10YR3/6), 35% gravel up to 4cm, 55% m to c sand, 10% silty fines, met clasts are grain supported some mm siltstone - some oxide staining	
30					SW	
35						




SHEET 2 of 9				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-47	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 288.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,450.05		EASTING (CCS NAD 27 Z 5): 7,615,629.49		DATE STARTED: 2/27/2006	
						DATE COMPLETED: 3/13/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Sonic AT (track mounted)			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: B. Moayyad, K. Ebel			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
40			2.5	SW	WELL GRADED SAND w/ GRAVEL (SW) - dr yellowish brn (10YR3/6), 30% gravel, 60% sand, 10% silty fines	Drilling smooth but preceeds less rapidly	
45			10	SW	- gravel is mostly fine	Soil sample collected	
50				SW	WELL GRADED SAND w/ GRAVEL (SW) - Pale brn (10YR6/3), 30% subang met gravel up to 5cm, 60% subrnd to subang m to c met sand, 10% silty fines, wet		
55			10	SP	POORLY GRADED SAND w/ GRAVEL (SP) - pale brn (10TR6/3), 30% f subang gravel up to 2 cm, 65% mostly c sand, =2% fines		
60					WELL GRADED GRAVEL w/ SILT AND SAND (GW) - brn (7.5YR5/4), 55% subang to ang met gravel up to 4cm, 25% f to c sand, 20% silty fines, dense, moist to dry	Collected Isoflow sample	
65			9.5	GW	- soil dries out - lt grey (10YR7/2) and powder dry - moist sandy zone, 55% gravel, 35% sand, 10% fines - dry silty lt grey GW below 65'	Drill rate slows to 2' / min	
70				SW	WELL GRADED SAND w/ GRAVEL (SW) - yellowish brn (10YR5/4), 35% subang met gravel up to 4cm, 60% subrnd sand, 5% silty fines, loose, moist to wet	Moderate Drill Rate	


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SHEET 3 of 9				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-47	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 288.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,450.05		EASTING (CCS NAD 27 Z 5): 7,615,629.49		DATE STARTED: 2/27/2006	
						DATE COMPLETED: 3/13/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Sonic AT (track mounted)			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: B. Moayyad, K. Ebel			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
75			9.5	SW	WELL GRADED SAND w/ SILT AND GRAVEL (SW) - yellowish brn (10YR5/4), 30% gravel, 50% sand, 20% silty fines, massive, dense, moist	Collected soil sample	
			GW	WELL GRADED GRAVEL w/ SILT AND SAND (GW) - lt gray, 65% ang met gravel, 25% subang sand, 10% fines, dry			
80			19	SM	SILTY SAND w/ GRAVEL (SM) - brn (10YR5/3), 22% subang met gravel up to 3.5cm, 50% subrnd to subang f to c sand, 23% silty fines, m density, wet	Collected Isoflow sample Moderate Drill Rate	
85				SW	WELL GRADED SAND w/ SILT AND GRAVEL (SW) - brn, 30% subang fine gravel, 65% subang to subrnd m to c sand, 10% silty fines, m dense, wet - silty zone, 15% fines	Driller reports harder drilling, likely stiff clay	
90				GW	WELL GRADED GRAVEL w/ SILT AND SAND (GW) - brn, 55% subrnd to subang met gravel up to 4.5cm, 35% f to c sand, 10% silty fines, lose to medium, wet	Green alteration mineral in milky quartz fragment	
95				SW	SILTY SAND w/ GRAVEL (SM) - 20% subang to subrnd met gravel, 60% subang f to c sand, 20% silty fines, massive, blocky, wet	Drill Rate = 1.5' / min	
100			12.5		WELL GRADED SAND w/ GRAVEL (SW) - grayish brn (10YR5/2), 15% subang to subrnd met gravel up to 2.5cm, 80% subrnd m to c sand, 5% silty fines, loose, wet	Soil sample collected	
105				SW	- becomes brn and gravelly, 30% gravel up to 3.5cm, 63% m to c sand, 7% fines		


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SHEET 4 of 9				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-47	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 288.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,450.05		EASTING (CCS NAD 27 Z 5): 7,615,629.49		DATE STARTED: 2/27/2006	
						DATE COMPLETED: 3/13/2006	
DRILLING METHOD: Rotasonic				DRILLING EQUIPMENT: Sonic AT (track mounted)			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: B. Moayyad, K. Ebel			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
110				GW	WELL GRADED SAND w/ GRAVEL (SW) - grayish brn (10YR5/2), 15% subang to subrnd met gravel up to 2.5cm, 80% subrnd m to c sand, 5% silty fines, loose, wet - silty with calcite nodules WELL GRADED GRAVEL w/ SILT AND SAND (GW) - brn, 60% gravel up to 4cm, 30% sand, 10% fines, dry	Core barrel fills at 108' bgs	
115			7	SW	WELL GRADED SAND w/ SILT AND GRAVEL (SW) - brn (7.5YR4/3), 25% subang met gravel up to 3.5cm, 65% subrnd f to c sand, 5% fines, loose, wet - greenish grey sand lenses	Significant rig chatter	
120			10	SM	SILTY SAND w/ GRAVEL (SM) - dusky red (2.5YR4/4), 15% subang met gravel up to 2.5cm, 60% subrnd to subang f to c sand, 20% fines, massive, blocky, clast supported, moist to wet	Driller reports intermittent hard layers	
125				GW	WELL GRADED GRAVEL w/ SILT AND SAND (GW) - light brownish gray (10YR6/2), 65% ang met gravel up to 4cm, 25% f to c sand, 5% silty fines, dry	Significant rig chatter	
130				SW	WELL GRADED SAND w/ SILT AND GRAVEL (SW) - dusky red, 15% gravel, 75% sand, 10% fines		
135			9	SM	SILTY SAND w/ GRAVEL (SM) - dusky red (2.5YR4/6), 15% subang to subrnd met gravel up to 3cm, 60% sand, 25% fines, massive, dense, clast supported, wet - more loose and less silty		
				SW	WELL GRADED SAND w/ SILT (SW) - dusky red (2.5YR4/6), 5% gravel, 90% subrnd f to c sand, 5% fines, loose, wet		
140					POORLY GRADED SAND w/ SILT (SP) - brn (7.5YR4/4), 5% subrnd to subang met gravel up to 4cm, 85% f to c sand, 10% fines, poorly graded, wet, no odor		


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SHEET 5 of 9				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-47	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 288.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,450.05		EASTING (CCS NAD 27 Z 5): 7,615,629.49		DATE STARTED: 2/27/2006	
						DATE COMPLETED: 3/13/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Sonic AT (track mounted)			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: B. Moayyad, K. Ebel			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
145			6	SP	POORLY GRADED SAND w/ SILT (SP) - brn (7.5YR4/4), 5% subrnd to subang met gravel up to 4cm, 85% f to c sand, 10% fines, poorly graded, wet, no odor	Collected Isoflow sample Drill rate = 0.75' to 1.5' / min	
			3	SM	SILTY SAND w/ GRAVEL (SM) - brn (7.5YR4/4), 20% subang to subrnd gravel up to 6cm, 60% f to c sand, 20% silty fines, well graded, m consolidated, met, wet, no odor		
150			5	SM	SILTY SAND w/ GRAVEL (SM) - dk yellowish brn (10YR4/4), 25% subang to subrnd up to 4cm met gravel, 60% well graded f to c sand, 15% fines, wet, no odor		
			4	SW	WELL GRADED SAND w/ SILT AND SAND (SW) - dr yellowish brn (10YR4/4), 10% subang to subrnd up to 3cm met gravel, 75%well graded f to c sand, 15% fines, moist to wet		
155			2	SW	SILTY SAND (SM) - brn (7.5YR4/4), 5% ang to subrnd met gravel up to 1.5cm increasing with depth, 85% poorly graded m to c sand, 10% fines, loose, wet		
			2	SM	SILTY SAND w/ GRAVEL (SM) - dk yellowish brn (10YR4/4), 15% subang to subrnd up to 2.5cm met gravel, 75% well graded f to c sand, 10% fines, mostly met, trace chert, loose, wet, no odor		
160			4	SM	SILTY SAND w/ GRAVEL (SM) - brn (7.5YR4/4), 25% subang to subrnd gravel up to 6.5cm, 60% m to c sand, 15% silty fines, well graded, m consolidated, met, wet, no odor		
			4	SW	SILTY SAND (SW) - mottled dk reddish brn (5YR3/4), 10% subang to subrnd gravel up to 2.5cm, 50% well graded f to m sand, 40% silt, metamorphic, dry to damp, no odor, interbedded sandy silt laminations		
165							
			5.5	SW	SAND w/ GRAVEL (SW) - dk reddish brn (5YR3/4), 20% subang to subrnd gravel up to 5cm, 75% f to c sand, 5% fines, well graded, loose, met, wet		
170							
			2.5	SM	SILTY SAND w/ GRAVEL (SM) - brn (7.5YR4/4), 15% subang to subrnd gravel, 70% f to m sand, 15% fines, poorly graded, met, increasingly consolidated, slightly to moderately calcareous, moist to wet		
175							


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SHEET 6 of 9				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-47	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 288.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,450.05		EASTING (CCS NAD 27 Z 5): 7,615,629.49		DATE STARTED: 2/27/2006	
						DATE COMPLETED: 3/13/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Sonic AT (track mounted)			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: B. Moayyad, K. Ebel			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
180			2	SM	SILTY SAND w/ GRAVEL (SM) - reddish brn (5YR4/4), 20% subang to subrnd gravel, 60% m to c sand, 20% fines, poorly graded, m consolidated, very calcareous, dry to damp, no odor	Collected Isoflow sample	
			4	SW	SILTY SAND (SW) - brn (7.5YR4/3), 10% subrnd to subang gravel up to 4.6cm, 70% f to c sand, 20% fines, well graded, met, moist to wet, no odor		
185			8	SM	SILTY SAND w/ GRAVEL (SM) - brn (7.5YR4/4), 20% subrnd to subang gravel up to 2.4cm, 65% f to c sand, 15% clayey fines lenses, well graded, met, very calcareous, dry to damp with locally moist areas, no odor	Drill Rate - 1.6' / min	
190			6	SM	SILTY SAND w/ GRAVEL (SM) - dr brn (7.5YR3/4), 10% subrnd to subang gravel up to 4cm, 75% f to c sand, 15% fines, well graded, loose to poorly consolidated, met, moist to wet, no odor		
195			2	GM	SILTY GRAVEL w/ SAND (GM) - reddish brn (5YR4/4), 45% subang to subrnd gravel up to 5.5cm, 40% f to c sand, 15% fines, slight to moderately calcareous, met, dry to damp with locally moist areas	Collected Isoflow sample	
			10	SM	SILTY SAND w/ GRAVEL (SM) - reddish brn (5YR4/4), 15% subang to subrnd gravel up to 5cm, 70% well graded f to c sand, 15% fines, moderately calcareous, loose to poorly consolidated, met, moist to wet - clay locally, slight decrease in gravel		
200						Drill Rate = 1.5' to 2' / min	
205							
210					SILTY SAND w/ GRAVEL (SM) - reddish brn (5YR4/4), 20% subang to subrnd gravel up to 6.5cm, 65% well graded f to c sand, 15% mostly clay fines, moderately to very calcareous, poorly graded, moist to wet - mostly met w. chloritic alteration		


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SHEET 7 of 9				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-47	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 288.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,450.05		EASTING (CCS NAD 27 Z 5): 7,615,629.49		DATE STARTED: 2/27/2006	
						DATE COMPLETED: 3/13/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Sonic AT (track mounted)			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: B. Moayyad, K. Ebel			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)				
215	X	X	7	SM	SILTY SAND w/ GRAVEL (SM) - reddish brn (5YR4/4), 20% subang to subrnd gravel up to 6.5cm, 65% well graded f to c sand, 15% mostly clay fines, moderately to very calcareous, poorly graded, moist to wet	Collected Isoflow sample Drill Rate = 1.5' / min	
			3	GM	SILTY GRAVEL w/ SAND (GM) - reddish brn (5YR4/4), subang to subrnd gravel up to 5cm, f to c sand, mostly clay fines, slight to moderately calcareous, moderate to well consolidated, met, dry to moist - minor chert, choloric alteration in parts		
220	X	X	3.5	SW	SILTY SAND (SW) - reddish brn (5YR4/4), 5% subang to subrnd gravel up to 2cm, 85% subang to subrnd sand, 15% fines, nom to slightly calcareous, well graded, loose to poorly consolidated, moist to wet - minor chloride alteration, increase in silt and clay locally		
			2.5	GW	GRAVEL W/ SAND (GM) - reddish brn (5YR4/4), 80% subang to subrnd gravel up to 6cm, 15% well graded f to c sand, 5% fines, nom to slightly calcareous, loose to poorly consolidated, met, wet, no odor - locally silty and sandy		
225	X	X	4	GM	SILTY GRAVEL W/ SAND (GM) - reddish brn (5YR4/4), 45% subang to subrnd gravel up to 5cm, 40% well graded f to c sand, 15% fines, poor to mod consolidated, mostly met, wet, no odor - minor chert, clayey locally, increase in fines locally		
			6	SM	SILTY SAND w/ GRAVEL (SM) - reddish brn (5YR4/4), 15% subang to subrnd gravel up to 3cm, 75% f to c sand, 10% fines, loose to mod consolidated, mostly met, wet, no odor - minor sed increase in fines, clay locally		
230	X	X	2		- met, increased silt and clay fraction, increased gravel, 25% subang to subrnd gravel up to 6.5cm, 55% sand, 20% fines		
			2	GW	SILTY GRAVEL w/ SAND (GW) - reddish brn (5YR4/4), 45% well graded subang to subrnd gravel up to 3cm, 35% well graded sand, 20% silt, mod to very calcareous, mod to well consolidated, mostly met, minor sed, dry to moist, no odor		
235	X	X			SILTY GRAVEL w/ SAND (GW) - reddish brn (5YR4/4), 55% well graded subang to subrnd gravel up to 7cm, 30% well graded sand, 15% silt, mod to very calcareous, mostly well consolidated, locally hard, mostly met, minor sed, dry to moist, no odor - locally very altered		
240	X	X				Collected Isoflow sample Drill Rate = 1' / min	
245	X	X					

SHEET 8 of 9				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-47	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 288.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,450.05		EASTING (CCS NAD 27 Z 5): 7,615,629.49		DATE STARTED: 2/27/2006	
						DATE COMPLETED: 3/13/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Sonic AT (track mounted)			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: B. Moayyad, K. Ebel			


DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
250			16	GW	SILTY GRAVEL w/ SAND (GW) - reddish brn (5YR4/4), 55% well graded subang to subrnd gravel up to 7cm, 30% well graded sand, 15% silt, mod to very calcareous, mostly well consolidated, locally hard, mostly met, minor sed, dry to moist, no odor	Drill rate = 0.75' / min
255						
260			10	GW	SILTY GRAVEL w/ SAND (GW) - reddish brn (5YR4/4), 65% well graded subang to subrnd gravel up to 8cm, 20% well graded sand, 15% silt, very calcareous, mostly well consolidated, mod to locally altered, mostly met, minor sed, dry to moist, no odor	Collected Isoflow sample
265				GW	SILTY GRAVEL w/ SAND (GW) - reddish brn (5YR4/4), 40% well graded subang to subrnd gravel up to 5.5cm, 35% well graded sand, 25% silt, mod to very calcareous, well consolidated, mod altered locally, mostly met, minor sed, dry to moist, no odor	Drill Rate = 1' / min
270			2.5	SW	SILTY SAND w/ GRAVEL (SW) - reddish brn (5YR4/4), 35% gravel up to 8cm, 45% well graded f to c sand, 20% fines, very calcareous, well consolidated, locally very altered, mostly met gravel, dry to moist, no odor	Drill Rate = 0.50' / min
275			0	GW	SILTY GRAVEL w/ SAND (GW) - reddish brn (5YR4/4), 65% well graded subang to subrnd gravel up to 5.5cm, 25% well graded f to c sand, 10% silt, very calcareous, well consolidated, mod to locally very altered, mostly met gravel, minor sed, damp to moist, no odor	
280			5	GW	SILTY GRAVEL w/ SAND (GW) - reddish brn (5YR4/4), 55% well graded subang to subrnd gravel up to 11.5cm, 30% well graded sand, 15% silt, very calcareous, well consolidated, very altered locally, mostly met, minor sed, damp to moist, no odor - gravel/sand fractions somewhat variable	
			2	SM	SILTY SAND w/ GRAVEL (SM) - reddish brn (5YR3/4), 30% poorly graded subang to subrnds gravel up to 11.5cm, 40% well graded sand, 30% fines, very calcareous, well consolidated to locally hard, mod to very altered in parts, mostly met, damp to moist, no odor	Collected Isoflow sample
			3	GW	SILTY GRAVEL w/ SAND (GW) - reddish brn (5YR3/4), 55% well graded subang to subrnd gravel up to 5.5cm, 30% well graded sand, 15% silt, very calcareous, well consolidated to commonly hard, mod to very altered locally, mostly met, minor sed, dry to moist, no odor	


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SHEET 9 of 9				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-47	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 288.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.6 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,450.05		EASTING (CCS NAD 27 Z 5): 7,615,629.49		DATE STARTED: 2/27/2006	
						DATE COMPLETED: 3/13/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Sonic AT (track mounted)			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: B. Moayyad, K. Ebel			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)				
285			0	BR	MIOCENE CONGLOMERATE BEDROCK (BR) - 60% well graded subang to rnd gravel up to 10cm, 30% well graded sand, 10% fines, very calcareous, well consolidated to mostly hard, mod to very altered locally, mostly met, dry to moist	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
					Boring Terminated at 288 ft ABBREVIATIONS <i>cc</i> = continuous core run <i>brn</i> = brown <i>lt</i> = light <i>dk</i> = dark <i>vf</i> = very fine-grained <i>f</i> = fine-grained <i>m</i> = medium-grained <i>c</i> = coarse-grained <i>vc</i> = very coarse-grained <i>ang</i> = angular <i>subang</i> = subangular <i>subrnd</i> = subrounded <i>rnd</i> = rounded <i>br</i> = bedrock formation <i>ss</i> = sandstone <i>conglom</i> = conglomerate <i>comptd</i> = compacted <i>qtz</i> = quartz		


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SHEET 1 of 5				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-48	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 138.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 484.4 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,101,435.28		EASTING (CCS NAD 27 Z 5): 7,615,915.90		DATE STARTED: 5/3/2006	
						DATE COMPLETED: 5/4/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT:			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: K. Ebel			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
5			0	SM	SILTY SAND (SM) - yellowish brn (10YR5/4), 65% vf to f sand, 25% silt, 10% met gravel, poorly graded, subang to ang up to 4cm, very loose, dry - some c sand, gravel increases to 15% - 40% gravel - some <3cm silt nodules, well graded, increased silt, 50% sand, 35% fines, 15% gravel - brn (10YR4/3), 65%sand, 10% fines, 25% gravel, increased gravel and c sand, mostly subang, loose, dry	Hand auger to ~6'	
10			10		Drilling Hard		
15					Drilling Hard		
20			10	SM	- becomes moist, dk yellow brn (10YR3/4), 75% sand, 15% fines, 10% silt - (10YR4/4) - increasing gravel up to 6cm, subrnd, met, 50% sand, 10% fines, 40% gravel		
25							
30			10		SILTY SAND W/ GRAVEL (SM) - dr yellowish brn (10YR4/4), 40% vf to c sand, 30% silt, 30% gravel, subang up to 4cm, dk met sand and gravel, hard, moist SANDY SILT W/ GRAVEL (ML) - dk yellow brn (10YR4/3), 35% vf to c sand, 50% met fines (50% clay & 50% silt), 15% gravel ,subang up to 2cm, m density, moist SILTY SAND W/ GRAVEL (SM) - dr yellowish brn (10YR4/4), 40% vf to c sand, 30% silt, 30% gravel, subang up to 4cm, dk met sand and gravel, hard, moist		
35					- large 10cm cobble, mm, lightly weathered		



SHEET 2 of 5				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-48	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 138.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 484.4 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,101,435.28		EASTING (CCS NAD 27 Z 5): 7,615,915.90		DATE STARTED: 5/3/2006	
						DATE COMPLETED: 5/4/2006	
DRILLING METHOD: Rotasonic				DRILLING EQUIPMENT:			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: K. Ebel			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
40			5	SM	WELL GRADED SAND (SM) - 75% mostly m to c sand, 10% fines, 15% gravel, subang up to 3cm, dark met, loose, moist - more fines, 60% sand, 25% fines, 15% gravel	Drilling Hard Drilling Hard - top of old alluvium ?	
45			6	SM	SAND w/ SILT and GRAVEL (SM) - reddish brn (5YR4/3), 45% m to c sand, 20% fines, 35% gravel, subang up to 4cm, mm, m density, wet - gravel fines, 75% sand, 15% fines, 10% gravel - clay nodules		
50			8	GM	GRAVEL w/ SILT and SAND dk reddish brn (5YR3/4), 25% well graded f to c sand, 30% fines, 45% subang gravel up to 9cm, fine silt, loose, dry SILT w/ SAND and GRAVEL (ML) - dr reddish brn (5YR3/3), 30% f to c poorly graded sand, 45% fines, 25% weathered gravel, subrnd to subang up to 3cm, loose, moist - 25% sand, 65% fines, 10% gravel, very wet - sandy lenses, 60% sand, 30% fines, 10% gravel - 30% gravel, 30% sand, 40% fines - large mm cobble, all highly weathered		
55					SANDY SILTY GRAVEL (GM) - dr reddish brn (5YR3/4), 30% f to c well graded subrnd to subang sand, 20% fines, 50% weathered gravel, subrnd to subang up to 10mm		
60			5				
65			5	GM	- increased gravel and silt, 15% sand, 25% silt, 60% gravel - large conglomerate cobbles, no met		
70			5				



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SHEET 3 of 5				PROJECT NUMBER: 326128.01.16.EN				BORING NUMBER: MW-48			
SOIL BORING LOG											
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 138.0				DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ			
SURFACE ELEVATION: 484.4 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,101,435.28		EASTING (CCS NAD 27 Z 5): 7,615,915.90		DATE STARTED: 5/3/2006			DATE COMPLETED: 5/4/2006		
DRILLING METHOD: Rotasonic						DRILLING EQUIPMENT:					
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California						LOGGED BY: K. Ebel					
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS					
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)								
75			5	GM	SANDY SILTY GRAVEL (GM) - dr reddish brn (5YR3/4), 30% f to c well graded subrnd to subang sand, 20% fines, 50% weathered gravel, subrnd to subang up to 10mm - less gravel, slightly moist, dense, fines are about 35% clay, gravel up to 5cm, 30% sand, 35% fines, 35% gravel						
80			10		SILTY SANDY GRAVEL (GW) - reddish brn (5YR4/4), 30% m sand, 20% fines, 50% gravel, subrnd to subang up to 4cm, mm & conglom clasts, loose, dry						
85											
90			10	SM	SILTY SAND (SM) - dr reddish (5YR3/3), 75% m subrnd sand, 20% fines, 5% gravel, subrnd to subang up to 8cm, trace clay, saturated - sand and gravel coarsening with depth, 50% sand, 20% fines, 30% gravel						
95				ML	SANDY SILT W/ GRAVEL (ML) - dk reddish brn (5YR3/3), 30% vf to c sand, 60% met fines, 10% gravel, subrnd up to 4cm, m density, wet - much siltier, 10% sand, 85% fines, 5% gravel - dr brn (7.5YR3/4), loose but dry gravel up to 6cm, 25% sand, 45% fines, 30% gravel - reddish brn (5YR4/4)						
100			10	GM	SANDY SILTY GRAVEL (GM) - brn (7.5YR4/4), 35% f to c sand, 35% fines, 40% gravel, subrnd to subang up to 9cm, mm, loose, dry - coarsening of sand and gravel - brn (7.5YR4/4)						
105											


SHEET 4 of 5				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-48	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 138.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 484.4 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,101,435.28		EASTING (CCS NAD 27 Z 5): 7,615,915.90		DATE STARTED: 5/3/2006	
						DATE COMPLETED: 5/4/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT:			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: K. Ebel			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
					SANDY SILTY GRAVEL (GM) - brn (7.5YR4/4), 35% f to c sand, 35% fines, 40% gravel, subrnd to subang up to 9cm, mm, loose, dry	Drill Rate = 1' / min	
110			10	ML	SILT w/ GRAVEL (ML)		
115					SILTY SANDY GRAVEL (GM)		
120			10	GM		Hard Drilling = 3' / min	
125							
130			1	GM	SILTY GRAVEL w/ SAND (GM)	Hard Drilling - Lost core from 127' to 137'	
135							
					SILTY SANDY GRAVEL (GM) - core sized conglom clasts - gravel fining	Very Hard Drilling = 0.7' / min, chattering	

SHEET 5 of 5				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-48	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 138.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 484.4 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,101,435.28		EASTING (CCS NAD 27 Z 5): 7,615,915.90		DATE STARTED: 5/3/2006	
						DATE COMPLETED: 5/4/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT:			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: K. Ebel			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
			10	GM	SILTY SANDY GRAVEL (GM) - core sized conglomerate clasts - moist core, subangular gravel, 15% sand, 35% fines, 50% gravel - dry core, subangular gravel, 15% sand, 35% fines, 50% gravel - 20% sand, 30% fines, 50% gravel	Drilling easier = 1.5' / min	
			8				
				BR	MIOCENE CONGLOMERATE (BR) - gravel coarsening up to 9cm		
					<i>Boring Terminated at 155 ft</i> ABBREVIATIONS <i>cc = continuous core run</i> <i>brn = brown</i> <i>lt = light</i> <i>dk = dark</i> <i>vf = very fine-grained</i> <i>f = fine-grained</i> <i>m = medium-grained</i> <i>c = coarse-grained</i> <i>vc = very coarse-grained</i> <i>ang = angular</i> <i>subang = subangular</i> <i>subrnd = subrounded</i> <i>rnd = rounded</i> <i>br = bedrock formation</i> <i>ss = sandstone</i> <i>conglom = conglomerate</i> <i>comptd = compacted</i> <i>qtz = quartz</i>		


SHEET 1 of 12				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-49	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 385.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.5 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,667.51		EASTING (CCS NAD 27 Z 5): 7,615,889.90		DATE STARTED: 3/12/2006	
						DATE COMPLETED: 3/22/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Track Mounted Rotosonic			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: K. Ebel / L. Kelly			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
5				SP	POORLY GRADED SAND (SP) - It reddish brn (5YR6/3), 0% gravel, 98% vf to f mostly quartz sand with some Fe staining, 2% fines, small mm fraction, loose, moist	No core, only slough	
10					- grades finer, mostly vf sand, 0% gravel, 95% sand, 5% fines, micaceous minerals, dry		
15							
20							
25							
30				SM	SILTY SAND (SM) - yellowish brn (10YR4/4), 0% gravel, 80% f subrnd sand with silt fraction, 20% fines, moist		
35					- very clayey lens, 0% gravel, 55% sand, 45% fines - clay nodules are larger & harder, (0, 70, 30)		


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SHEET 2 of 12				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-49		
SOIL BORING LOG								
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 385.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ		
SURFACE ELEVATION: 482.5 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,667.51		EASTING (CCS NAD 27 Z 5): 7,615,889.90		DATE STARTED: 3/12/2006		
						DATE COMPLETED: 3/22/2006		
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Track Mounted Rotosonic				
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: K. Ebel / L. Kelly				
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS		
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.		
40				CL	CLAY w/ SAND (CL) - brn (10YR4/3), 0% gravel, 5% sand, 95% fines, low hardness, m plasticity, mostly clay			
				SM	SILTY SAND (SM) - brn (10YR4/3) 0% gravel, 75% f subrnd to rnd mostly quartz sand, 25% fines, m density, moist.			
				ML	SILT w/ SAND (SM) - brn (10YR4/3), 0% gravel, 15% sand, 85% silt, m density, low plasticity, moist to sat			
45				SM	SILTY SAND (SM) - brn (10YR4/4), 0% gravel, 80% sand, 20% silt w/subang - rnd 3 inches in density - 6cm v hard siltstone gravel, cemented - 3" silt - very high dilatency, saturated - 3" clay with silt, gravel up to 2cm - f sand (0.75,15) - mottled brown/blk sand			
					ML			SILT w/ SAND (ML) - brn (10YR4/2), 0% gravel, 9% sand, 10% silt, m density, moist
								SM
50				ML	- sand			
					GW			
								ML
55								
60								
65								
70								


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SHEET 3 of 12				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-49	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 385.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.5 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,667.51		EASTING (CCS NAD 27 Z 5): 7,615,889.90		DATE STARTED: 3/12/2006	
						DATE COMPLETED: 3/22/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Track Mounted Rotosonic			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: K. Ebel / L. Kelly			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
75				GM	SILT SANDY GRAVEL (GM) - drk yellowish brn (10YR4/3, 50% gravel, 35% sand, 15%, sand, subrd-subang, mostly m-c gravel subrnd-subang met, up to 7cm, loose wet - gravel mostly subrnd	Drilling Rate Slows	
80				GW	SANDY GRAVEL (GW) - yellowish brn (10YR5/4), 65% m sand, 30% silt, 5% gravel subnrg, sand mostly c, subrnd-subang only silt - gravel up to 8 cm - gravel (c sandstone) lt cm		
85				ML	SANDY GRAVELLY SILT (ML) - yellowish brn (10YR5/4), 35% sand, 30% silt, 45% subng met gravel up to 4 cm, subrnd-subang m-c sand, v. soft, saturated		
90				GW	SANDY GRAVEL (GW) - greyish brn (10YR4/2), 30% sand, 68% silt, 2% gravel, subng met, f gravel up to 2 cm and vc sand, well graded, most n, 5 cm 100% wet - minor clay (85,10,5) gravel, coarsens up to to 9 cm, some silt nodules		
95				SW	GRAVELLY SAND (SM) - greyish brn (10R4/2) 30% sand, 68% silt 2% gravel silt subrnd-subang gravel up to 3 cm, sand m-c, met - almost no gravel, (5,85,10) sand f-c		
100				GM	SANDY SILTY GRAVEL (GM) - brn (10YR4/3), 55% subang gravel up to 6cm, 25% subang to subrnd f to c sand, 20% fines, met and some alteration, loose, wet - 3 core barrel (8") 55 clasts		
105							


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SHEET 4 of 12				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-49			
SOIL BORING LOG									
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 385.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ			
SURFACE ELEVATION: 482.5 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,667.51		EASTING (CCS NAD 27 Z 5): 7,615,889.90		DATE STARTED: 3/12/2006			
						DATE COMPLETED: 3/22/2006			
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Track Mounted Rotosonic					
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: K. Ebel / L. Kelly					
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS			
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.			
110					SANDY SILTY GRAVEL (GM) - brn (10YR4/3), 55% subang gravel up to 6cm, 25% subang to subrnd f to c sand, 20% fines, met and some alteration, loose, wet - poor sample quality due to several attempts to recover core	Poor core recovery due to several attempts to recover core			
				SW	WELL GRADED SAND (SW) - yellowish brn (10YR5/4), 5% rnd to subrnd gravel up to 1.5cm, 95% f to c sand, 0% fines, ig/met/sed mix, locally more gravel, % gravel increases w/depth, loose, wet				
115				SP	POORLY GRADED SAND w/ GRAVEL (SP) - yellowish brn (10YR5/4), 40% rnd to subrnd f to c gravel up to 4.5cm, 60% m to c sand, 0% fines, ig/met mix, minor alteration, loose, wet				
120				GW	WELL GRADED GRAVEL w/ SAND (GW) - yellowish brn (10YR5/4), 85% subang to subrnd f to c gravel up to 7.5cm, 15% f to c sand, 0% fines, coarse gravel w/depth, ig/met/sed mix, minor alteration, loose, wet				
				GW	GRAVEL w/ SAND (GW) - dr yellowish brn (10YR4/4), 75% subrnd to subang gravel, 20% sand, 5% fines, cobbles up to 12 cm, met/sed/ig mix, loose, wet				
125				GW	GRAVEL w/ SAND (GW) - yellowish brn (10YR5/4), 60% f to c gravel up to 6cm, 40% f to c sand, 0% fines, mostly ig/met, loose, wet - poor sample quality due to attempts to recover core			Poor core recovery due to several attempts to recover core	
130				GM	SILTY SAND w/ GRAVEL - brn (10YR4/3), 45% subang to subrnd f to c gravel up to 4cm, 35% f to c sand, 20% fines, ig to mostly met gravel, some chloritic alteration, fines clay in part, loose to poorly consolidated, wet				
135				SW	WELL GRADED SAND (SW) - dk yellowish brn (10YR4/4), 5% subang to subrnd gravel up to 2cm, 95% f to c sand, 0% fines, met/sed mix, locally more gravel, % gravel increases w/depth, loose, wet				
				GW	WELL GRADED GRAVEL w/ SAND (GW) - yellowish brn (10YR5/4), 85% subrnd to subang f to c gravel up to 3cm, 15% f to c sand, 0% fines, loose, wet				
140				SM	SILTY SAND w/ GRAVEL (SM) - brn (7.5YR4/4), 25% subang to subrnd gravel up to 3cm, 45% f to c sand, 30% fines, mostly met, low plasticity, poor to mod consolidated				


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SHEET 5 of 12				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-49	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 385.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.5 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,667.51		EASTING (CCS NAD 27 Z 5): 7,615,889.90		DATE STARTED: 3/12/2006	
						DATE COMPLETED: 3/22/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Track Mounted Rotosonic			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: K. Ebel / L. Kelly			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
145				GM	SILTY GRAVEL w/ SAND (GM) - reddish brn (5YR4/4), 55% f to c subang to subrnd gravel up to 7.5cm, 20% sand, 25% fines, mostly met, some chloritic alteration, low plasticity, poorly consolidated, wet	Good sample quality	
				SM	SILTY SAND (SM) - brn (7.5YR4/4), 10% f gravel, 50% f to c sand, 40% fines, mostly met, low plasticity, poor to mod consolidated, moist to wet		
150				SM	GRAVELLY SAND (SM) - drk yellowish brn (10R4/4) 40% sand, 50% silt 10% gravel silt mc sand, gravel up to 3 cm, modtly ig. some met subang wet	Drilling Rate Slow = 0.5' /min	
				GM	SANDY GRAVEL (GM) - drk yellowish brn (10YR4/4), 45% sand, 40% silt, 15% sand, subang subrnd gravel up to 5 cm, subrnd-subang m-c sand, ig. and met, loose, wet		
155				SM	GRAVELLY SAND (SM) - drk yellowish brn (10R4/4) 20% sand, 65%, 15% silt subang f gravel up to 2 cm, subrnd-subang mc sand, ig & met loose, wet	Drilling Rate = 2' /min	
160				SM	GRAVELLY SILTY SAND (SM) - reddish brn (5YR4/3), 35% sand, 45% silt, 20% gravel, subang gravel up to 4 cm, well graded for subrnd-subang sand, mostly met, some ig & sed, dark in parts, moist - dr greyish brn (10YR4/2), (25,70,15), more sed. gravels		
165				GM	SANDY GRAVEL w/ SILT (GM) - brn (7.5Yr5/4), 60% sand, 20% silt, 20% subang f gravel up tp 3 cm, m-c subang sand, mostly met, some ig & sed, loose, wet		
				SM	SILTY SAND w/ GRAVEL (SM) brn (7.5/yr4/4 - 10% sand, 70% gravel, 20% sand subrnd-subang met gravel, up t 2 cm - well graded f sand, density moist		
170					GRAVELLY SAND (SM) - brn (7.5YR4/3) 20% sand, 60% 15% subrnd subang met & ig f grave up to 5 cm. subrnd-subang m-c sand, loose, wet - brn 7.5yr4/2 (15,80,5), sand mostly poorly graded m. sand - brn (7.5Yr4/4), (25,60,15), siltier gravel up to 7 cm, ig & met		
175							


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SHEET 6 of 12				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-49	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 385.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.5 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,667.51		EASTING (CCS NAD 27 Z 5): 7,615,889.90		DATE STARTED: 3/12/2006	
						DATE COMPLETED: 3/22/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Track Mounted Rotosonic			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: K. Ebel / L. Kelly			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
180				SM	GRAVELLY SAND (SM) - brn (7.5YR4/3) 20% sand, 60% 15% subrnd subang met & ig f grave up to 5 cm. subrnd-subang m-c sand, loose, wet - reddish brn (5YR4/3), (35,45,20) - saturated, (33,35,30), gravel up to 8 cm - gravel up to 15 cm	Driller says hole is soupy	
185					- sandier, (20,55,25)		
190					- dk brn (7.5YR4/3), (35,45,20), gravel subang-ang up to 3 cm, mostly met, some ig sand subrnd-subang, mostly m-c		
195				SM	SAND w/ SILT (SM) - drk greyish brn (10YR4/2), 5% mostly c to m sand, 18% silt, 10% gravel, m-c subrnd-subang met sand, loose, wet		
200					GRAVELLY SILTY SAND (SM) - greyish brn (10R4/2) 35% sand, 40% silt 25% subrnd-subang met, altered and weathered gravel up to 4 cm, v f-c subang sand,m m dense clast separated, moist - brn (7.5YR4/4), (20,50,30), met gravel up to 3 cm		
205					- sand (30,55,25), sand mostly met, gravel finer up to 2cm		
210							


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SHEET 7 of 12				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-49	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 385.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.5 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,667.51		EASTING (CCS NAD 27 Z 5): 7,615,889.90		DATE STARTED: 3/12/2006	
						DATE COMPLETED: 3/22/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Track Mounted Rotosonic			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: K. Ebel / L. Kelly			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
215				SM	GRAVELLY SILTY SAND (SM) - greyish brn (10R4/2) 35% sand, 40% silt 25% subrnd-subang met, altered and weathered gravel up to 4 cm, v f-c subang sand,m m dense clast separated, moist - sand (20,45,35), siltier, gravel up to 5 cm		
220					- dk brn (7YR3/4), (25,45,30), subrnd-subang met gravel up to 6 cm	Stop drilling for the day (03/23/06)	
225					- br (7.5YR4/2), (15,70,15), subang gravel up to 2 cm	Drilling Rate = 1' /min	
230				SP	POORLY GRADED SAND (SP) - reddish brn (5YR4/3), 5% sand, 93% silt 2% gravel wet m subrnd-subang met sand minor gravel to 6		
235					GRAVELLY SILTY SAND (SM) - reddish brn (5YR4/4), 30% subrnd to subang ig/met gravel up to 3cm, 45% f to c subrnd to subang sand, 25% silt, med density, moist		
240					- (40, 45,15), mostly met	Fast Drilling Rate	
245				SM	- (15,55,30), mostly ig - (40,40,20), mixed met, dk reddish brn (5YR3/3), mostly f gravel up to 6cm		


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SHEET 8 of 12				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-49	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 385.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.5 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,667.51		EASTING (CCS NAD 27 Z 5): 7,615,889.90		DATE STARTED: 3/12/2006	
						DATE COMPLETED: 3/22/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Track Mounted Rotosonic			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: K. Ebel / L. Kelly			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
250					GRAVELLY SILTY SAND (SM) - reddish brn (5YR4/4), 30% subrnd to subang ig/met gravel up to 3cm, 45% f to c subrnd to subang sand, 25% silt, med density, moist - (20,50,30), mostly met, increasing silt, gravel up to 4 cm - (20,85,5), poorly graded, m-c sand, gravel up to 2 cm, loose		
255				SW	WELL GRADED SAND w/ GRAVEL (GW) - reddish brn 5YR4/4, 30% f ang to subrnd gravel up to 2.5cm, 65% f to c sand, 5% silt, gravel mostly met, minor alteration, mod to very calcareous, saturated	Stop drilling for the day (03/24/06)	
260				GW	WELL GRADED GRAVEL w/ SAND (GW) - reddish brn (5YR4/4), 50% ang to subrnd f to c gravel up to 6.5cm, 45% f to c sand, 5% fines, gravel mostly met, some alteration, mod to very calcareous, loose, wet - 65% gravel up to 11cm, 30% sand, 5% fines, mostly met - 55% gravel up to 8cm, 35% sand, 10% fines, clayey in part, locally minor gravel, mostly met, very strong alteration		
265				SM	SILTY SAND w/ GRAVEL (SM) - brn (5YR4/4), 30% subang to subrnd f gravel up to 3.5cm, 55% f to c sand, 15% fines, mostly met, very calcareous, loose to poorly consolidated, wet		
				SM	SILTY SAND (SM) - reddish brn (5YR4/4), 5% subang to rnd f gravel, 80% f to c sand, 15% silt, fines clayey in part, gravel mostly met, very calcareous, loose to poorly consolidated, wet		
270				GM	SILTY GRAVEL w/ SAND (GM) - reddish brn (5YR4/4), 60% subang to subrnd f gravel up to 2.5cm, 30% f to c sand, 10% fines, mostly met gravel, fines clayey in part, mod calcareous, low plasticity, loose to poorly consolidated, wet		
				GM	SILTY GRAVEL w/ SAND (GM) - dk reddish brn (2.5YR3/3), 65% f to c subang to subrnd gravel up to 7cm, 20% f to c sand, 15% fines, fines clayey in part, gravel mostly met, mod calcareous, low plasticity, loose to poorly consolidated, wet		
275				SW	WELL GRADED SAND (SW) - reddish brn (5YR4/4), 10% subrnd to subang f gravel up to 2cm, 85% f to c sand, 5% fines, gravel mostly met, mod calcareous, loose, wet		
280				SW	SILTY SAND w/ GRAVEL (SW) - reddish brn (5YR4/4), 35% subang to subrnd f to c gravel up to 4cm, 45% f to c sand, 20% fines, fines clayey in part, gravel mostly met, poorly consolidated, wet		


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SOIL BORING LOG

PROJECT NAME: IMPM Drill Program		HOLE DEPTH (ft): 385.0	DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.5 ft. MSL	NORTHING (CCS NAD 27 Z 5): 2,103,667.51	EASTING (CCS NAD 27 Z 5): 7,615,889.90	DATE STARTED: 3/12/2006	DATE COMPLETED: 3/22/2006
DRILLING METHOD: Rotosonic			DRILLING EQUIPMENT: Track Mounted Rotosonic	
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			LOGGED BY: K. Ebel / L. Kelly	

DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
285						Stop drilling for the day (03/25/06)
				CL	CLAY w/ SAND (CL) - reddish brn (2.5YR4/3), 10% f subang to subrnd gravel up to 2cm, 20% sand, 70% fines, low hardness, m plastic fines, mostly clay, moderately consolidated, wet	
GC				CLAYEY GRAVEL w/ SAND (GL) - reddish brn (2.5YR4/3), 40% f to c subang to subrnd gravel up to 6cm, 35% f to c sand, 25% fines, gravel is mostly met, mod plasticity, mod to well consolidated, wet		
ML				SANDY SILT w/ GRAVEL (ML) - dk reddish brn (2.5YR3/3), 30% subang to subrnd gravel up to 2.5cm, 25% sand, 45% fines, very calcareous, non to low plasticity, mod to well consolidated, moist to wet		
SM				SILTY SAND w/ GRAVEL (SM) - reddish brn (5YR4/3), 40% subang to subrnd f to c gravel up to 4cm, 45% f to c sand, 15% fines, non to low plasticity, mostly met, very calcareous, increased fines locally, mod consolidated, moist to wet		
SW				SAND w/ GRAVEL (SW) - reddish brn (2.5YR4/3), 35% subang to subrnd f gravel up to 1.5cm, 60% f to c sand, 5% fines, gravel mostly met, poorly consolidated, wet		
GW				SILTY SAND w/ GRAVEL (GW) - reddish brn (5YR4/4), 45% subang to subrnd f to c gravel up to 7.5cm, 40% f to c sand, 15% fines, mostly silt fines, mostly met gravel, very calcareous, low plasticity, porr to mod consolidated, wet		
SW/SM				SILTY SAND w/ GRAVEL (SW/SM) - reddish brn (2.5YR4/4), 40% subang to subrnd f to c gravel up to 2.5cm, 50% f to c sand, 10% fines, fines clayey in part, gravel mostly met, poorly consolidated, wet		
GM				SILTY GRAVEL w/ SAND (GM) - dr reddish brn (2.5YR4/3), 45% subang to subrnd f to c gravel up to 3cm, 40% f to c sand, 15% fines, gravel is mostly met, mod calcareous		
310				SW	WELL GRADED SAND w/ GRAVEL (SW) - dk reddish brn (2.5YR4/3), 40% subang to subrnd f gravel up to 2.5cm, 55% f to c sand, 5% fines, gravel mostly met, fines clayey in part, loose, wet - 45% subang to subrnd gravel up to 5cm, 40% sand, 15% fines, gravel is mostly met	
315	GM	SILTY GRAVEL w/ SAND (GM) - dr reddish brn (2.5YR3/4), 50% subang to ang f to c gravel up to 5.5cm, 35% f to c sand, 15% fines, gravel is mostly met, fines are clayey in part, mod calcareous, poorly consolidated				

**CH2MHILL**

SHEET 10 of 12				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-49	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 385.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.5 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,667.51		EASTING (CCS NAD 27 Z 5): 7,615,889.90		DATE STARTED: 3/12/2006	
						DATE COMPLETED: 3/22/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Track Mounted Rotosonic			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: K. Ebel / L. Kelly			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
320				SW	WELL GRADED SAND w/ GRAVEL (SW) - dk reddish brn (5YR4/3), subang to subrnd f gravel up to 6cm, f to c sand, fines, gravel mostly met, mod calcareous, loose, wet	Very Slow Drilling Rate = 0.25' to 0.4' /min	
325				SW	SILTY SAND w/ GRAVEL (SM) - reddish brn (5YR4/4), 30% subang to subrnd f to c gravel up to 12cm, 50% f to c sand, 20% fines, non to low plasticity, mostly met gravel, mod calcareous, stong chloritic alteration, loose to poorly consolidated, wet		
330				GW	SILTY GRAVEL w/ SAND (GM) - reddish brn (5YR4/3), 50% subang to subrnd f to c gravel up to 6cm, 35% f to c sand, 15% fines, mostly silt fines, gravel is mostly met, very calcareous, poor to mod consolidated, wet		
335				SC	CLAYEY SAND w/ GRAVEL (SC) - reddish brn (5YR4/4), 30% subrnd to subang f gravel up to 4cm, 40% f to c sand, 30% fines, mostly clay fines, mod plastic, mod consolidated, moist	Stop drilling for the day (03/26/06)	
340				SW	WELL GRADED SAND w/ GRAVEL (SW) - dk brn (7.5YR3/4), 25% subrnd f to c gravel up to 5cm, 70% f to c sand, 5% fines, loose, wet	Very Slow Drilling Rate = 0.25' to 0.4' /min	
345				GW	WELL GRADED GRAVEL w/ SAND (GW) - brn (7.5YR4/3), 55% subrnd to subang f to c gravel up to 5cm, 40% m to c sand, 5% fines, gravel is mostly met, loose, wet		
350				SM	SILTY SAND w/ GRAVEL (SM) - reddish brn (5YR4/4), 20% subang to subrnd f to c gravel up to 4cm, 60% f to c sand, 20% fines, non to low plasticity, mostly met gravel, mod calcareous, poor to mod consolidated, wet	Very Slow Drilling Rate = 0.2' to 0.4' /min	
				GW	WELL GRADED GRAVEL w/ SAND (GW) - dk brn (5YR3/4), 60% ang f to c gravel up to 6cm, 35% f to c sand, 5% fines, gravel mostly met, slightly calcareous, loose, wet		
					- locally grades into 1' beds of silty gravel with sand (GM), 60% gravel, 25% sand, 15% fines		
					- 60% subang to subrnd gravel up to 4.5cm, 35% sand, 5% fines, gravel mostly met		
					WELL GRADED SAND W/GRAVEL (GW) - reddish brn 5YR4/3, 75% gravel 15% sand 10% silt f-c subang gravel up to 15 cm, mostly met, few conglomerate clasts, well graded subang-subrnd met sand (f-c) mm unconsolidated, saturated	Drilling Rate = 0.3' /min, no recovery first pass, second pass only 4' recovery, slough had sand & gravel	


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SOIL BORING LOG

PROJECT NAME: IMPM Drill Program		HOLE DEPTH (ft): 385.0	DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.5 ft. MSL	NORTHING (CCS NAD 27 Z 5): 2,103,667.51	EASTING (CCS NAD 27 Z 5): 7,615,889.90	DATE STARTED: 3/12/2006	DATE COMPLETED: 3/22/2006
DRILLING METHOD: Rotosonic			DRILLING EQUIPMENT: Track Mounted Rotosonic	
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California			LOGGED BY: K. Ebel / L. Kelly	


DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
355				GW	WELL GRADED SAND W/GRAVEL (GW) - reddish brn 5YR4/3, 75% gravel 15% sand 10% silt f-c subang gravel up to 15 cm, mostly met, few conglomerate clasts, well graded subang-subrnd met sand (f-c) mm unconsolidated, saturated	Harder Drilling Rate = 0.5" /min
360					- avg. clast size is 2 cm	
365					- grades coarser with depth - avg. clast size is 6 cm	
370					- avg. clast size 710 cm	
375				ML	SILT WITH GRAVEL (ML) - reddish brn (5YR4/4), 15% sand, 20% silt, 65% gravel, gravel up to 2 cm, met, subang silt contains weathered met gravel and v/sand lenses, moderatly consolidated, moist, some fine laminations	Drilling Rate ~ 1' /min
380					- reddish brn (5YR4/4 (75,15,10) sand subang mostly c	
385				NR	NO RECOVERY	Drilling Rate = 0.1' /min
Boring Terminated at 384 ft						

**CH2MHILL**

SHEET 12 of 12				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-49	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 385.0		DRILLING CONTRACTOR: Prosonic Corp. Phoenix, AZ	
SURFACE ELEVATION: 482.5 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,667.51		EASTING (CCS NAD 27 Z 5): 7,615,889.90		DATE STARTED: 3/12/2006	
						DATE COMPLETED: 3/22/2006	
DRILLING METHOD: Rotosonic				DRILLING EQUIPMENT: Track Mounted Rotosonic			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: K. Ebel / L. Kelly			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
					ABBREVIATIONS cc = continuous core run brn = brown lt = light dk = dark vf = very fine-grained f = fine-grained m = medium-grained c = coarse-grained vc = very coarse-grained ang = angular subang = subangular subrnd = subrounded rnd = rounded br = bedrock formation ss = sandstone conglom = conglomerate comptd = compacted qtz = quartz		


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SHEET 1 of 8				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-50	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 248.0		DRILLING CONTRACTOR:	
SURFACE ELEVATION: 495.1 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,069.27		EASTING (CCS NAD 27 Z 5): 7,615,599.84		DATE STARTED: 3/25/2004	DATE COMPLETED:
DRILLING METHOD:				DRILLING EQUIPMENT:			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: L. Kelly			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
5					NO RECOVERY		
10			0				
15							
20							
25			5	GM	SILTY GRAVEL w/ SAND, BOULDERS, AND COBBLES (GM) - brn (10YR 4/3), 55% md to subrnd f to c gravel up to 14cm, 25% f to c sand, 20% fines, mostly met		
			2	SM	SILTY SAND w/ GRAVEL (SM) - brn (10YR5/3), 15% ang to subrnd f gravel up to 2.5cm, 45% f to c sand, 40% fines, mostly met gravel, some chloritic alteration, fines clay in part, minor chert, loose, dry		
30			5	GM	SILTY GRAVEL w/ SAND (GM) - dr yellowish brn (10YR4/4), 50% f to c and to subrnd gravel up to 6.5cm, 35% f to c sand, 15% fines, mostly met, occasional ig,, mod to v calcareous, loose, dry		
			2	GW	WELL GRADED GRAVEL w/ SAND (GW) - dr yellow brn (10YR4/4), 50% ang to subrnd f to c gravel up to 6cm, 40% f to c sand, 10% fines, mostly met, very cal, loose, dry		
35							



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SHEET 2 of 8				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-50			
SOIL BORING LOG									
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 248.0		DRILLING CONTRACTOR:			
SURFACE ELEVATION: 495.1 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,069.27		EASTING (CCS NAD 27 Z 5): 7,615,599.84		DATE STARTED: 3/25/2004	DATE COMPLETED:		
DRILLING METHOD:				DRILLING EQUIPMENT:					
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: L. Kelly					
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS			
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.			
40			5	SW	WELL GRADED SAND w/ GRAVEL (SW) - dk yellowish brn (10YR4/4), 40% subang to subrnd mostly f gravel up to 2cm, 50% f to c sand, 10% fines, mostly met, mod cal, loose to poorly consolidated, dry to damp - groundwater at 35' bgs	Drill rate = 0.15' to 0.25' / min			
			5	SM	SILTY SAND w/ GRAVEL (SM) - brn (10YR5/3), 30% subang to subrnd f to c gravel up to 6cm, 40% f to c sand, 30% mod clayey fines, mostly met gravel, minor chert, mod to v cal, non to mod plasticity, loose, dry				
45			5	GW	WELL GRADED GRAVEL w/ SAND (GW) - dr yellow brn (10YR5/3), well graded ang to subrnd f to c gravel up to 7cm, f to c sand, mod clayey fines, mostly met, mod cal, loose to poorly consolidated, moist to wet				
			6	SW/SM	WELL GRADED SAND w/ GRAVEL (SW) - brn (10YR4/3), 20% subang to subrnd mostly f gravel up to 2cm, 75% f to c sand, 5% mostly silt fines, mostly met w/ chlorite alteration, v cal, loose to poorly consolidated, moist to wet				
50			6	SW	WELL GRADED SAND w/ GRAVEL (SW) - brn (10YR4/3), 30% subang to rnd mostly f gravel up to 7cm, 65% f to c sand, 5% mostly silt fines, mostly met w/ some chlorite alteration, mod to v cal, loose to poorly consolidated, wet - SM interbedded with SW, 20% gravel, 65% sand, 15% fines			Drill rate = 0.4' to 0.5' / min	
			9	GW	WELL GRADED GRAVEL w/ SAND (GW) - brn (10YR4/3), 55% ang to subrnd f to c gravel up to 7cm, 40% f to c sand, 5% fines, mod cal, loose to poorly consolidated, wet - as above, 50% subang to subrnd gravel up to 7.5cm, 45% sand, 5% fines, mostly met w/ occ chert and ig				
60			9	GW					
			9	GW					
65									
70				SM	SILTY SAND (SM) - dk brn (10YR3/3), 5% subang f to c gravel up to 8cm, 70% f to c sand, 20% fines, loose sand, wet				

SHEET 3 of 8				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-50			
SOIL BORING LOG									
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 248.0		DRILLING CONTRACTOR:			
SURFACE ELEVATION: 495.1 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,069.27		EASTING (CCS NAD 27 Z 5): 7,615,599.84		DATE STARTED: 3/25/2004	DATE COMPLETED:		
DRILLING METHOD:				DRILLING EQUIPMENT:					
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: L. Kelly					
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS			
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)						
75			10	SM	SILTY SAND (SM) - dk brn (10YR3/3), 5% subang f to c gravel up to 8cm, 50% f to m sand, 45% fines, wet - sand w/ gravel, strong brn				
			SM	SILTY SAND w/ GRAVEL (SM) - strong brn (7.5YR3/6), 15% subrnd gravel up to 6cm, 60% m sand, 25% fines, mostly met, wet					
80			20	SM	SILTY SAND (SM) - strong brn (7.5YR3/6), 10% subang gravel up to 6cm, 60% m to c sand, 30% fines, met gravel, wet				
85									
90									
95									
100				SW	WELL GRADED SAND w/ SILT and GRAVEL (SW) - strong brn (7.5YR4/6), 15% met subang gravel up to 8cm, 50% m to c sand, 35% fines, wet				
105									


SHEET 4 of 8				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-50	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 248.0		DRILLING CONTRACTOR:	
SURFACE ELEVATION: 495.1 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,069.27		EASTING (CCS NAD 27 Z 5): 7,615,599.84		DATE STARTED: 3/25/2004	
DATE COMPLETED:		DRILLING METHOD:					
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California						LOGGED BY: L. Kelly	
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
110			20		WELL GRADED SAND w/ SILT and GRAVEL (SW) - strong brn (7.5YR4/6), 15% met subang gravel up to 8cm, 50% m to c sand, 35% fines, wet		
				SW	WELL GRADED SAND w/ GRAVEL (SW) - dk brn (7.5YR3/2), 25% met ang gravel up to 4cm, 70% f to c sand, 5% fines, wet		
115				SW	WELL GRADED SAND w/ SILT and GRAVEL (SW) - strong brn (7.5YR4/6), 15% met subang gravel up to 8cm, 50% m to c sand, 35% fines, wet		
120			20		SILTY SAND (SM) - dk brn (7.5YR3/4), 5% met ang gravel up to 4cm, 75% f to m sand, 20% fines, wet		
125					- increased gravel content and size, 15% met subang gravel up to 8cm, 65% sand, 20% fines, wet		
130							
135							
140					WELL GRADED SAND w/ SILT and GRAVEL (SW/SM) - dk brn (7.5YR3/4), 15% subang met f to c gravel up to 6cm, 75% f to c sand, 10% fines, clasts poorly cemented, wet		

SHEET 5 of 8				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-50	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 248.0		DRILLING CONTRACTOR:	
SURFACE ELEVATION: 495.1 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,069.27		EASTING (CCS NAD 27 Z 5): 7,615,599.84		DATE STARTED: 3/25/2004	DATE COMPLETED:
DRILLING METHOD:				DRILLING EQUIPMENT:			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: L. Kelly			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
145			20	SW/SM	WELL GRADED SAND w/ SILT and GRAVEL (SW/SM) - dk brn (7.5YR3/4), 15% subang met f to c gravel up to 6cm, 75% f to c sand, 10% fines, clasts poorly cemented, wet - increased gravel content, 25% gravel up to 8cm, 65% sand, 10% fines		
150							
155							
160					POORLY GRADED SAND (SP) - yellowish red (5YR 4/6), 10% gravel, 85% c sand, 5% fines, weak cementation becoming stronger w/ depth, wet - very evident color change from dk brn to yellowish red		
165							
170			17	SP	- lg met cobble up to 12cm, increased gravel content - trans to SILTY GRAVEL w/ SAND, 40% met ang gravel up to 5cm, 30% sand, 30% fines		
175							



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SHEET 6 of 8				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-50	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 248.0		DRILLING CONTRACTOR:	
SURFACE ELEVATION: 495.1 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,069.27		EASTING (CCS NAD 27 Z 5): 7,615,599.84		DATE STARTED: 3/25/2004	DATE COMPLETED:
DRILLING METHOD:				DRILLING EQUIPMENT:			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: L. Kelly			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)			DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
180				GW/GM	POORLY GRADED SAND (SP) - yellowish red (5YR 4/6), 10% gravel, 85% c sand, 5% fines, weak cementation becoming stronger w/ depth, wet	Drill rate = 0.1' / min	
185			18	SM	WELL GRADED GRAVEL w/ SILT and SAND (GW/GM) - dk reddish brn (5YR3/4), 50% met subang f to c gravel up to 5cm, 40% f to c sand, 10% fines, wet		
190					SILTY SAND w/ GRAVEL (SM) - yellowish red (5YR4/6), 25% met subang gravel up to 4cm, 60% f to c sand, 15% fines, weak to mod cementation, wet		
195							
200					SILTY SAND w/ GRAVEL (SM) - dk reddish brn (5YR3/4), 10% subang f to c gravel, 50% f to c sand, 40% fines, cloritic alteration, cementation increasing to mod, moist	Drill rate = 1' / min	
205							
210			20	SM			


SHEET 7 of 8				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-50	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 248.0		DRILLING CONTRACTOR:	
SURFACE ELEVATION: 495.1 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,069.27		EASTING (CCS NAD 27 Z 5): 7,615,599.84		DATE STARTED: 3/25/2004	DATE COMPLETED:
DRILLING METHOD:				DRILLING EQUIPMENT:			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: L. Kelly			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
215					SILTY SAND w/ GRAVEL (SM) - dk reddish brn (5YR3/4), 10% subang f to c gravel, 50% f to c sand, 40% fines, cloritic alteration, cementation increasing to mod, moist - reworked miocene becomes finer grained/ more massive		
220							
225			16	SM	SILTY SAND w/ GRAVEL (SM) - dk reddish brn (5YR3/4), 10% met subang c gravel up to 8cm, 60% f to c sand, 30% fines, strat layer (8") of dry well-cemented conglom w/ 1' layers of wet clean sand	Drill rate = 2' / min	
230							
235					MIOCENE CONGLOMERATE (BR) - firm, well-consolidated, matrix supported conglomerate, moist (BR), top of weathered bedrock ? - bedrock less weathered and dryer	Drill rate = 0.25' / min	
240			0	BR			
245							


CH2MHILL


SHEET 8 of 8				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-50	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 248.0		DRILLING CONTRACTOR:	
SURFACE ELEVATION: 495.1 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,103,069.27		EASTING (CCS NAD 27 Z 5): 7,615,599.84		DATE STARTED: 3/25/2004	
DATE COMPLETED:		DRILLING METHOD:		DRILLING EQUIPMENT:			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: L. Kelly			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
					MIOCENE CONGLOMERATE (BR)		
					Boring Terminated at 248 ft		
					ABBREVIATIONS cc = continuous core run brn = brown lt = light dk = dark vf = very fine-grained f = fine-grained m = medium-grained c = coarse-grained vc = very coarse-grained ang = angular subang = subangular subrnd = subrounded rnd = rounded br = bedrock formation ss = sandstone conglom = conglomerate comptd = compacted qtz = quartz		

 CH2MHILL


SHEET 1 of 4				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-51	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 114.0		DRILLING CONTRACTOR:	
SURFACE ELEVATION: 496.8 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,101,900.11		EASTING (CCS NAD 27 Z 5): 7,615,807.51		DATE STARTED: 3/31/2004	DATE COMPLETED:
DRILLING METHOD:				DRILLING EQUIPMENT:			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: R. Tweidt / A. Brewster			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
5				SM	SILTY SAND w/ GRAVEL (SM) - dk yellowish brn (10YR4/4), 20% well graded subang to subrnd met gravel up to 14cm, 50% sand, 30% fines, slightly moist		
10			0				
15							
20			10		- increased gravel, 40% gravel up to 7cm, 30% sand, 30% fines - 20% gravel up to 5cm, 50% sand, 30% fines		
25							
30				ML	SILT (ML) - dk greyish brn (10YR4/2), 10% well graded subang to subrnd gravel up to 5cm, 10% sand, 10% fines, gravel mostly met, slightly moist		
35			8		SILT w/ SAND and GRAVEL (ML) - dr yellowish brn (10YR4/4), 20% well graded subang gravel up to 6cm, 20% sand, 60% fines, mostly met gravel, slightly moist		


CH2MHILL


SHEET 2 of 4				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-51	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 114.0		DRILLING CONTRACTOR:	
SURFACE ELEVATION: 496.8 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,101,900.11		EASTING (CCS NAD 27 Z 5): 7,615,807.51		DATE STARTED: 3/31/2004	
DATE COMPLETED:		DRILLING METHOD:					
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California						LOGGED BY: R. Tweidt / A. Brewster	
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
40				ML	SILT w/ SAND and GRAVEL (ML) - dr yellowish brn (10YR4/4), 20% well graded subang gravel up to 6cm, 20% sand, 60% fines, mostly met gravel, slightly moist - 25% gravel up to 7cm, 15% sand, 60% fines - increased moisture		
45			10		- 25% gravel up to 6cm, 15% sand, 60% fines		
50			10		- 20% gravel up to 7cm, 20% sand, 60% fines		
55				SP	- 20% gravel up to 5cm, 15% sand, 65% fines		
60			10		SAND (SP) - dk brn (7.5YR 3/4), 5% f gravel, poorly sorted, subang to subrnd up to 12 cm, 85% sand, 10% fines, wet - 10% gravel up to 8cm, 80% sand, 10% fines		
65							
70							


CH2MHILL

SHEET 3 of 4				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-51	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 114.0		DRILLING CONTRACTOR:	
SURFACE ELEVATION: 496.8 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,101,900.11		EASTING (CCS NAD 27 Z 5): 7,615,807.51		DATE STARTED: 3/31/2004	DATE COMPLETED:
DRILLING METHOD:				DRILLING EQUIPMENT:			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: R. Tweidt / A. Brewster			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)		SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
75			6	SP/SM	SAND (SP/SM) - dk greyish brn (10YR4/2), 0% gravel, 90% subang to subrnd sand, 10% fines, poorly graded, wet		
80			7	SM	SAND (SM) - brn (10YR4/3), 5% subang gravel up to 5cm, 75% sand, 20% fines, mostly met gravel, poorly graded, moist - 15% gravel up to 10cm, 70% sand, 15% fines		
85							
90			10		SILT (ML) dk brn (7.5YR3/4), 10% ang to subang gravel up to 5cm, 15% sand, 75% fines, mostly met gravel, slightly moist		
95							
100							
105			10	ML	- 20% gravel up to 10cm, 10% sand, 70% fines - 10% gravel up to 4cm, 15% sand, 75% fines - 10% gravel up to 5cm, 15% sand, 75% fines		

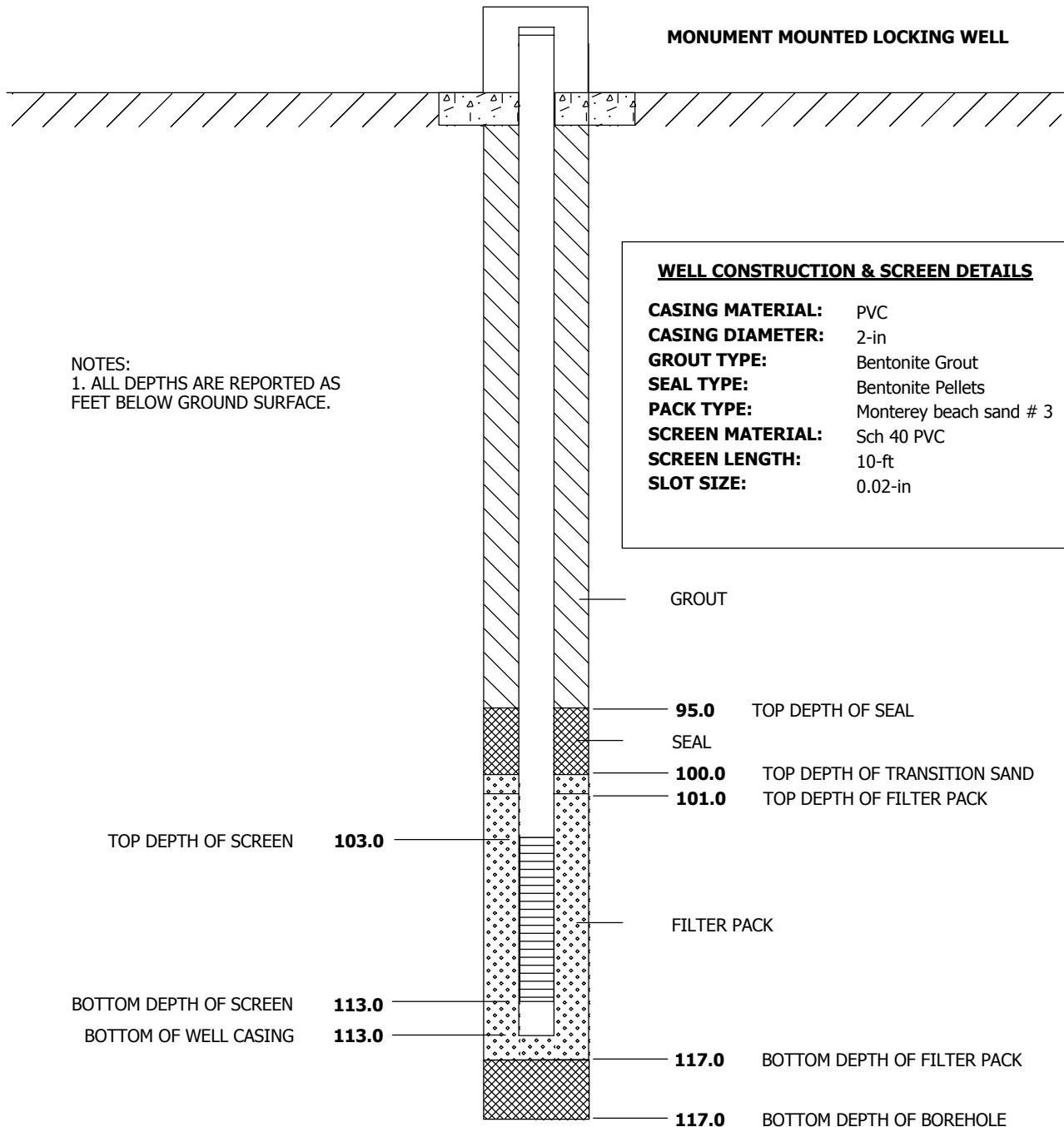

CH2MHILL

SHEET 4 of 4				PROJECT NUMBER: 326128.01.16.EN		BORING NUMBER: MW-51	
SOIL BORING LOG							
PROJECT NAME: IMPM Drill Program				HOLE DEPTH (ft): 114.0		DRILLING CONTRACTOR:	
SURFACE ELEVATION: 496.8 ft. MSL		NORTHING (CCS NAD 27 Z 5): 2,101,900.11		EASTING (CCS NAD 27 Z 5): 7,615,807.51		DATE STARTED: 3/31/2004	
DATE COMPLETED:		DRILLING METHOD:		DRILLING EQUIPMENT:			
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California				LOGGED BY: R. Tweidt / A. Brewster			
DEPTH BGS (feet)	SAMPLE			USCS CODE	SOIL DESCRIPTION	COMMENTS	
	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)				
110					SILT (ML) dk brn (7.5YR3/4), 10% ang to subang gravel up to 5cm, 15% sand, 75% fines, mostly met gravel, slightly moist	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
				ML	SANDY SILT (ML) - dk reddish brn (2.5YR 53/3), 10% ang to subang gravel up to 4cm, 40% sand, 50% fines, mostly met gravel, well graded, saturated		
			7	ML	SILT (ML) - dk reddish brn (2.5YR3/3), 20% gravel, 20% sand, 60% fines, presence of highly weathered clasts to clay		
				BR	MIOCENE CONGLOMERATE (BR)		
					Boring Terminated at 114 ft ABBREVIATIONS cc = continuous core run brn = brown lt = light dk = dark vf = very fine-grained f = fine-grained m = medium-grained c = coarse-grained vc = very coarse-grained ang = angular subang = subangular subrnd = subrounded rnd = rounded br = bedrock formation ss = sandstone conglom = conglomerate comptd = compacted qtz = quartz		


CH2MHILL

WELL COMPLETION DIAGRAM

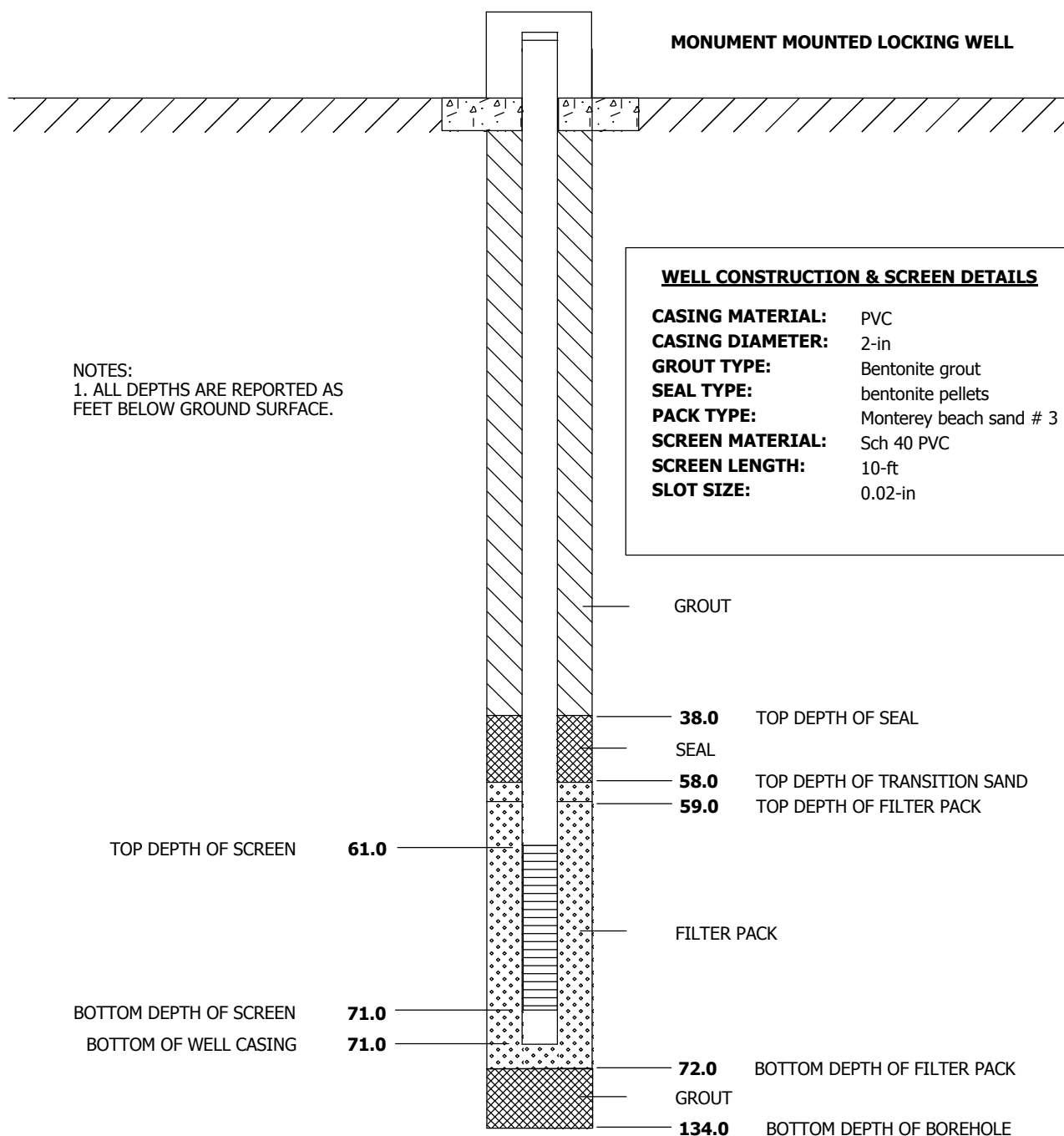
PROJECT NO: 326128.01.16.EN	PROJECT: IMPM Drill Program	WELL NO: <i>MW-44-115</i>
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California		
DRILLING CONTRACTOR: Prosonic (Perry Hormann = Driller)	DRILLING START DATE: 3/7/2006	
DRILLING METHOD: Rotosonic	DRILLING END DATE: 3/10/2006	
LOGGER: Rob Tweidt, Kate Ebel	WELL COMPLETION DATE: 3/11/2006	
TOP OF WELL CASING (NGVD 29): 471.99	NORTHING COORDINATE (CCS DAND 27, ZONE 5): 2102723.85	
GROUND SURFACE ELEVATION (NGVD 29): 470.54	EASTING COORDINATE (CCS NAD 27 ZONE 5): 7616262.11	



WELL DIAGRAM IS NOT TO SCALE

WELL COMPLETION DIAGRAM

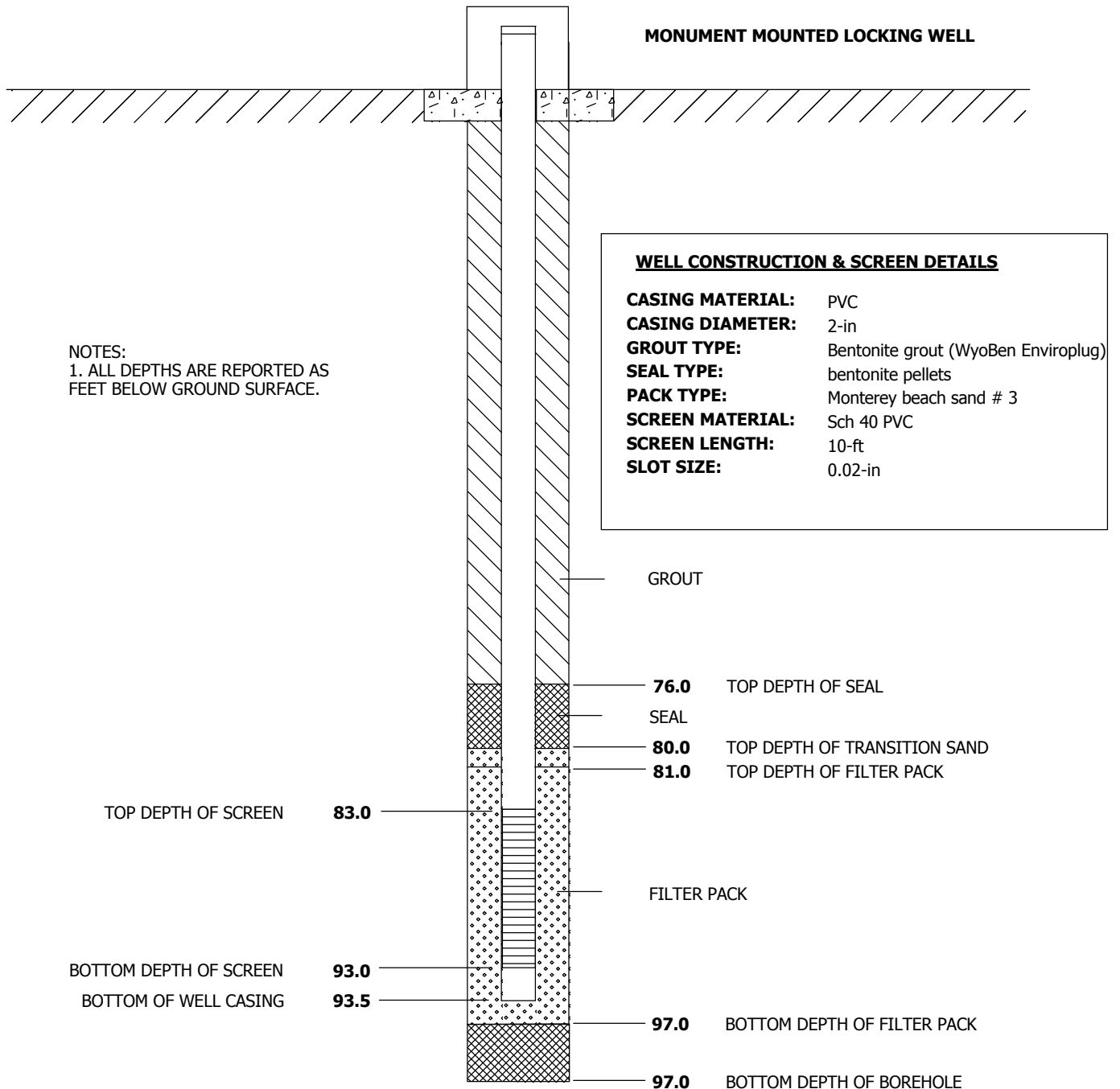
PROJECT NO: 326128.01.16.EN	PROJECT: IMPM Drill Program	WELL NO: <i>MW-44-70</i>
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California		
DRILLING CONTRACTOR: Prosonic (Perry Hormann = Driller)	DRILLING START DATE: 2/21/2006	
DRILLING METHOD: Rotosonic	DRILLING END DATE: 3/6/2006	
LOGGER: Rob Tweidt	WELL COMPLETION DATE: 3/7/2006	
TOP OF WELL CASING (NGVD 29): 471.88	NORTHING COORDINATE (CCS DAND 27, ZONE 5): 2102728.31	
GROUND SURFACE ELEVATION (NGVD 29): 470.82	EASTING COORDINATE (CCS NAD 27 ZONE 5): 7616255.62	



WELL DIAGRAM IS NOT TO SCALE

WELL COMPLETION DIAGRAM

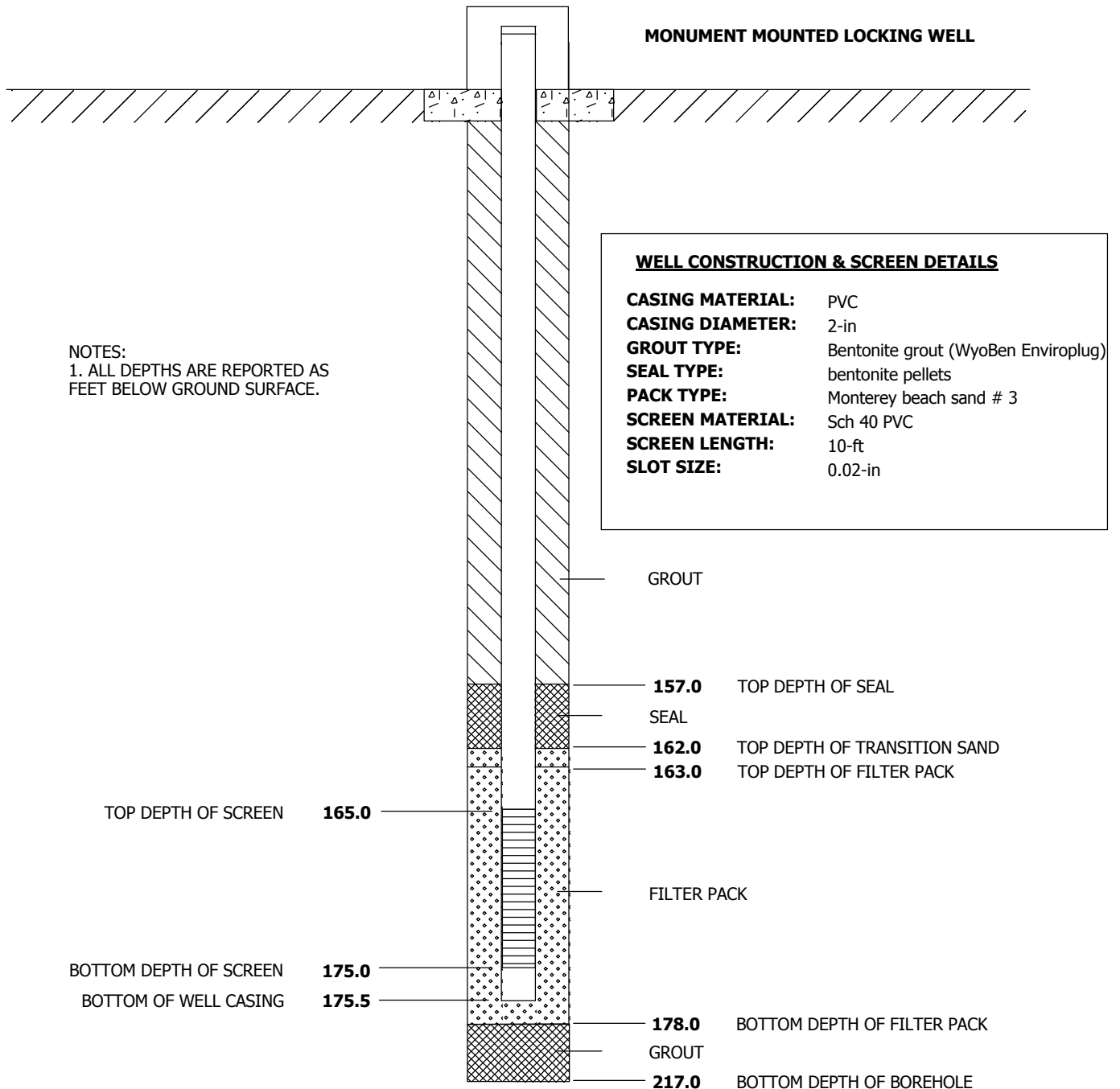
PROJECT NO: 326128.01.16.EN	PROJECT: IMPM Drill Program	WELL NO: <i>MW-45-95</i>
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California		
DRILLING CONTRACTOR: Prosonic (Denzel Roberts = Driller)	DRILLING START DATE: 2/13/2006	
DRILLING METHOD: Rotosonic	DRILLING END DATE: 2/15/2006	
LOGGER: Rob Tweidt	WELL COMPLETION DATE: 2/15/2006	
TOP OF WELL CASING (NGVD 29): 470.03	NORTHING COORDINATE (CCS DAND 27, ZONE 5): 2102559.75	
GROUND SURFACE ELEVATION (NGVD 29): 466.63	EASTING COORDINATE (CCS NAD 27 ZONE 5): 7616358.13	



WELL DIAGRAM IS NOT TO SCALE

WELL COMPLETION DIAGRAM

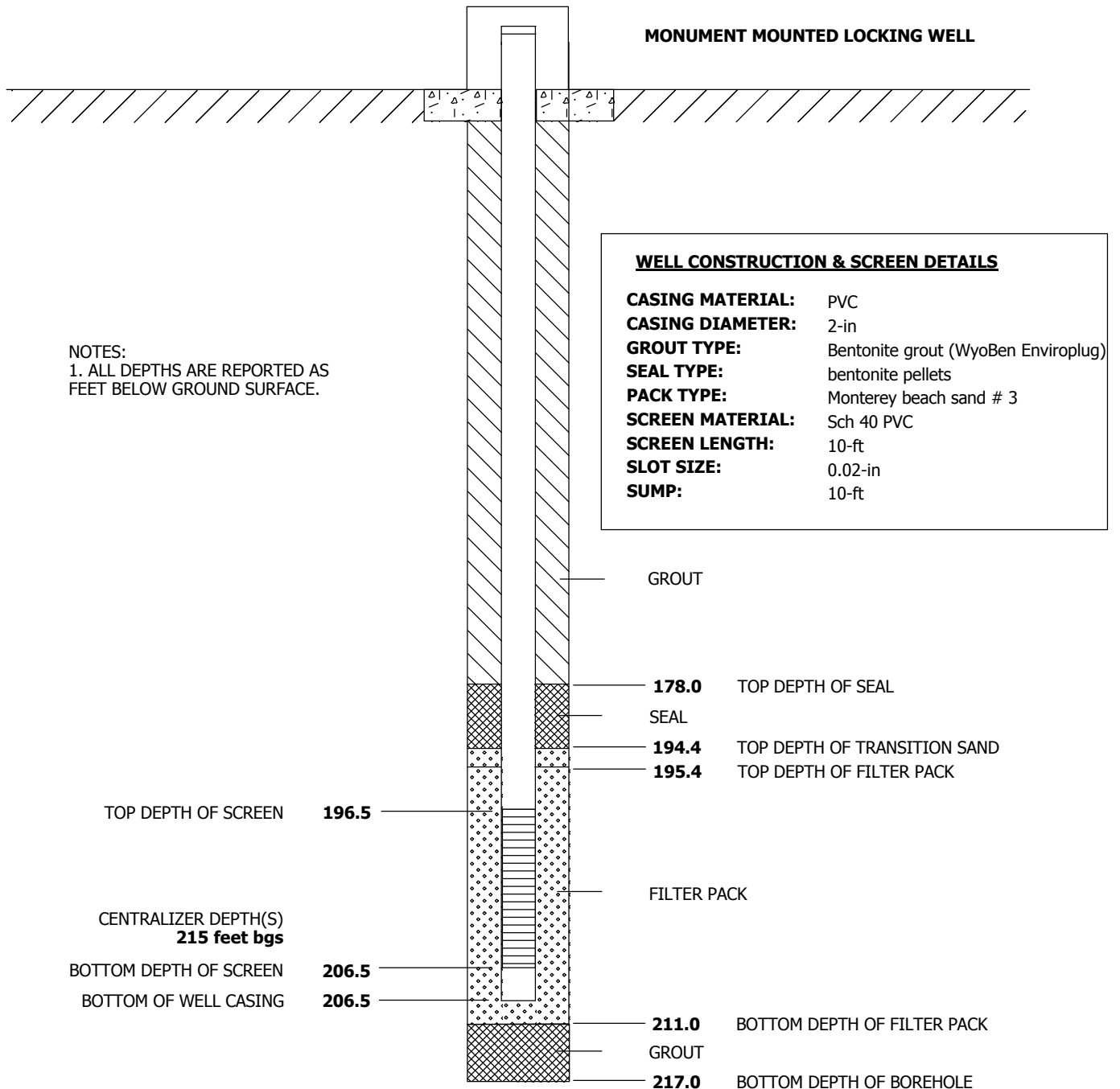
PROJECT NO: 326128.01.16.EN	PROJECT: IMPM Drill Program	WELL NO: <i>MW-46-175</i>
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California		
DRILLING CONTRACTOR: Prosonic (Denzel Roberts = Driller)	DRILLING START DATE: 2/7/2006	
DRILLING METHOD: Rotosonic	DRILLING END DATE: 2/13/2006	
LOGGER: Rob Tweidt	WELL COMPLETION DATE: 2/13/2006	
TOP OF WELL CASING (NGVD 29): 482.20	NORTHING COORDINATE (CCS DAND 27, ZONE 5): 2102939.85	
GROUND SURFACE ELEVATION (NGVD 29): 480.82	EASTING COORDINATE (CCS NAD 27 ZONE 5): 7616196.75	



WELL DIAGRAM IS NOT TO SCALE

WELL COMPLETION DIAGRAM

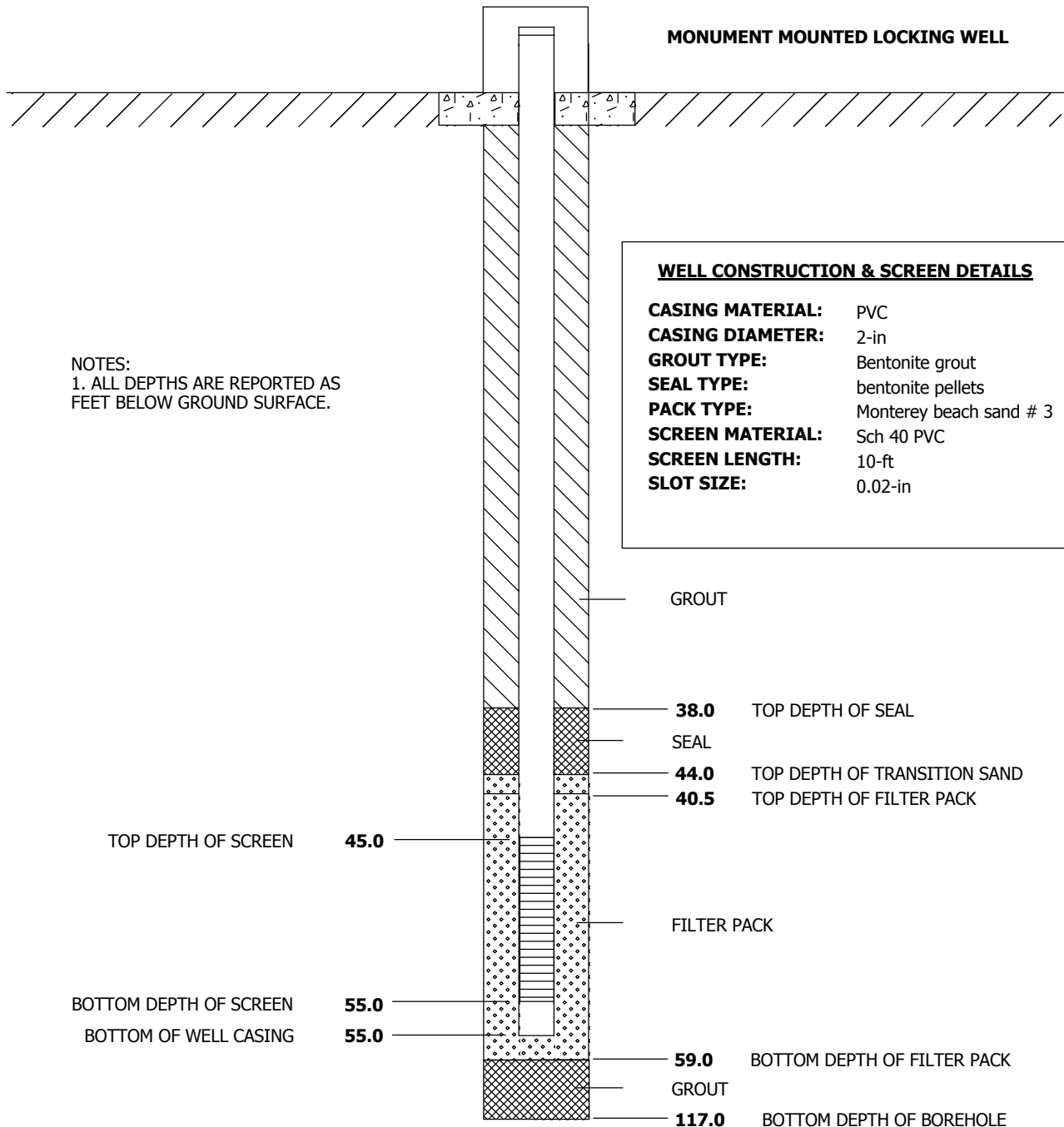
PROJECT NO: 326128.01.16.EN	PROJECT: IMPM Drill Program	WELL NO: <i>MW-46-205</i>
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California		
DRILLING CONTRACTOR: Prosonic (Denzel Roberts = Driller)	DRILLING START DATE: 2/7/2006	
DRILLING METHOD: Rotosonic	DRILLING END DATE: 2/13/2006	
LOGGER: Rob Tweidt	WELL COMPLETION DATE: 2/13/2006	
TOP OF WELL CASING (NGVD 29): 482.23	NORTHING COORDINATE (CCS DAND 27, ZONE 5): 2102940.09	
GROUND SURFACE ELEVATION (NGVD 29): 480.82	EASTING COORDINATE (CCS NAD 27 ZONE 5): 7616196.89	



WELL DIAGRAM IS NOT TO SCALE

WELL COMPLETION DIAGRAM

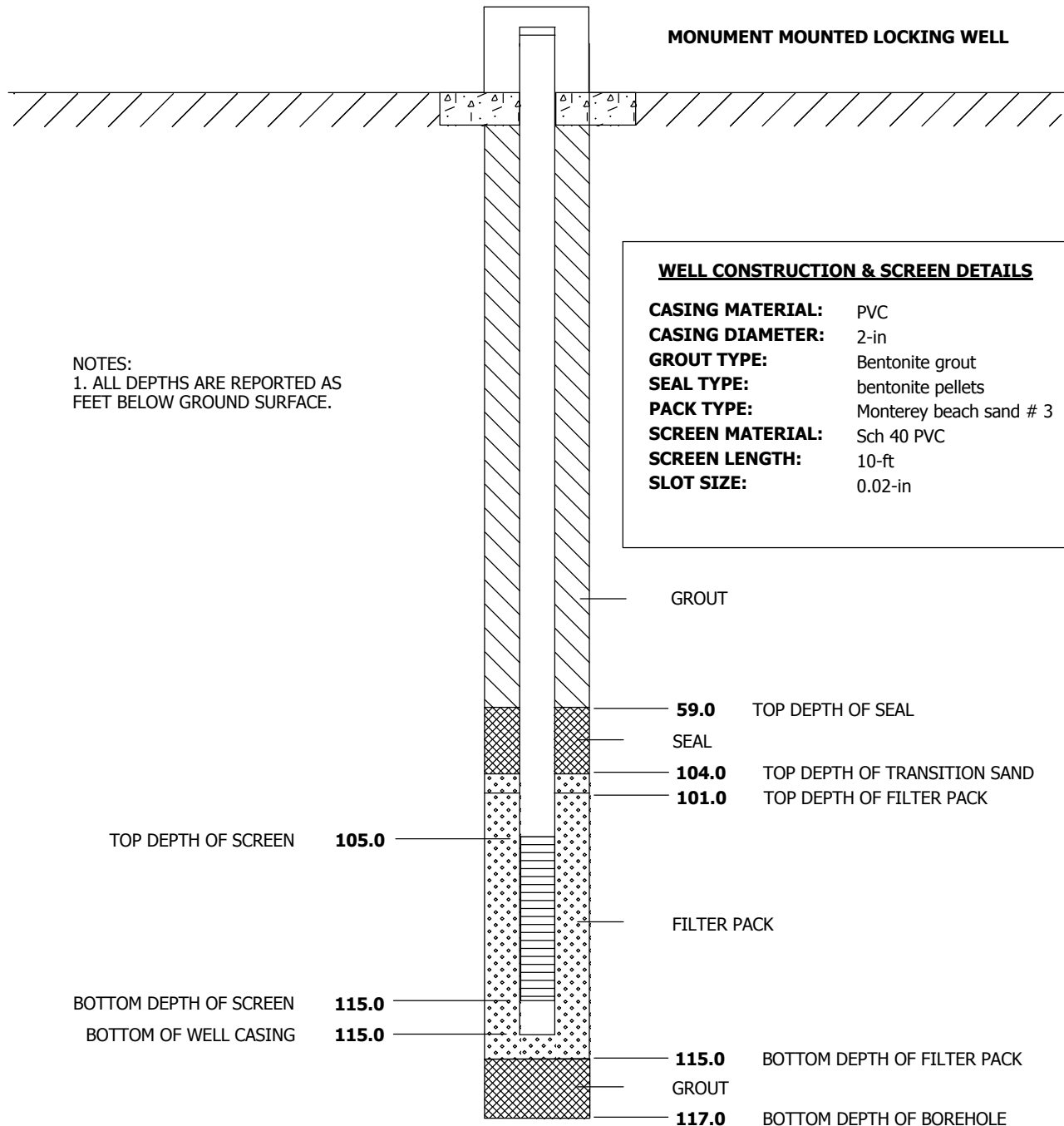
PROJECT NO: 326128.01.16.EN	PROJECT: IMPM Drill Program	WELL NO: <i>MW-47-055</i>
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California		
DRILLING CONTRACTOR: Prosonic (Chato = Driller)	DRILLING START DATE: 3/13/2006	
DRILLING METHOD: Rotosonic	DRILLING END DATE: 3/15/2006	
LOGGER: Loren Kelly	WELL COMPLETION DATE: 3/15/2006	
TOP OF WELL CASING (NGVD 29): 483.87	NORTHING COORDINATE (CCS DAND 27, ZONE 5): 2103450.05	
GROUND SURFACE ELEVATION (NGVD 29): 482.59	EASTING COORDINATE (CCS NAD 27 ZONE 5): 7615629.49	



WELL DIAGRAM IS NOT TO SCALE

WELL COMPLETION DIAGRAM

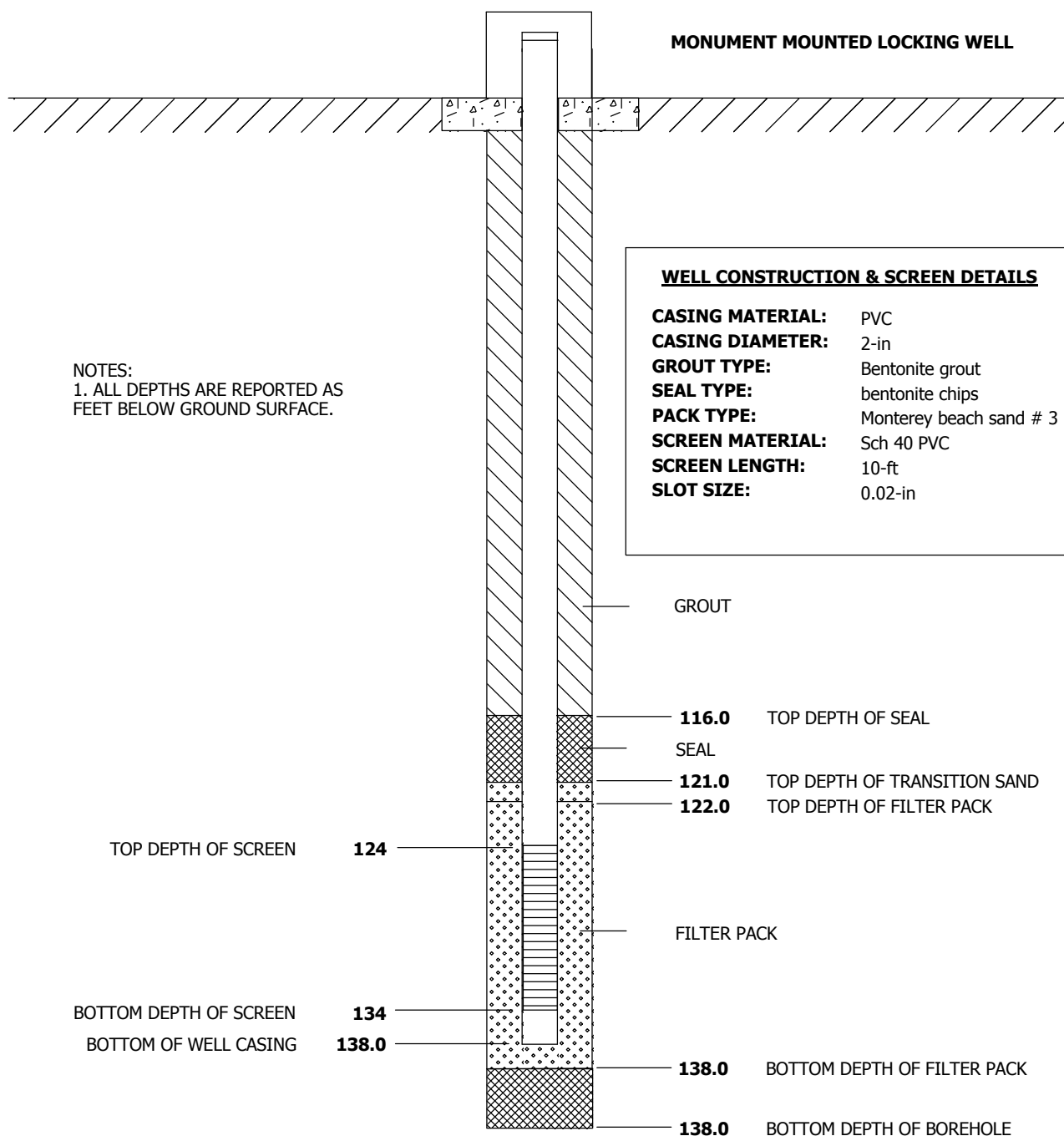
PROJECT NO: 326128.01.16.EN	PROJECT: IMPM Drill Program	WELL NO: <i>MW-47-115</i>
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California		
DRILLING CONTRACTOR: Prosonic (Chato = Driller)	DRILLING START DATE: 3/13/2006	
DRILLING METHOD: Rotosonic	DRILLING END DATE: 3/15/2006	
LOGGER: Loren Kelly	WELL COMPLETION DATE: 3/15/2006	
TOP OF WELL CASING (NGVD 29): 484.06	NORTHING COORDINATE (CCS DAND 27, ZONE 5): 2103450.09	
GROUND SURFACE ELEVATION (NGVD 29): 482.59	EASTING COORDINATE (CCS NAD 27 ZONE 5): 7615629.74	



WELL DIAGRAM IS NOT TO SCALE

WELL COMPLETION DIAGRAM

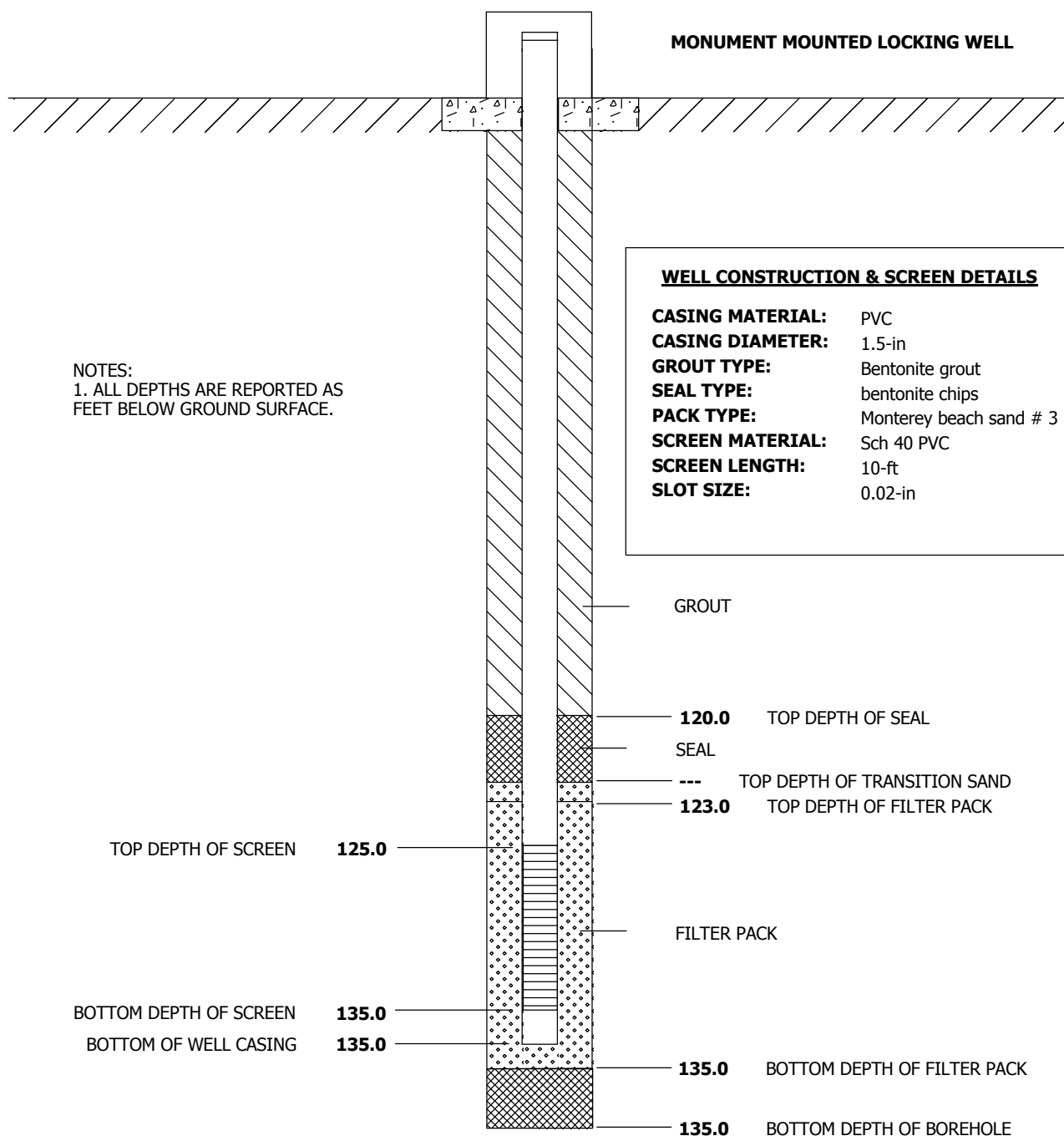
PROJECT NO: 326128.01.16.EN	PROJECT: IMPM Drill Program	WELL NO: <i>MW-48</i>
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California		
DRILLING CONTRACTOR: Prosonic (Denzel Roberts = Driller)	DRILLING START DATE: 5/3/2006	
DRILLING METHOD: Rotosonic	DRILLING END DATE: 5/4/2006	
LOGGER: J. Blei	WELL COMPLETION DATE: 5/4/2006	
TOP OF WELL CASING (NGVD 29): 486.22	NORTHING COORDINATE (CCS DAND 27, ZONE 5): 2101435.28	
GROUND SURFACE ELEVATION (NGVD 29): 484.41	EASTING COORDINATE (CCS NAD 27 ZONE 5): 7615915.90	



WELL DIAGRAM IS NOT TO SCALE

WELL COMPLETION DIAGRAM

PROJECT NO: 326128.01.16.EN	PROJECT: IMPM Drill Program	WELL NO: <i>MW-49-135</i>
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California		
DRILLING CONTRACTOR: Prosonic (Perry Hormann = Driller)	DRILLING START DATE: 3/12/2006	
DRILLING METHOD: Rotosonic	DRILLING END DATE: 4/4/2006	
LOGGER: K. Ebel / L. Kelly	WELL COMPLETION DATE: 4/7/2006	
TOP OF WELL CASING (NGVD 29): 484.56	NORTHING COORDINATE (CCS DAND 27, ZONE 5): 2103667.53	
GROUND SURFACE ELEVATION (NGVD 29): 482.57	EASTING COORDINATE (CCS NAD 27 ZONE 5): 7615889.63	



WELL DIAGRAM IS NOT TO SCALE

WELL COMPLETION DIAGRAM

PROJECT NO: 326128.01.16.EN

PROJECT: IMPM Drill Program

WELL NO: *MW-49-275*

LOCATION: PG&E Compressor Station - Flood Plain, Topock, California

DRILLING CONTRACTOR: Prosonic (Perry Hormann = Driller)

DRILLING START DATE: 3/12/2006

DRILLING METHOD: Rotosonic

DRILLING END DATE: 4/4/2006

LOGGER: K. Ebel / L. Kelly

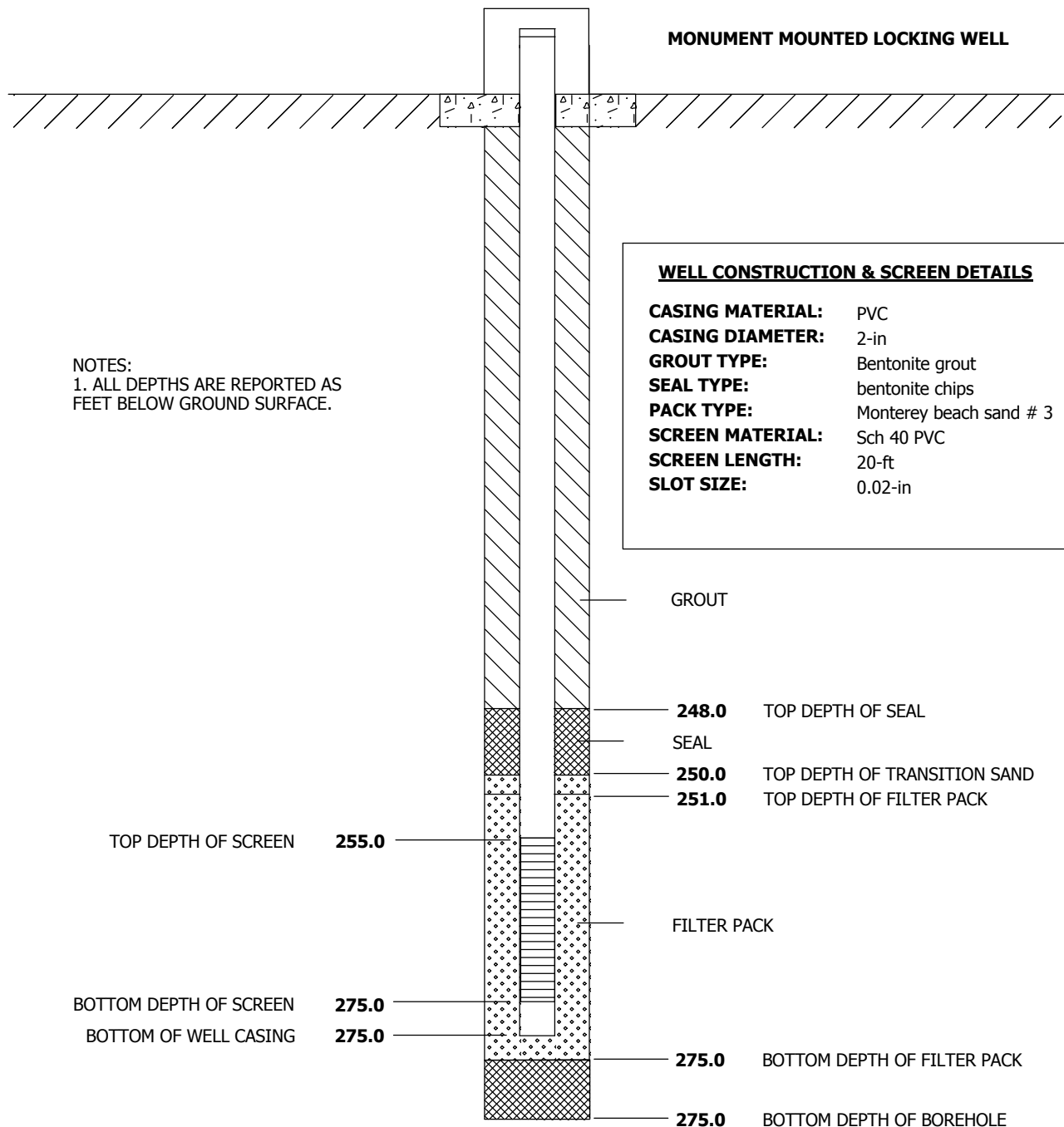
WELL COMPLETION DATE: 4/7/2006

TOP OF WELL CASING (NGVD 29): 484.56

NORTHING COORDINATE (CCS DAND 27, ZONE 5): 2103667.52

GROUND SURFACE ELEVATION (NGVD 29): 482.57

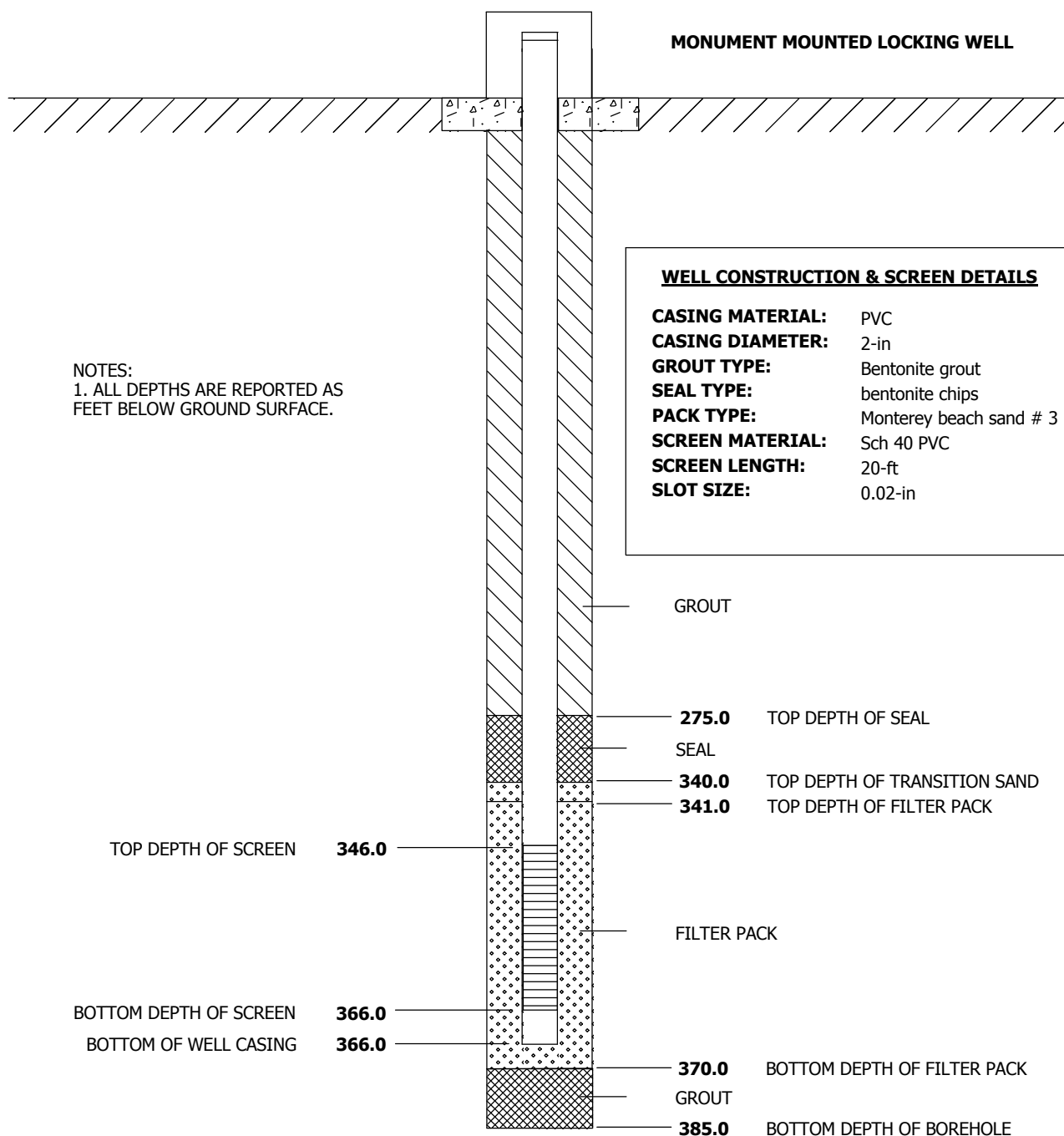
EASTING COORDINATE (CCS NAD 27 ZONE 5): 7615889.88



WELL DIAGRAM IS NOT TO SCALE

WELL COMPLETION DIAGRAM

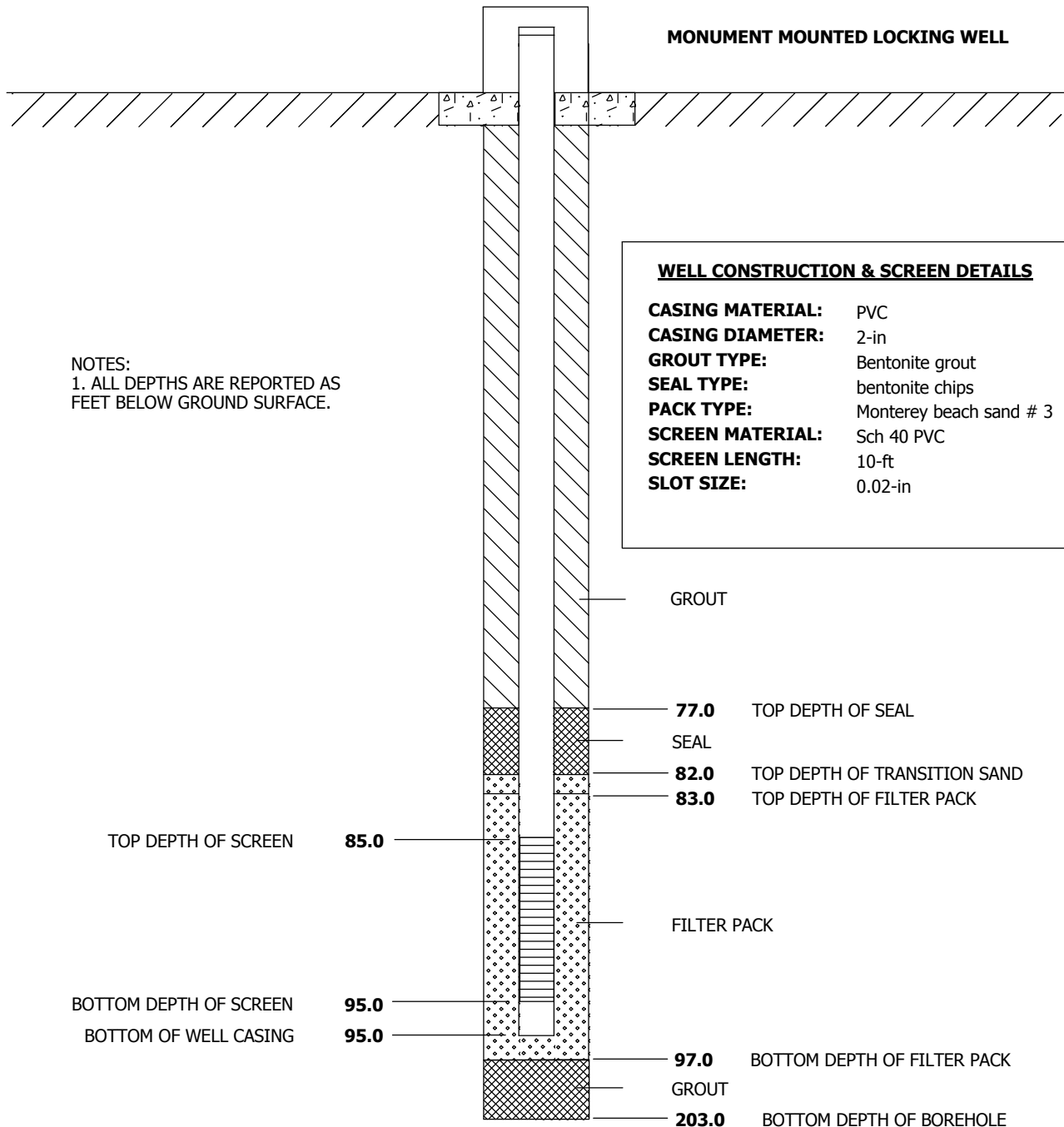
PROJECT NO: 326128.01.16.EN	PROJECT: IMPM Drill Program	WELL NO: <i>MW-49-365</i>
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California		
DRILLING CONTRACTOR: Prosonic (Perry Hormann = Driller)	DRILLING START DATE: 3/12/2006	
DRILLING METHOD: Rotosonic	DRILLING END DATE: 4/4/2006	
LOGGER: K. Ebel / L. Kelly	WELL COMPLETION DATE: 4/7/2006	
TOP OF WELL CASING (NGVD 29): 484.56	NORTHING COORDINATE (CCS DAND 27, ZONE 5): 2103667.25	
GROUND SURFACE ELEVATION (NGVD 29): 482.57	EASTING COORDINATE (CCS NAD 27 ZONE 5): 7615889.83	



WELL DIAGRAM IS NOT TO SCALE

WELL COMPLETION DIAGRAM

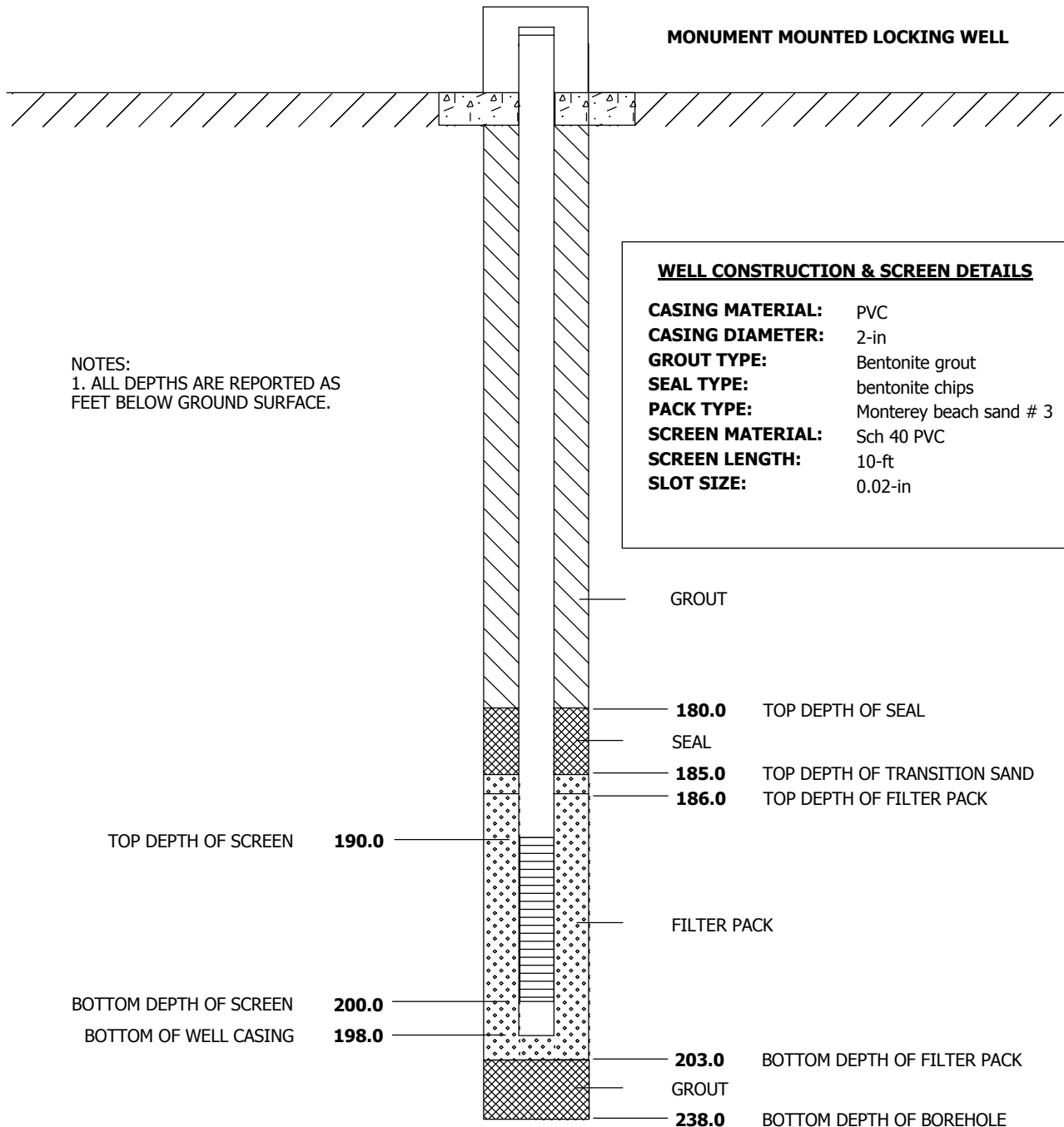
PROJECT NO: 326128.01.16.EN	PROJECT: IMPM Drill Program	WELL NO: <i>MW-50-095</i>
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California		
DRILLING CONTRACTOR: Prosonic (Perry Hormann = Driller)	DRILLING START DATE: 4/4/2006	
DRILLING METHOD: Rotosonic	DRILLING END DATE: 4/20/2006	
LOGGER: J. Blei	WELL COMPLETION DATE: 4/21/2006	
TOP OF WELL CASING (NGVD 29): ---	NORTHING COORDINATE (CCS DAND 27, ZONE 5): 2103069.27	
GROUND SURFACE ELEVATION (NGVD 29): 495.05	EASTING COORDINATE (CCS NAD 27 ZONE 5): 7615599.84	



WELL DIAGRAM IS NOT TO SCALE

WELL COMPLETION DIAGRAM

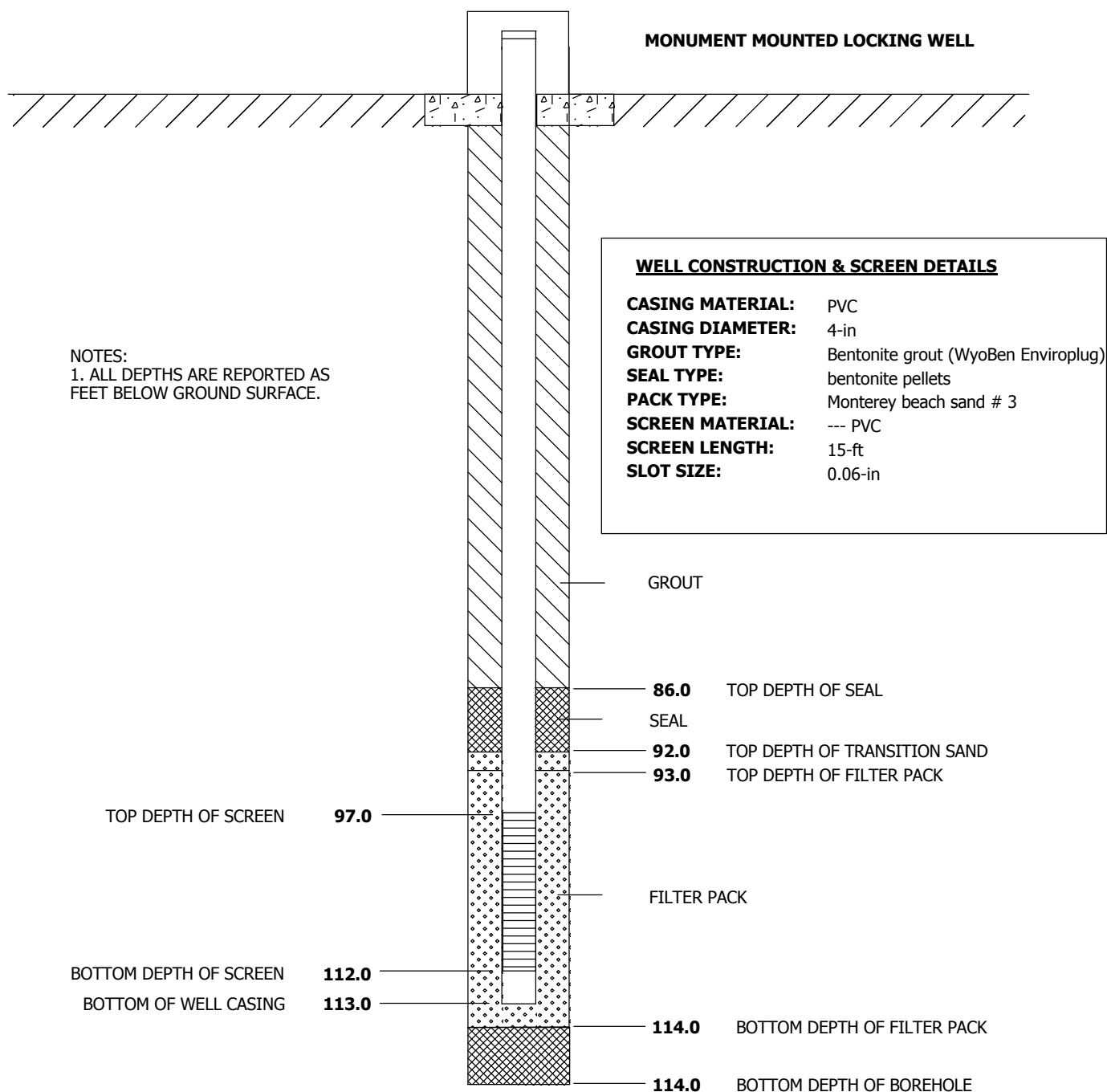
PROJECT NO: 326128.01.16.EN	PROJECT: IMPM Drill Program	WELL NO: <i>MW-50-200</i>
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California		
DRILLING CONTRACTOR: Prosonic (Perry Hormann = Driller)	DRILLING START DATE: 4/4/2006	
DRILLING METHOD: Rotosonic	DRILLING END DATE: 4/20/2006	
LOGGER: J. Blei	WELL COMPLETION DATE: 4/21/2006	
TOP OF WELL CASING (NGVD 29): ---	NORTHING COORDINATE (CCS DAND 27, ZONE 5): 2103069.62	
GROUND SURFACE ELEVATION (NGVD 29): 495.05	EASTING COORDINATE (CCS NAD 27 ZONE 5): 7615599.91	



WELL DIAGRAM IS NOT TO SCALE

WELL COMPLETION DIAGRAM

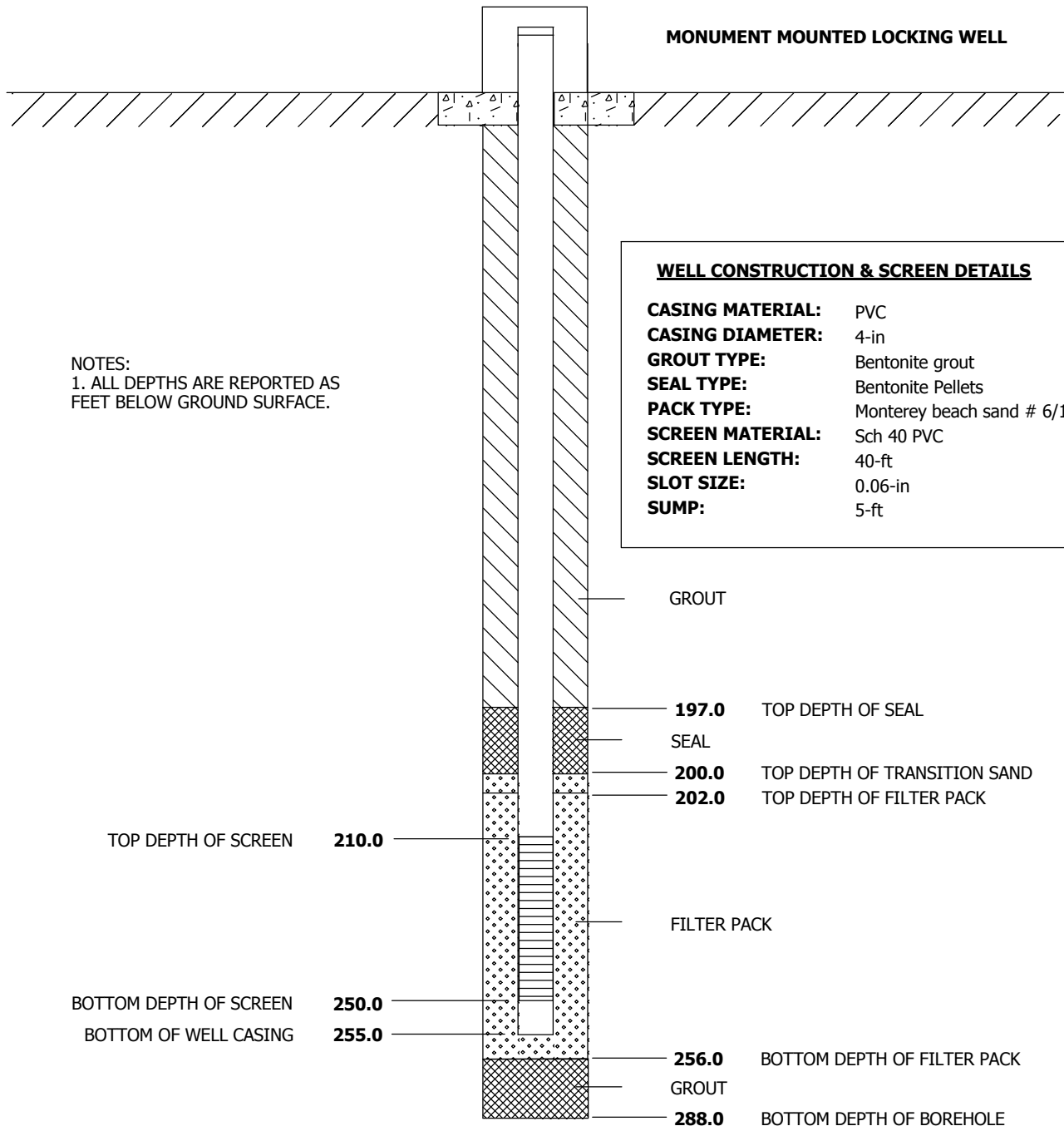
PROJECT NO: 326128.01.16.EN	PROJECT: IMPM Drill Program	WELL NO: <i>MW-51</i>
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California		
DRILLING CONTRACTOR: Prosonic	DRILLING START DATE: 4/8/2006	
DRILLING METHOD: Rotosonic	DRILLING END DATE: 4/13/2006	
LOGGER: Rob Tweidt / Arlin Brewster	WELL COMPLETION DATE: 4/13/2006	
TOP OF WELL CASING (NGVD 29): ---	NORTHING COORDINATE (CCS DAND 27, ZONE 5): 2101900.11	
GROUND SURFACE ELEVATION (NGVD 29): 496.81	EASTING COORDINATE (CCS NAD 27 ZONE 5): 7615807.51	



WELL DIAGRAM IS NOT TO SCALE

WELL COMPLETION DIAGRAM

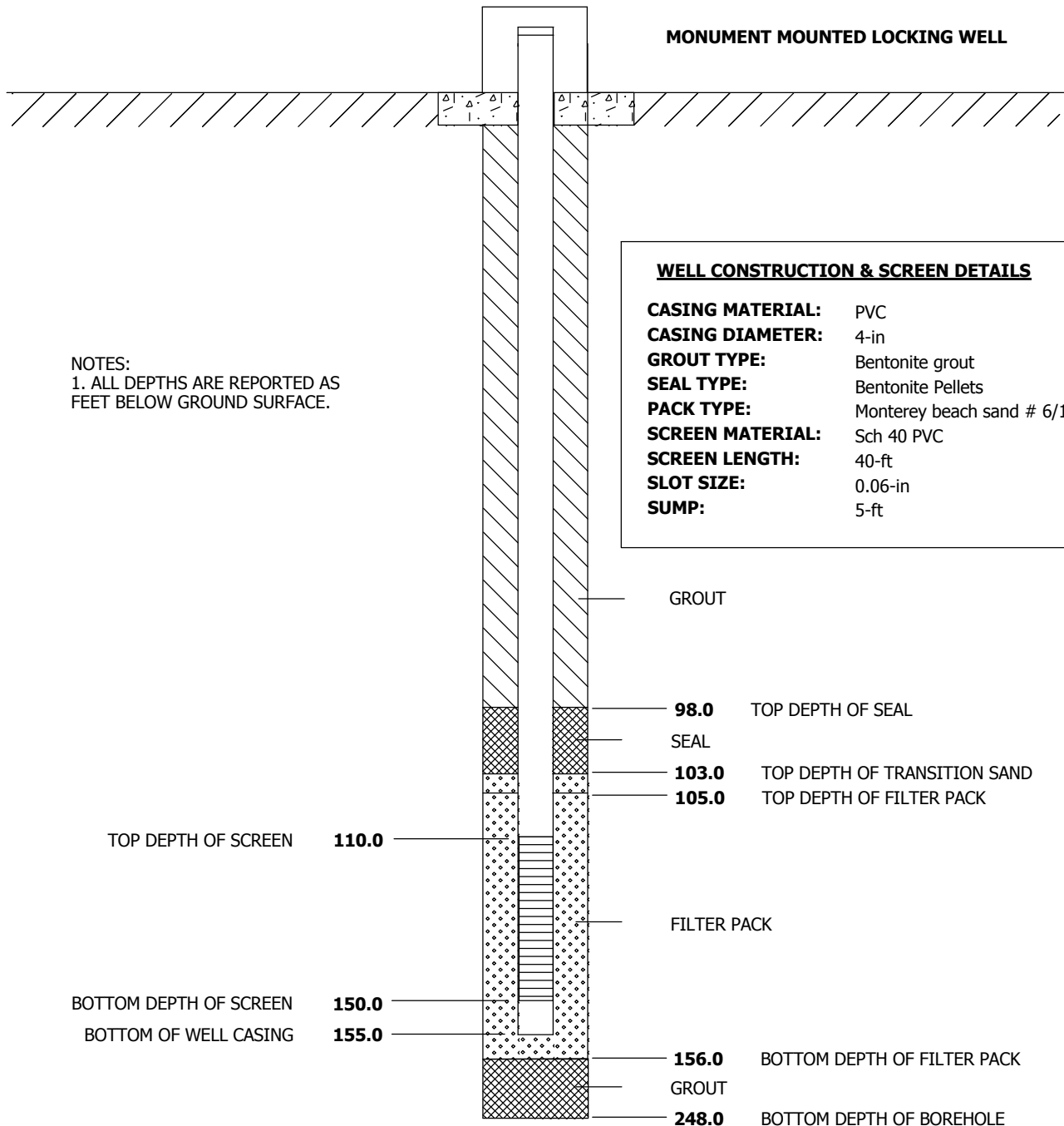
PROJECT NO: 326128.01.16.EN	PROJECT: IMPM Drill Program	WELL NO: <i>TW-4</i>
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California		
DRILLING CONTRACTOR: Prosonic (Chato = Driller)	DRILLING START DATE: 2/27/2006	
DRILLING METHOD: Rotosonic	DRILLING END DATE: 3/13/2006	
LOGGER: L. Kelly	WELL COMPLETION DATE: 2/27/2006	
TOP OF WELL CASING (NGVD 29): ---	NORTHING COORDINATE (CCS DAND 27, ZONE 5): 2103457.17	
GROUND SURFACE ELEVATION (NGVD 29): 482.62	EASTING COORDINATE (CCS NAD 27 ZONE 5): 7615623.69	



WELL DIAGRAM IS NOT TO SCALE

WELL COMPLETION DIAGRAM

PROJECT NO: 326128.01.16.EN	PROJECT: IMPM Drill Program	WELL NO: <i>TW-5</i>
LOCATION: PG&E Compressor Station - Flood Plain, Topock, California		
DRILLING CONTRACTOR: Prosonic	DRILLING START DATE: 4/21/2006	
DRILLING METHOD: Rotosonic	DRILLING END DATE: 4/22/2006	
LOGGER: J. Blei	WELL COMPLETION DATE: 4/24/2006	
TOP OF WELL CASING (NGVD 29): ---	NORTHING COORDINATE (CCS DAND 27, ZONE 5): 2103457.17	
GROUND SURFACE ELEVATION (NGVD 29): 482.62	EASTING COORDINATE (CCS NAD 27 ZONE 5): 7615623.69	



WELL DIAGRAM IS NOT TO SCALE

TABLE A3
Well Survey Data
Interim Measures 2006 Performance Monitoring Well Installation Report
PG&E Topock Compressor Station

Location ID	Survey Date	Northing (feet)	Easting (feet)	Top of PVC Elevation (feet MSL)	Top of Steel Casing Elevation (feet MSL)	Ground Elevation (feet MSL)
MW-44-070	4/17/2006	2102728.31	7616255.62	471.88	472.3	470.82
MW-44-115	4/17/2006	2102723.85	7616262.11	471.99	472.52	470.54
MW-44-125	4/17/2006	2102728.48	7616255.55	471.99	472.3	470.82
MW-45-095a	3/2/2006	2102559.751	7616358.126	470.03	---	466.63
MW-45-095b	3/2/2006	2102559.751	7616358.126	469.51	---	466.63
MW-46-175	5/16/2006	2102940.02	7616196.86	482.16	482.84	480.82
MW-46-205	5/16/2006	2102940.16	7616196.96	482.23	482.84	480.82
MW-47-055	4/17/2006	2103450.05	7615629.49	483.87	484.67	482.59
MW-47-115	4/17/2006	2103450.09	7615629.74	484.06	484.67	482.59
MW-48	5/16/2006	2101435.28	7615915.9	486.22	486.36	484.41
MW-49-135	5/16/2006	2103667.53	7615889.63	484.02	484.56	482.57
MW-49-275	5/16/2006	2103667.52	7615889.88	483.95	484.56	482.57
MW-49-365	5/16/2006	2103667.25	7615889.83	484.01	484.56	482.57
MW-50-095	5/16/2006	2103069.27	7615599.84	496.55	496.81	495.05
MW-50-200	5/16/2006	2103069.62	7615599.91	496.45	496.81	495.05
MW-51	5/16/2006	2101900.11	7615807.51	501.56	502.04	501.99
TW-04	4/17/2006	2103457.17	7615623.69	484.11	484.53	482.62
TW-05	5/16/2006	2103066.15	7615592.99	496.3	496.64	494.97

Notes:

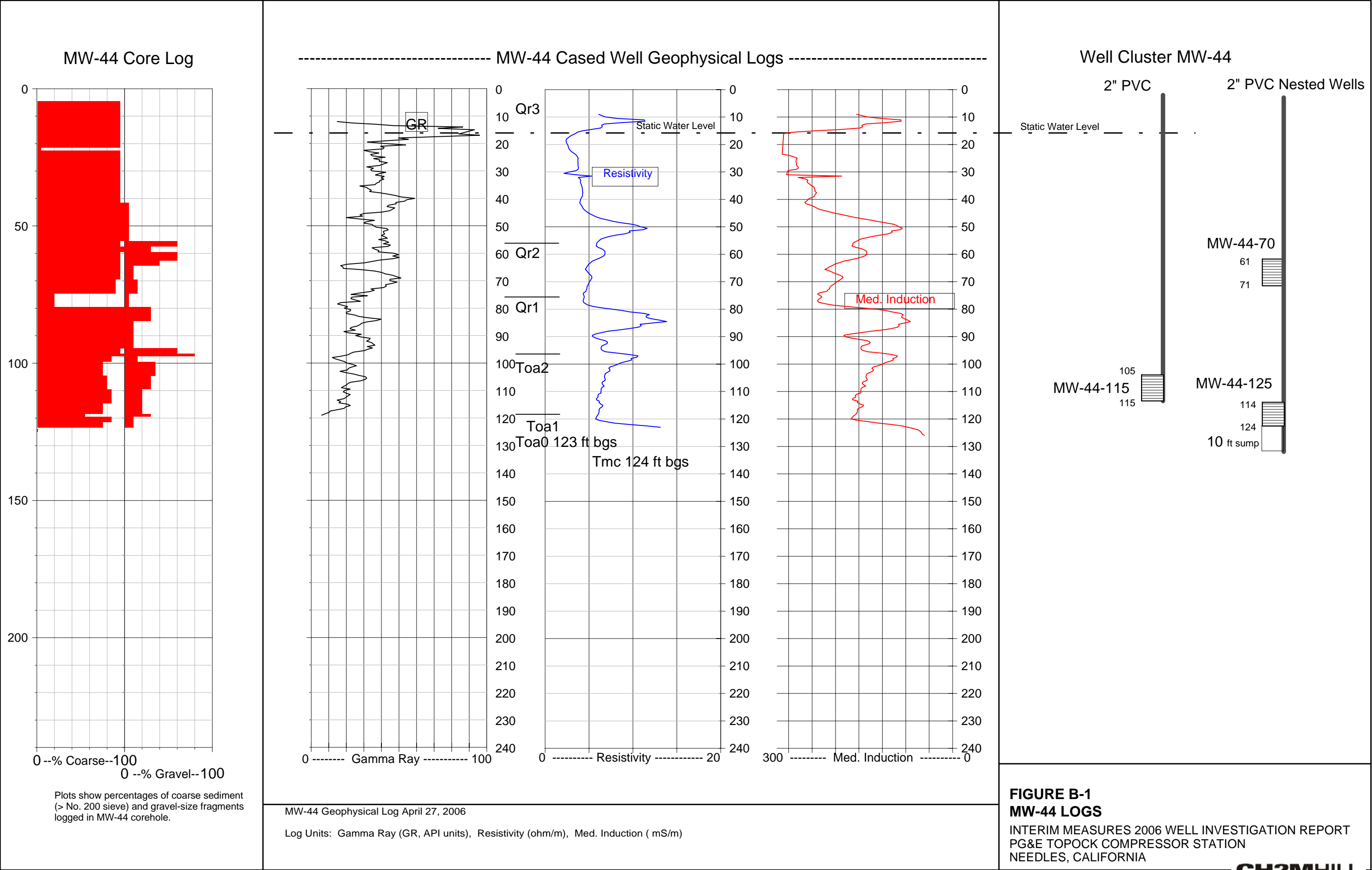
--- not available

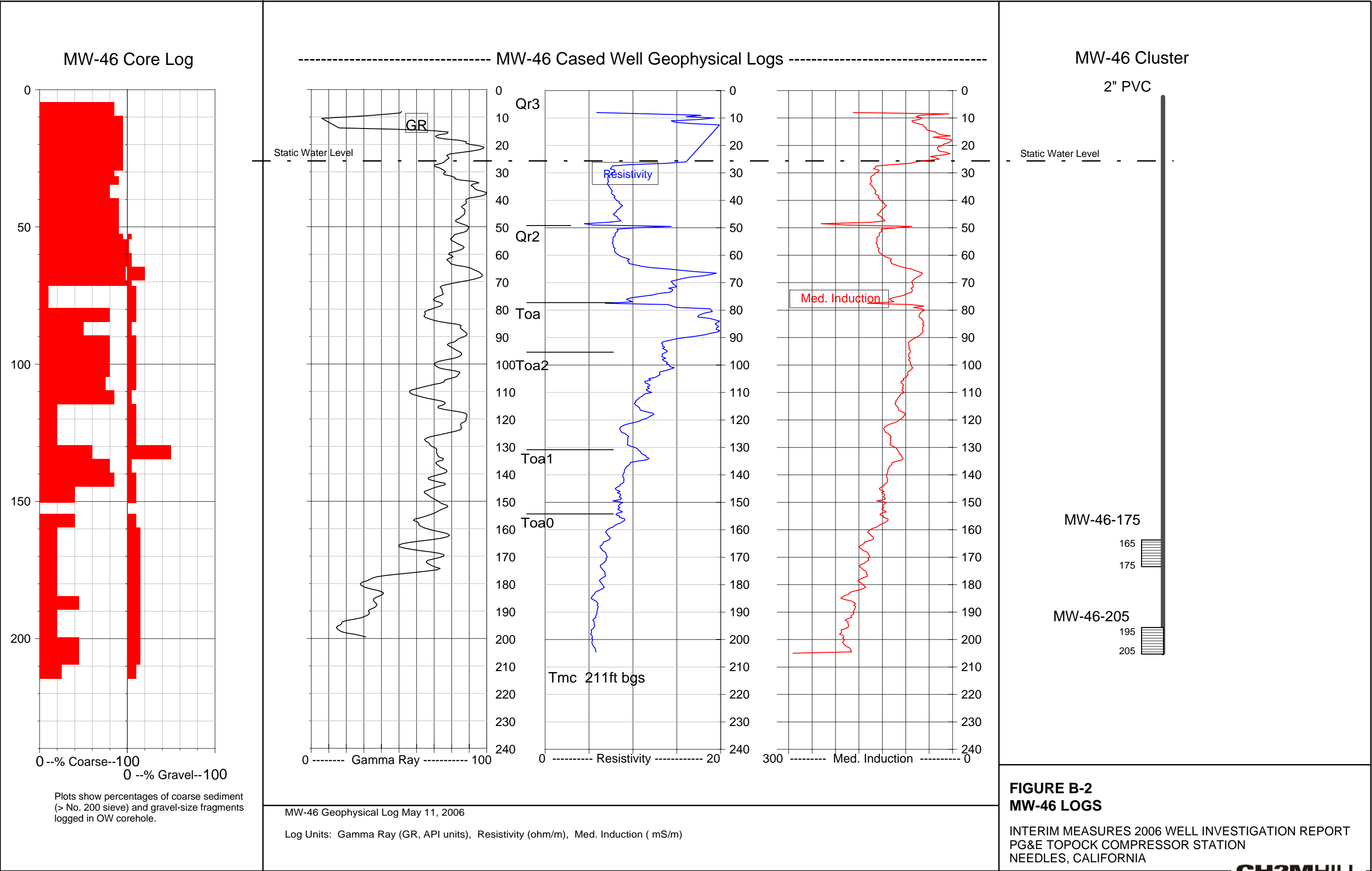
Surveys used the following datums:

Coordinates are CCS NAD83, Zone 5, 1991.35 Epoch, based on values found on NGS data sheets EU1248 and EU0763.

Elevations in feet above meas sea level (MSL) are NAVD 88, based on values found on NGS data sheet EU0763.

Appendix B
Hydrogeologic and Geophysical Logging Data

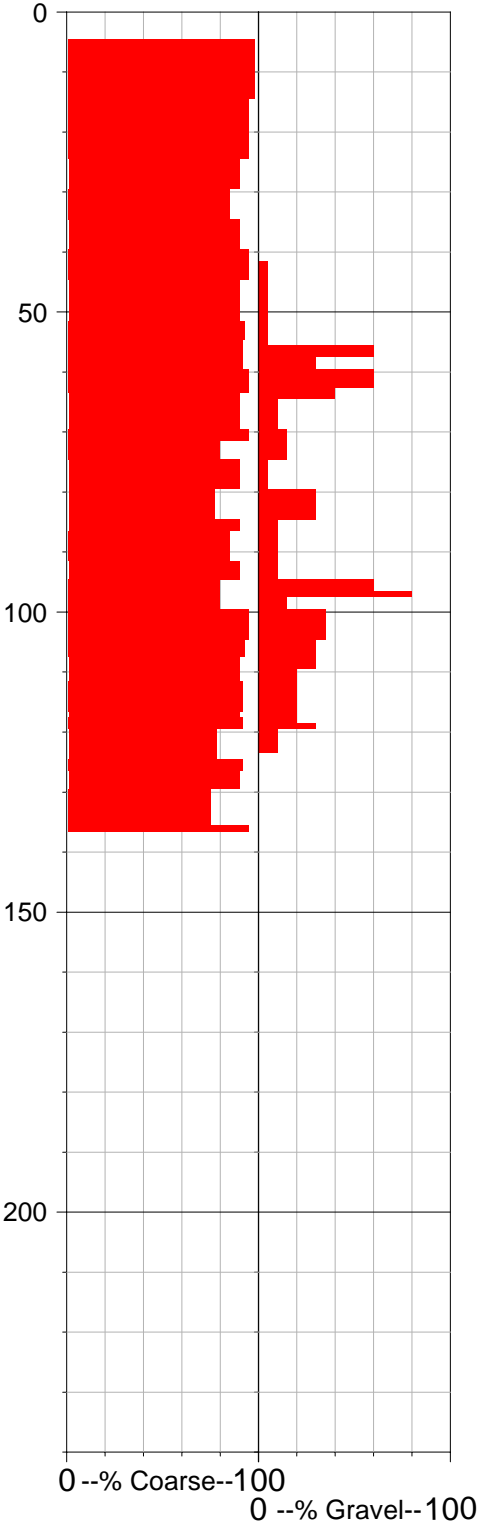




MW-46 Geophysical Log May 11, 2006

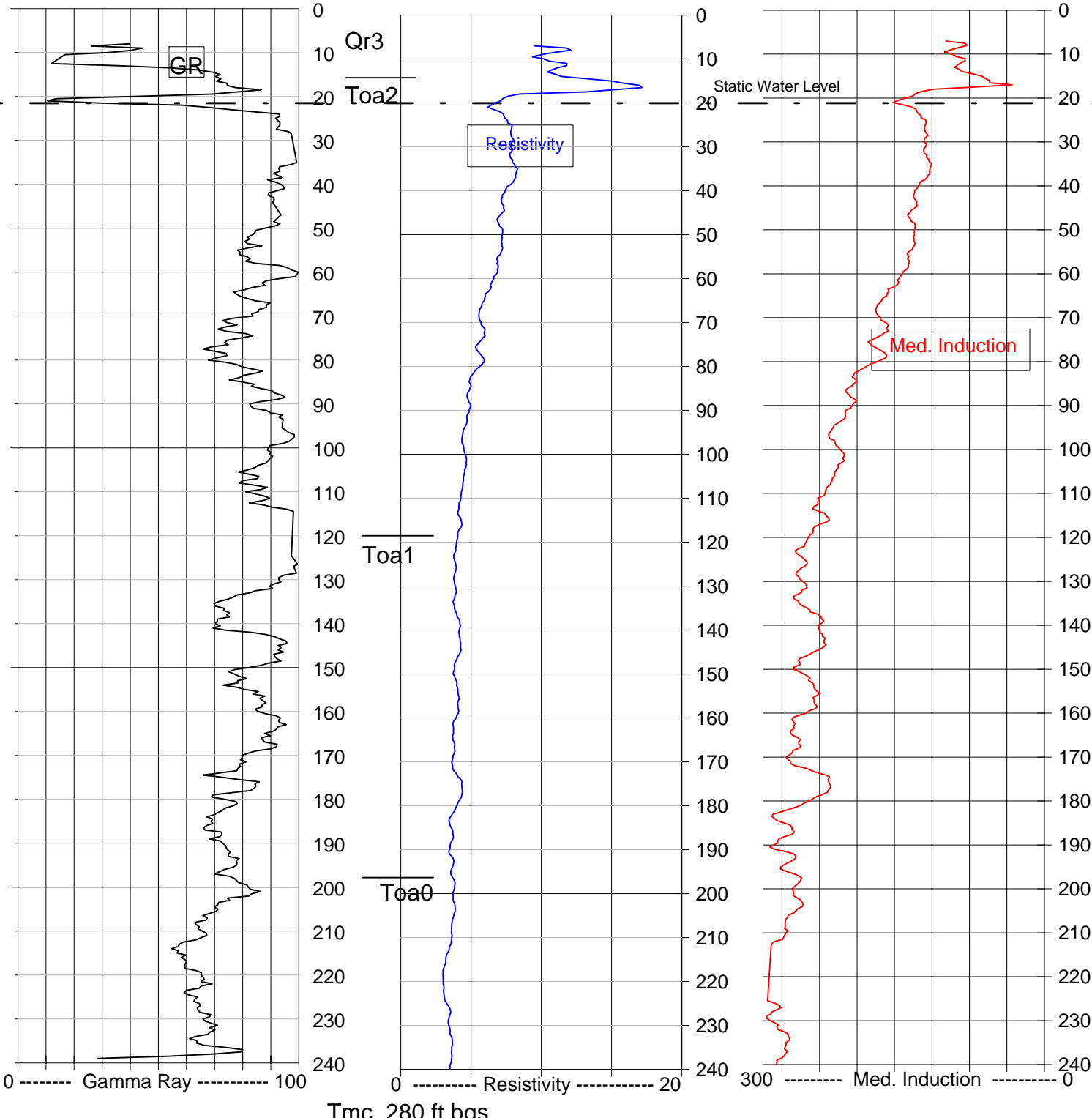
Log Units: Gamma Ray (GR, API units), Resistivity (ohm/m), Med. Induction (mS/m)

MW-47 Core Log



Plots show percentages of coarse sediment (> No. 200 sieve) and gravel-size fragments logged in OW corehole.

----- TW-04 Cased Well Geophysical Logs -----



TW-04 Geophysical Log April 27, 2006
Log Units: Gamma Ray (GR, API units), Resistivity (ohm/m), Med. Induction (mS/m)

Well Cluster MW-47 TW-04

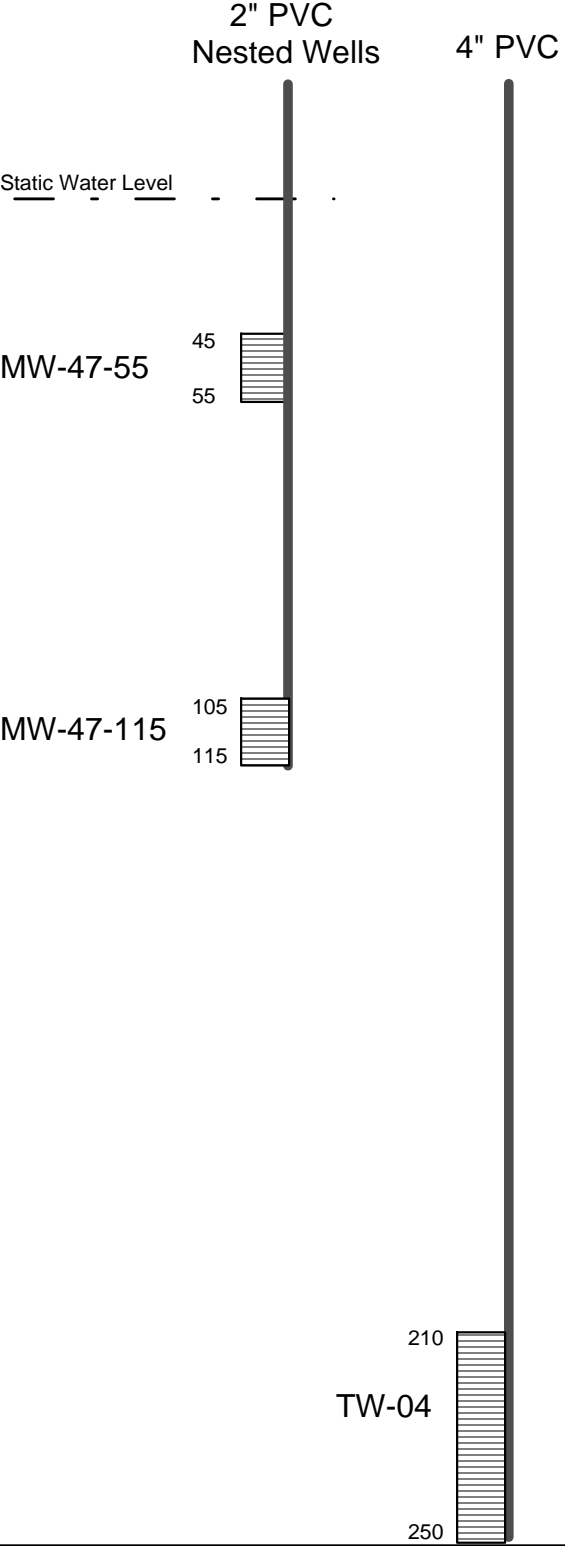
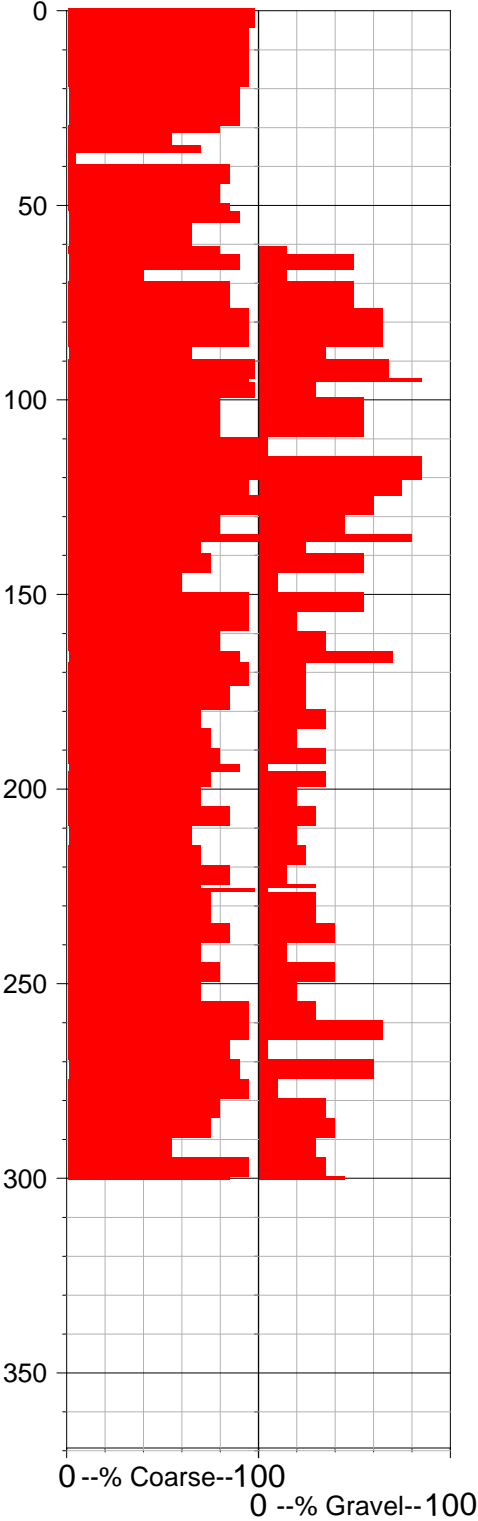


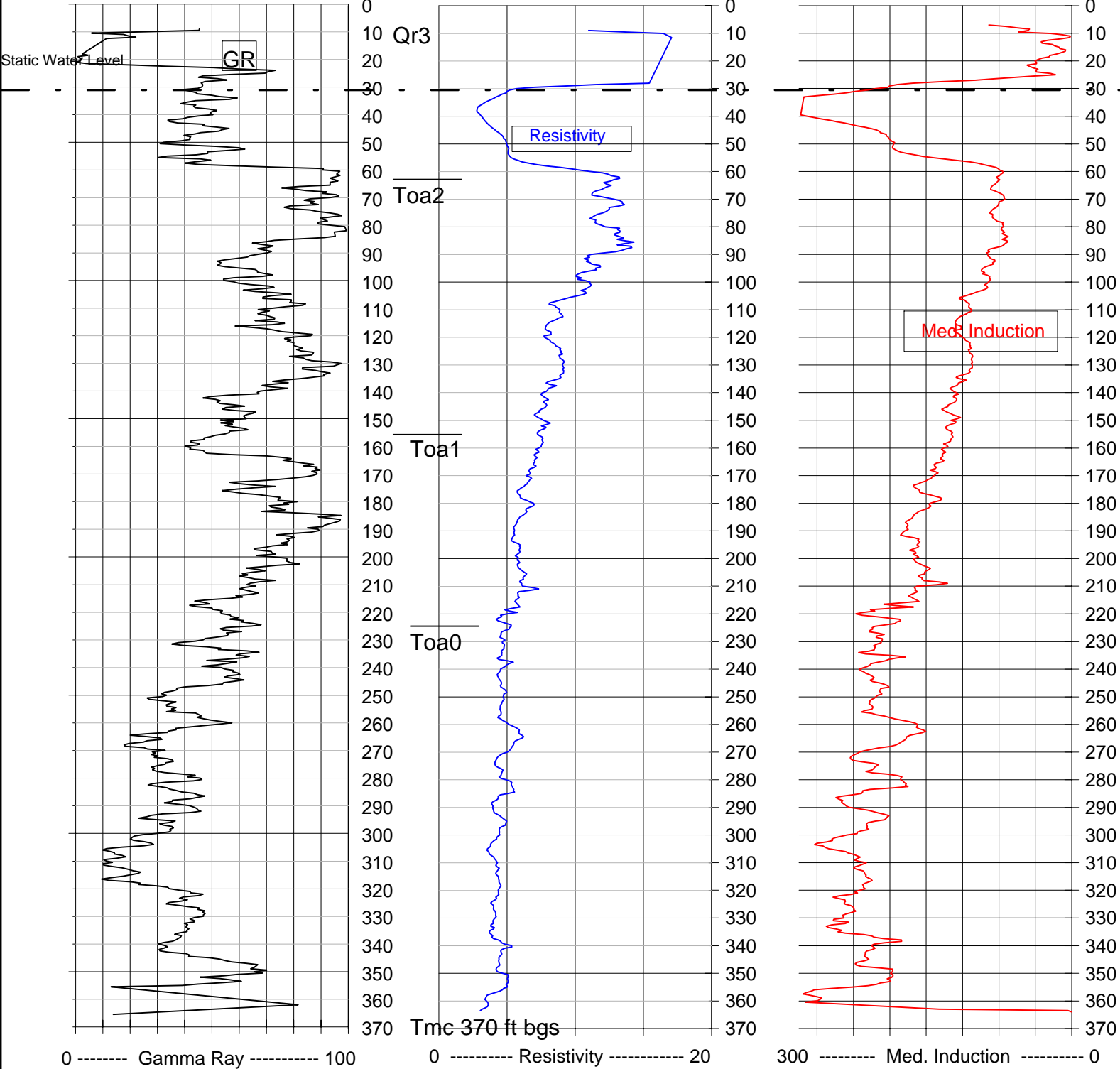
FIGURE B-3
MW-47 AND TW-04 LOGS
INTERIM MEASURES 2006 WELL INVESTIGATION REPORT
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

MW-49 Core Log



Plots show percentages of coarse sediment (> No. 200 sieve) and gravel-size fragments logged in OW corehole.

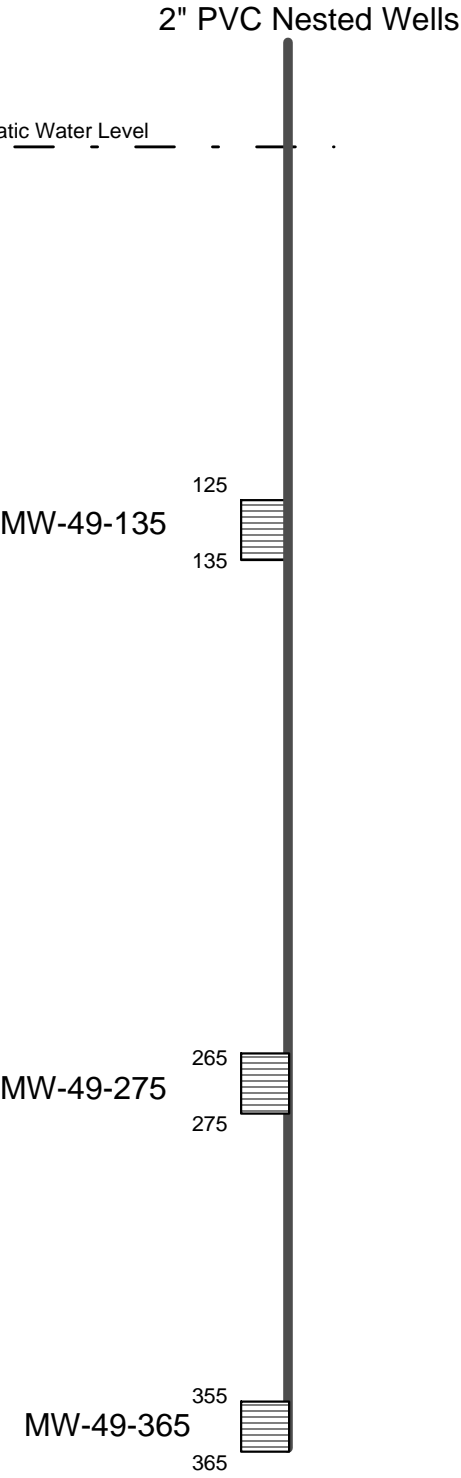
MW-49 Cased Well Geophysical Logs



MW-49 Geophysical Log April 27, 2006

Log Units: Gamma Ray (GR, API units), Resistivity (ohm/m), Med. Induction (mS/m)

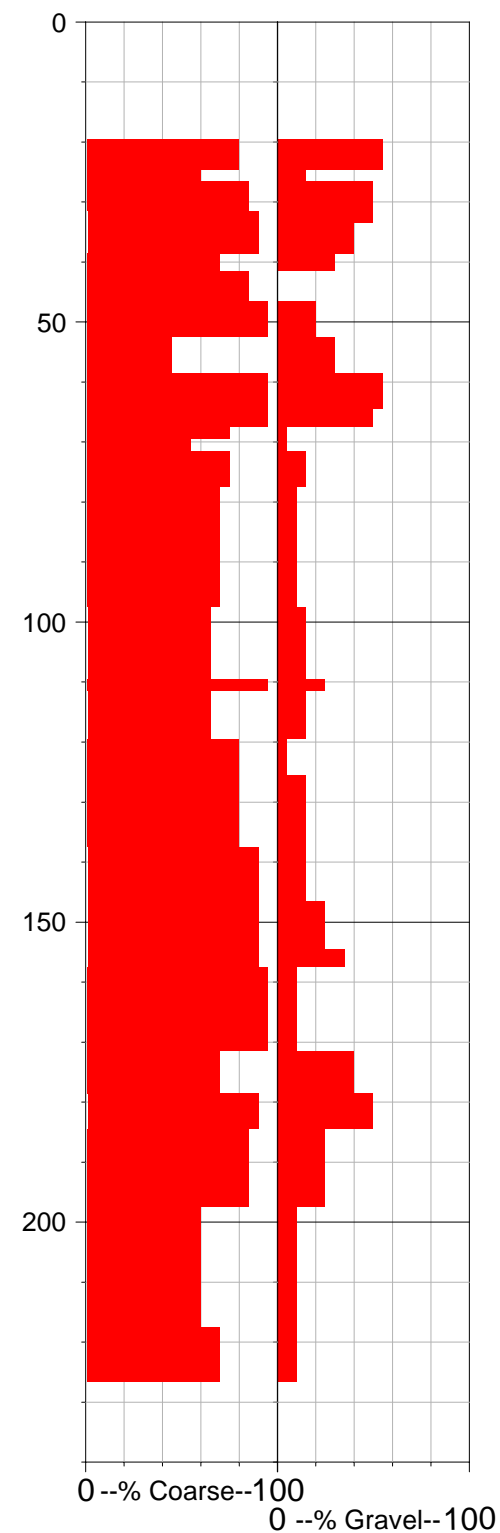
Well Cluster MW-49



**FIGURE B-4
MW-49 LOG**

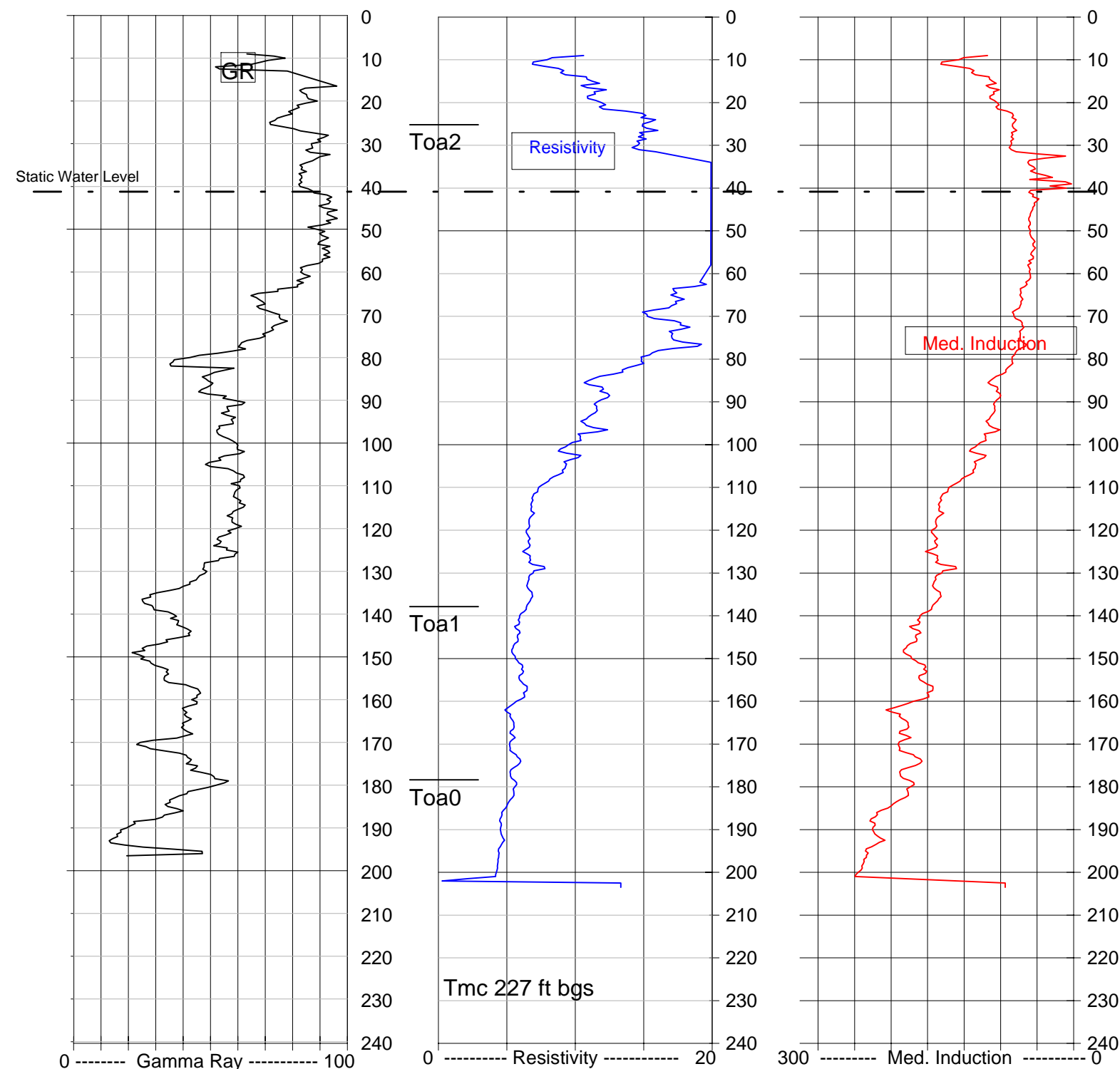
INTERIM MEASURES 2006 WELL INSTALLATION REPORT
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

MW-50 Core Log



Plots show percentages of coarse sediment (> No. 200 sieve) and gravel-size fragments logged in OW corehole.

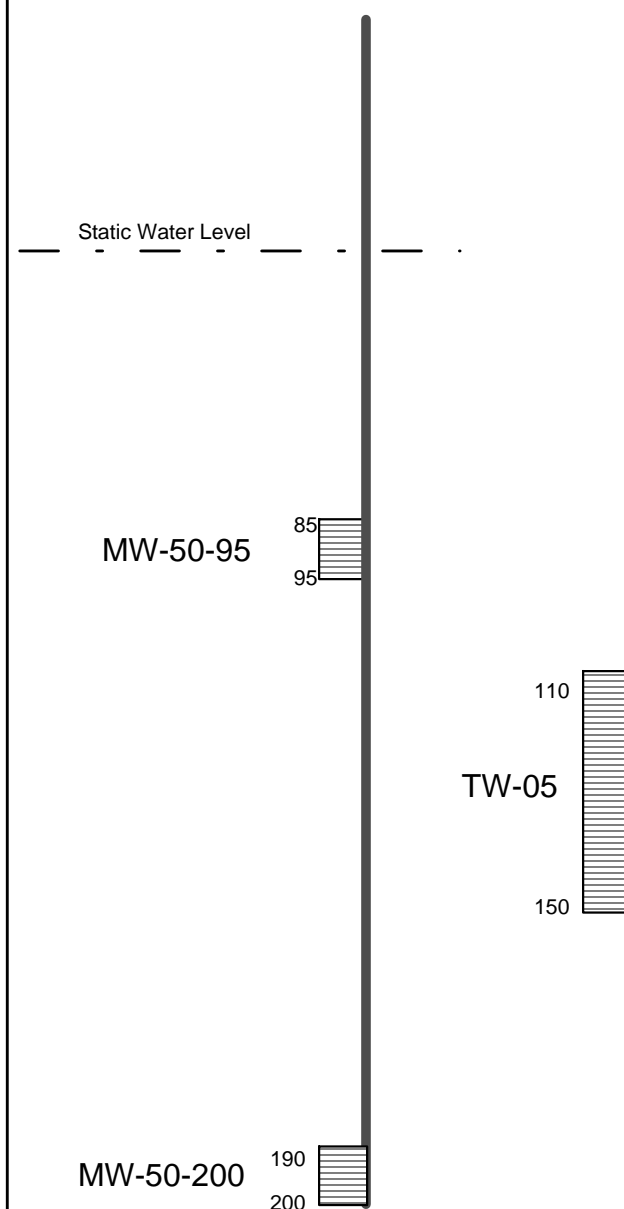
MW-50 Cased Well Geophysical Logs



MW-50 Geophysical Log April 27, 2006

Log Units: Gamma Ray (GR, API units), Resistivity (ohm/m), Med. Induction (mS/m)

Well Cluster MW-50 2" PVC Nested Wells

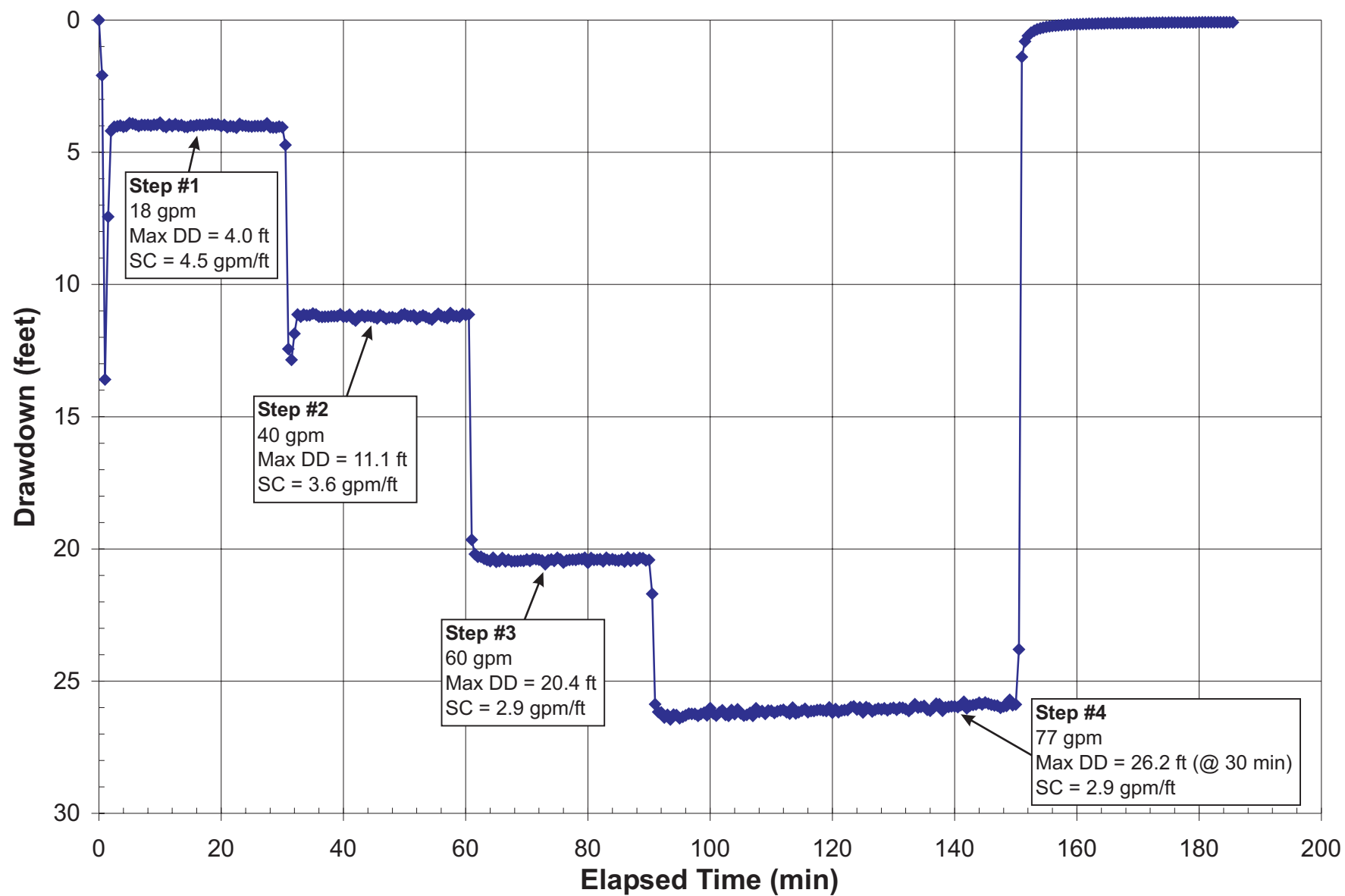


**FIGURE B-5
MW-50 AND TW-05 LOGS**

IMPM WELL INSTALLATION REPORT
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

Appendix C

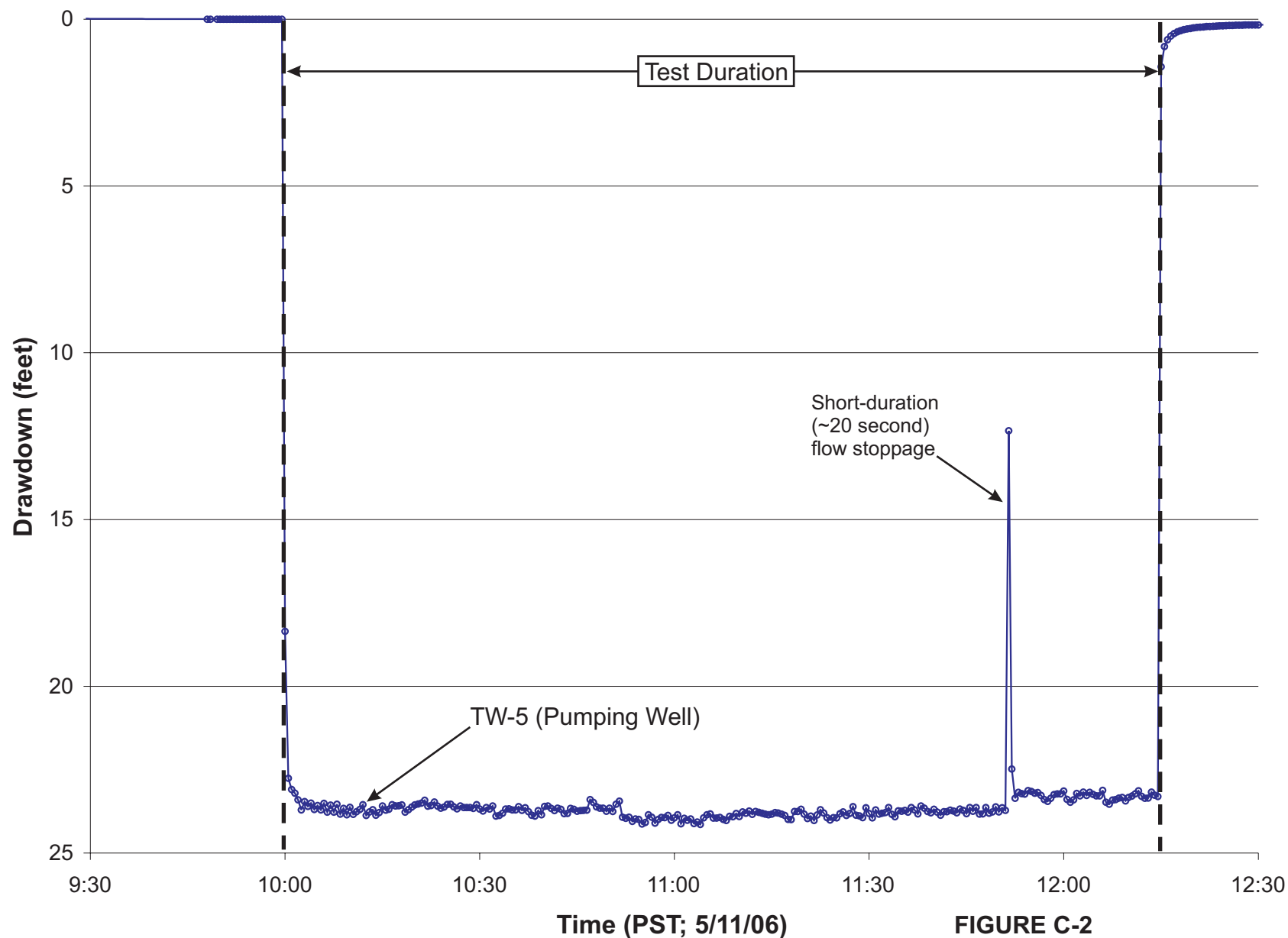
Hydraulic Testing Data



Notes:

Test was conducted on 05/10/2006 at 12:30:00 PM.
Each step of the is 30 minutes except the last step, which was extended to 60 minutes.

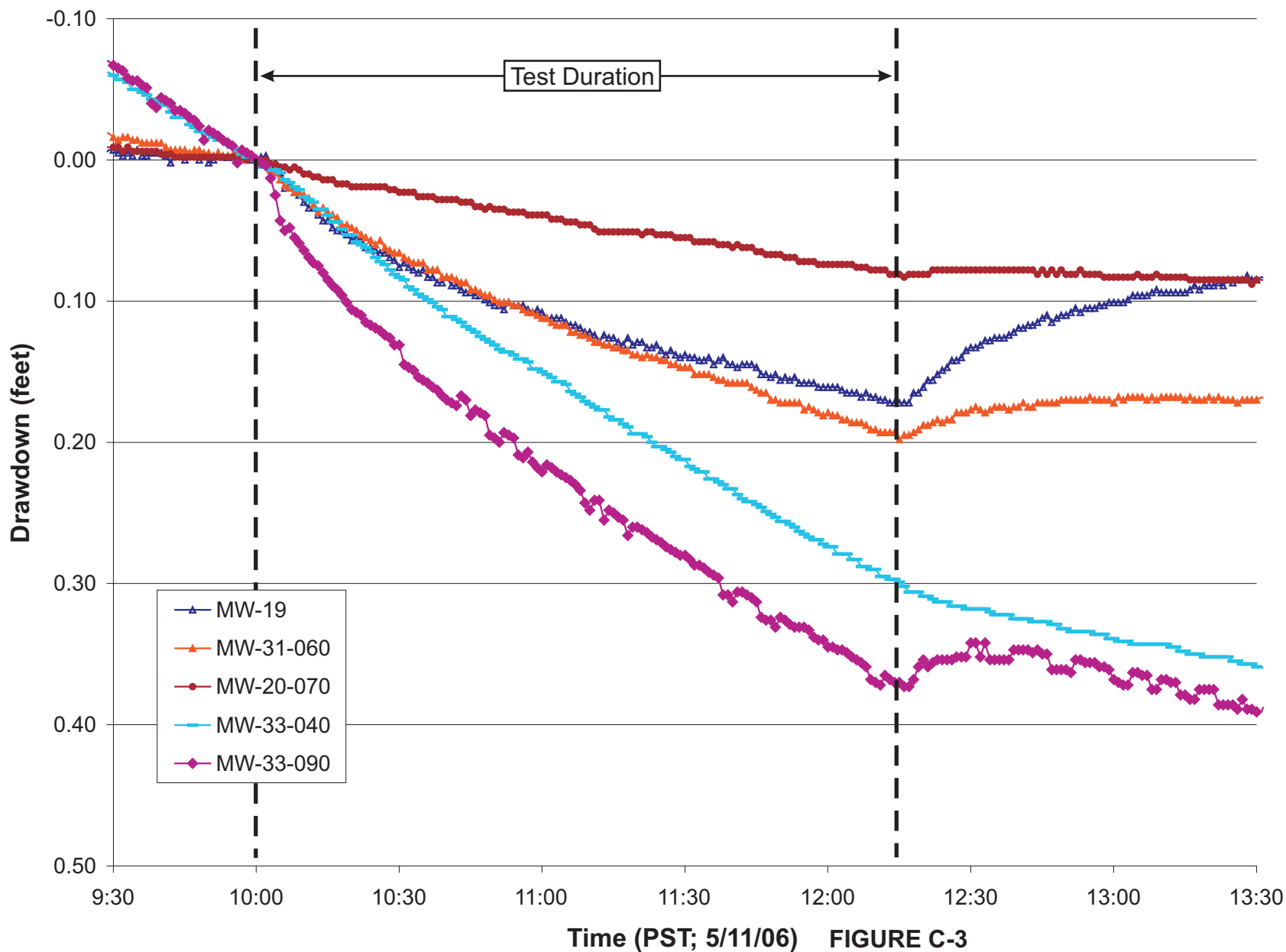
FIGURE C-1
TW-5 STEP DRAWDOWN TEST
INTERIM MEASURES 2006 WELL DRILLING
INVESTIGATION REPORT
PG&E TOPOCK COMPRESSOR STATION



Notes:

Pumping well is TW-5; test began at 5/11/06 at 10:00 AM, PST.
Pumping rate = 70.1 gallons/minute; test duration = 135 minutes.

FIGURE C-2
TW-5 CONSTANT RATE TEST -
DRAWDOWN AT PUMPING WELL
INTERIM MEASURES 2006 WELL DRILLING
INVESTIGATION REPORT
PG&E TOPOCK COMPRESSOR STATION



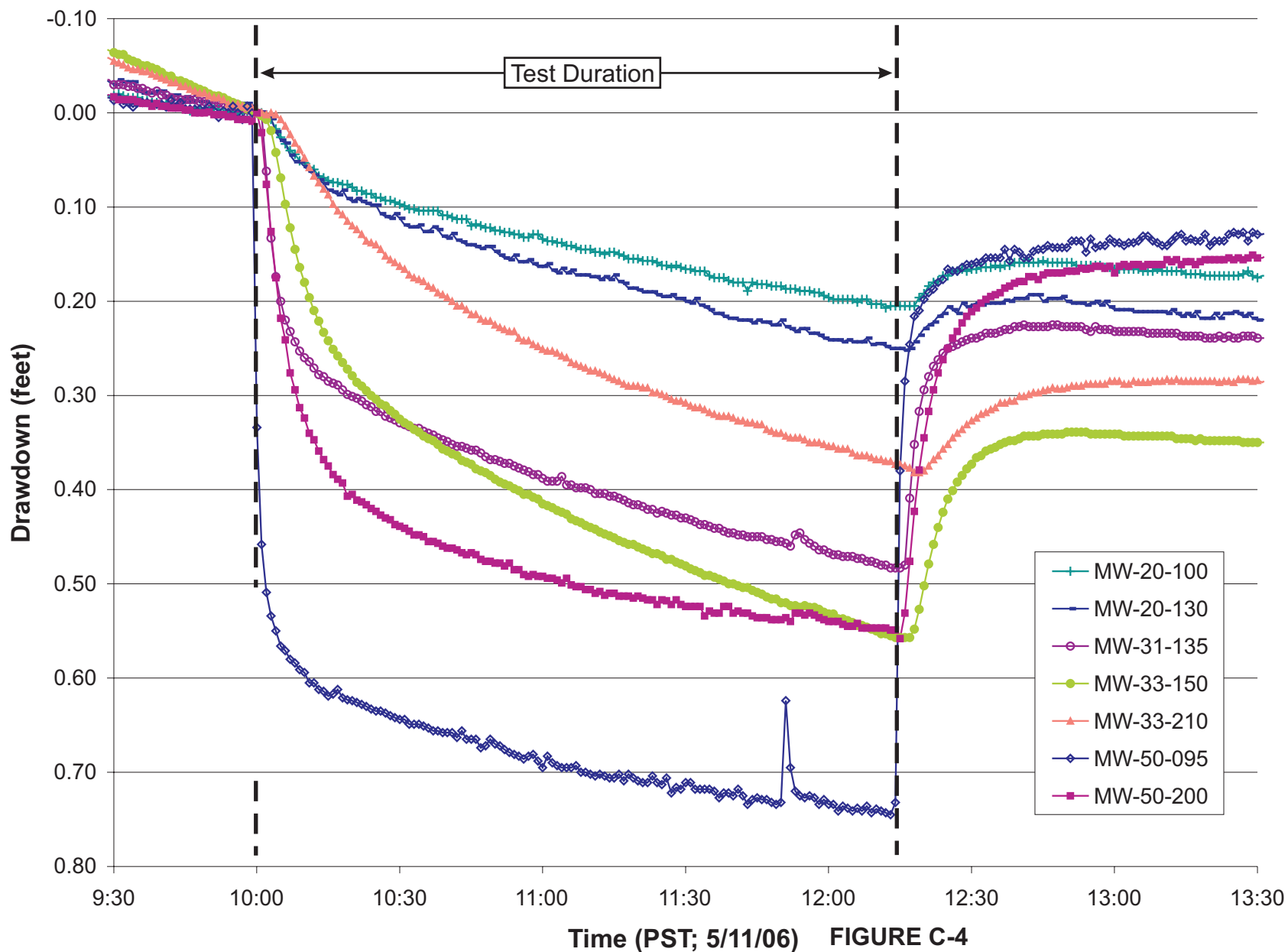
Notes:

Pumping well is TW-5; test began at 5/11/06 at 10:00 PST.
Pumping rate = 70.1 gallons/minute; test duration = 135 minutes.

FIGURE C-3

**TW-5 CONSTANT RATE TEST - DRAWDOWN AT
SELECT SHALLOWER OBSERVATION WELLS**

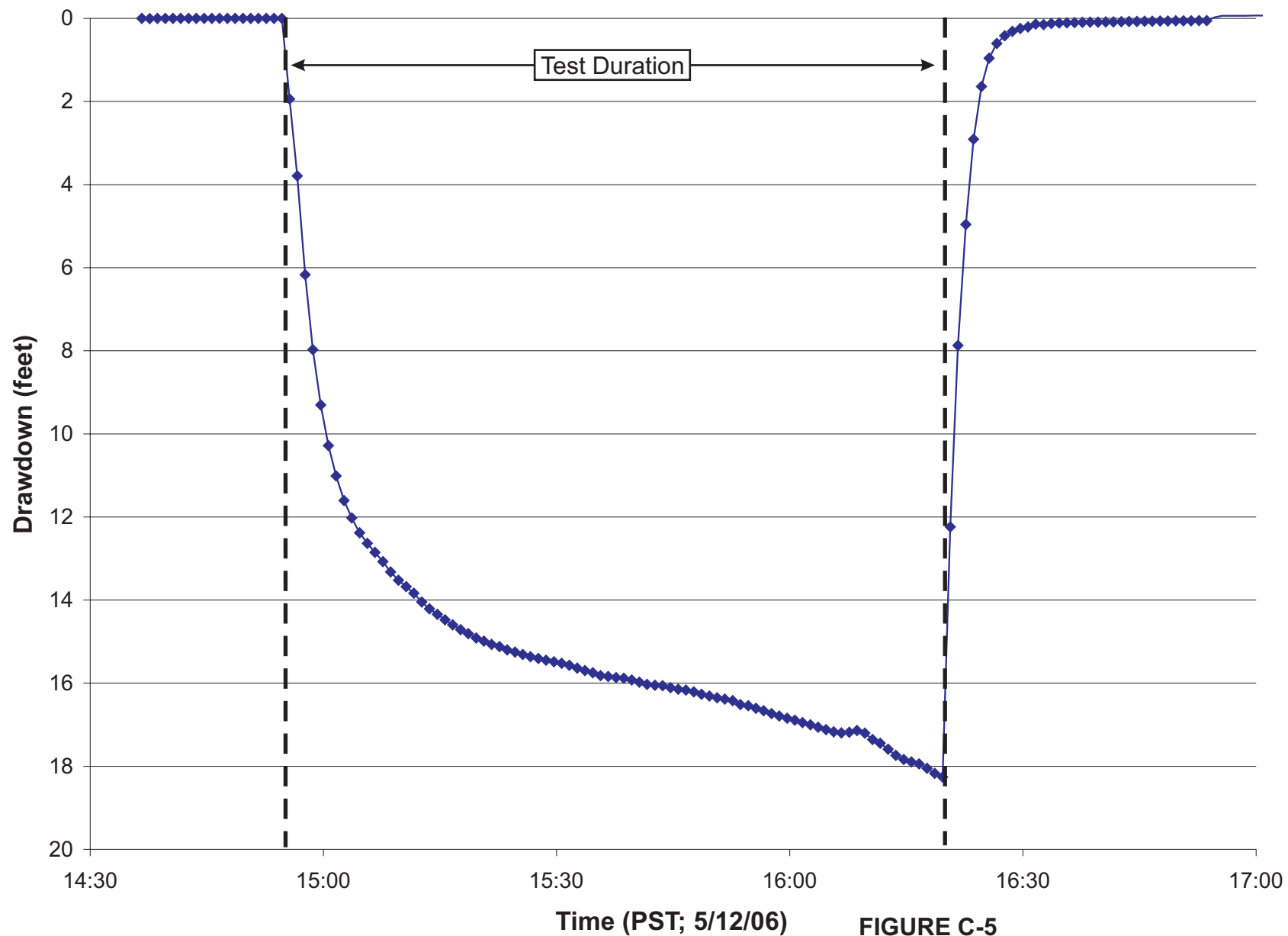
INTERIM MEASURES 2006 WELL DRILLING
INVESTIGATION REPORT
PG&E TOPOCK COMPRESSOR STATION



Notes:

Pumping well is TW-5; test began at 5/11/06 at 10:00 PST.
Pumping rate = 70.1 gallons/minute; test duration = 135 minutes.

FIGURE C-4
TW-5 CONSTANT RATE TEST - DRAWDOWN AT
SELECT DEEPER OBSERVATION WELLS
INTERIM MEASURES 2006 WELL DRILLING
INVESTIGATION REPORT
PG&E TOPOCK COMPRESSOR STATION

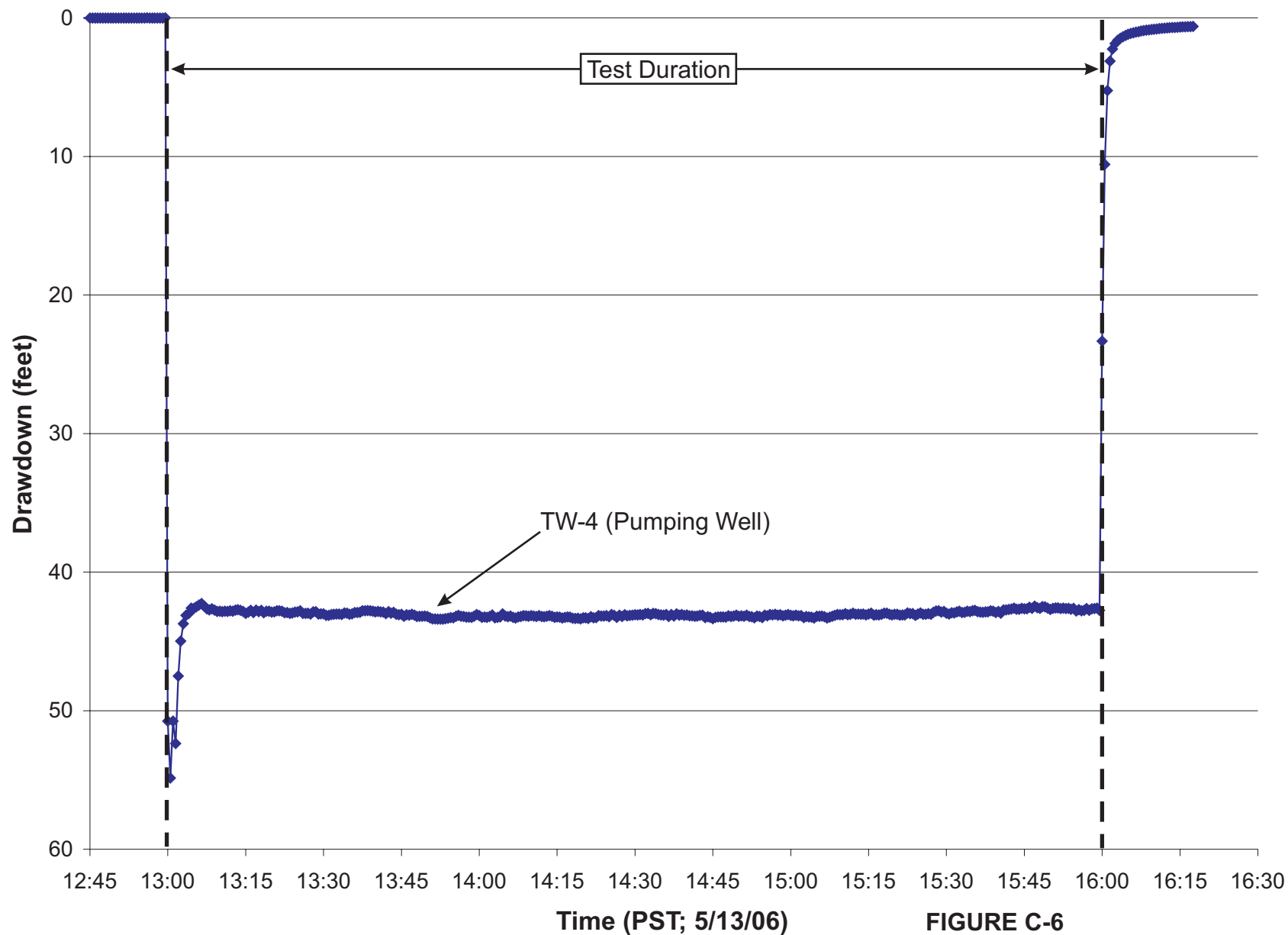


Notes:

Pumping well is MW-26; test began at 5/12/06 at 13:55 PST.
Pumping rate = 4.8 gallons/minute; test duration = 85 minutes.

**FIGURE C-5
MW-26 CONSTANT RATE TEST - DRAWDOWN
AT PUMPING WELL**

INTERIM MEASURES 2006 WELL DRILLING
INVESTIGATION REPORT
PG&E TOPOCK COMPRESSOR STATION



Notes:

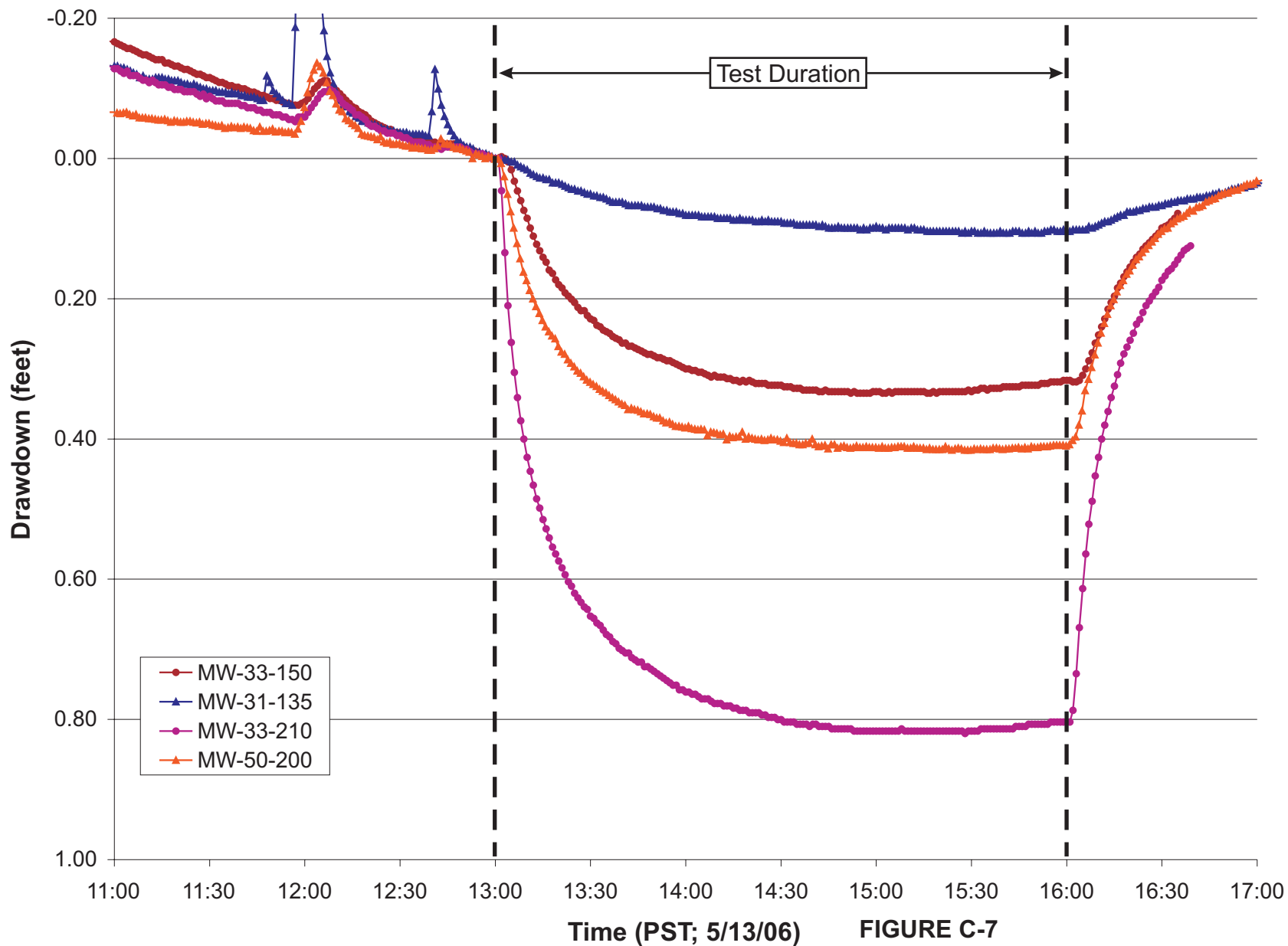
Pumping well is TW-4; test began at 5/13/06 at 13:00.

Pumping rate = 28 gallons/minute; test duration = 180 minutes.

FIGURE C-6

**TW-4 CONSTANT RATE TEST -
DRAWDOWN AT PUMPING WELL**

INTERIM MEASURES 2006 WELL DRILLING
INVESTIGATION REPORT
PG&E TOPOCK COMPRESSOR STATION



Notes:

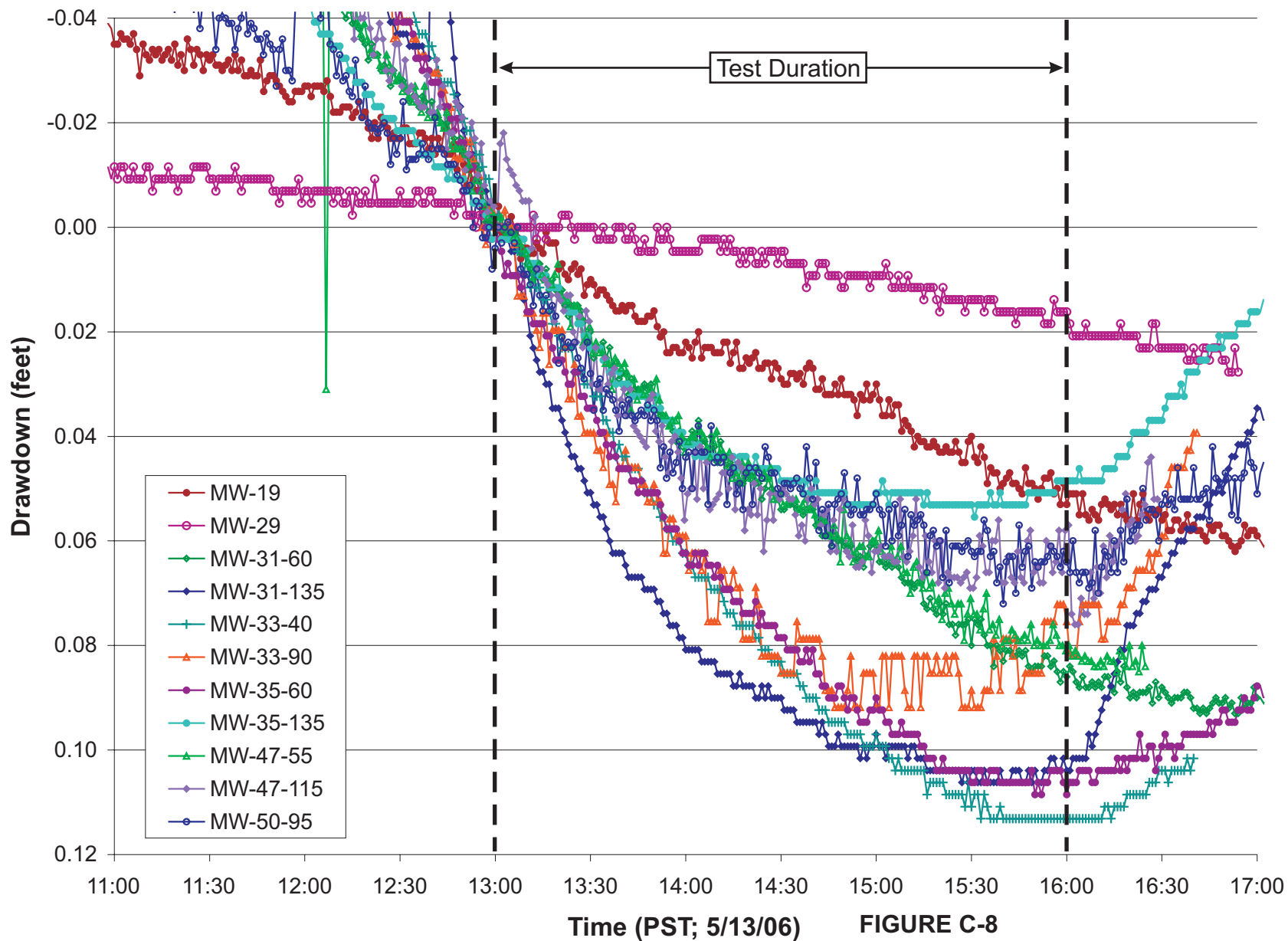
Pumping well is TW-4; test began at 5/13/06 at 13:00.

Pumping rate = 28 gallons/minute; test duration = 180 minutes.

FIGURE C-7

**TW-4 CONSTANT RATE TEST - DRAWDOWN
AT SELECT OBSERVATION WELLS**

INTERIM MEASURES 2006 WELL DRILLING
INVESTIGATION REPORT
PG&E TOPOCK COMPRESSOR STATION



Notes:

Pumping well is TW-4; test began at 5/13/06 at 13:00.

Pumping rate = 28 gallons/minute; test duration = 180 minutes.

FIGURE C-8

**TW-4 CONSTANT RATE TEST - DRAWDOWN
AT SELECT OBSERVATION WELLS**

INTERIM MEASURES 2006 WELL DRILLING
INVESTIGATION REPORT
PG&E TOPOCK COMPRESSOR STATION