

Yvonne J. Meeks Site Remediation - Portfolio Manager - San Luis Obispo, CA 93405 Environmental Affairs

6588 Ontario Road

Mailing Address 4325 South Higuera Street San Luis Obispo, CA 93401

805,546,5243 Internal: 664.5243 Fax: 805.546.5232 Internet: YJM1@pge.com

June 22, 2005

Mr. Norman Shopay Project Manager California Department of Toxic Substances Control Geology and Corrective Action Branch 700 Heinz Avenue Berkeley, California 94710

Groundwater and Hydrogeologic Investigation Report for Interim Measures No. 3 Subject: Injection Area Pacific Gas and Electric Company, Topock Project

Dear Mr. Shopay:

This letter transmits the revised Groundwater and Hydrogeologic Investigation Report for Interim Measures No. 3 Injection Area, prepared in response to DTSC's May 24, 2005 comments on the draft report submitted on March 31, 2005. In addition, this report incorporates the groundwater quality and elevation data collected in May 2005 in response to DTSC's April 25, 2005 letter and previously submitted on June 10, 2005 (Baseline Groundwater Quality Technical Memorandum for IM No. 3 Injection Area and groundwater elevation contour maps). The submittal date for this report, originally June 17, 2005, was extended to June 22 by DTSC in an electronic mail correspondence dated June 14, 2005.

DTSC's May 24, 2005 comments relevant to this report have been incorporated. This report also addresses the following five criteria identified by DTSC as required prior to approval of subsurface injection:

The subsurface geology and hydrogeology needs to be understood in the area impacted by the ٠ injection.

-Addressed in Section 5.0

The injection wells must demonstrate the capability to accept the maximum expected flow rate of ٠ treated water plus a 50 percent contingency factor. This equates to a minimum flow of 200 gpm, which must be available at all times, even when one well is offline for maintenance.

-Addressed in Section 7.0

- The extent of groundwater contamination in the area impacted by the injection needs to be characterized.
 - Addressed in Section 6.0

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• A sufficient number of monitoring and observations wells need to be installed to monitor the aquifer during injection.

- Addressed in Sections 4.0 and 5.0

- The estimated flow and rate of movement of injected groundwater needs to be modeled and understood.
 - Addressed in Appendix F

With this submittal PG&E believes that all requirements identified by DTSC for Interim Measures No. 3 startup have been satisfied. If you have any questions, please do not hesitate to contact me at (805) 546-5243.

Sincerely,

Teni Heron Jor Gronge Meeks

Cc: Kate Burger/DTSC Liann Chavez/CRBRWQCB Jose Cortez/CRBRWQCB

Groundwater and Hydrogeologic Investigation Report for Interim Measures No. 3 Injection Area

PG&E Topock Compressor Station Needles, California

Prepared for

Pacific Gas and Electric Company

June 22, 2005

Prepared by CH2MHILL 155 Grand Avenue, Suite 100 Oakland, California 94612

Groundwater and Hydrogeologic Investigation Report for Interim Measures No. 3 Injection Area

PG&E Topock Compressor Station Needles, California

Prepared for California Department of Toxic Substances Control

> On behalf of Pacific Gas and Electric Company

> > June 22, 2005

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

Paul Bertucci, C.E.G. Project Hydrogeologist



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Acronyms & Abbreviations

µg/L	micrograms per liter
ADEQ	Arizona Department of Environmental Quality
bgs	below ground surface
Cr(III) Cr(VI) Cr(T) CRBRWQCB CWG CW	trivalent chromium hexavalent chromium total chromium California Regional Water Quality Control Board, Colorado River Basin Consultative Work Group compliance well
DTSC	Department of Toxic Substances Control
gpm	gallons per minute
IM-3 IW	injection well
mg/L MLU MRP msl mV MW	milligrams per liter Multi-Layer Unsteady state software Monitoring and Reporting Program mean sea level millivolts monitoring well
NTU	nephelometric turbidity unit
ORP OW	oxidation reduction potential observation well
PCBs PG&E PVC	polychlorinated biphenyls Pacific Gas and Electric Company polyvinyl chloride
RCRA RFI RO	Resource Conservation and Recovery Act RCRA Facility Investigation reverse osmosis
SVOC	semi-volatile organic compound
TIC	tentatively-identified compound
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound
WDR	waste discharge requirements

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is addressing chromium in groundwater at the Topock Compressor Station in Needles, California under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). On July 8, 2004, PG&E submitted the *Summary of Proposed Project for Interim Measures No. 3* (CH2M HILL 2004a), which described the installation of a new groundwater treatment plant and injection well field to manage increased volumes of extracted groundwater in compliance with DTSC directives under Interim Measures No. 2. On June 30, 2004, DTSC issued to PG&E conditional approval to implement the Interim Measures No. 3 (IM-3) project to expand the existing groundwater extraction and management facilities to address hydraulic control of the chromium plume at the Topock site (DTSC 2004a).

As described in the *Summary of Proposed Project for Interim Measures No. 3,* the proposed location for the injection well field is on PG&E property, identified as Parcel 650-151-06, located near the existing Interim Measures groundwater extraction and treatment facilities. On July 29, 2004, PG&E submitted an application and Report of Waste Discharge to the California Regional Water Quality Control Board Colorado River Basin Region (CRBRWQCB) for subsurface injection. October 13, 2004, CRBRWQCB issued waste discharge requirements (WDR) Order No. R7-2004-0103 specifying effluent limitations, prohibitions, specifications, and provisions for subsurface injection.

This report presents the results and assessment of a multiple-phase well drilling, groundwater sampling, and testing program conducted during September 2004 through May 2005 to characterize the hydrogeology and groundwater quality conditions in the IM-3 Injection Area. This report is submitted to DTSC and the CRBRWQCB in compliance with DTSC's conditional approval for Interim Measures No. 3 and CRBRWQCB requirements under WDR-0103.

A draft *Groundwater and Hydrogeologic Investigation Report for the Interim Measures No. 3 Injection Area* was submitted to DTSC and the CRBRWQCB on March 31, 2005 (CH2M HILL 2005a). DTSC provided comments on the draft report and other IM-3 documents in a letter dated May 24, 2005 (DTSC 2005a). The Groundwater and Hydrogeologic Investigation Report has been revised to address DTSC's comments on the draft version.

1.1 Project Background

As directed by the DTSC under Interim Measures No. 2, PG&E is currently pumping groundwater from one deep extraction well (TW-2D) located on a bench along the station access road and above the Colorado River floodplain. The bench, referred to as the monitoring well MW-20 bench, is owned by the United States Bureau of Reclamation and is managed by the United States Bureau of Land Management. PG&E began pumping from this location in March 2004 and is currently pumping at a rate of approximately 70 gallons per minute (gpm).

Assisting DTSC and PG&E with the planning and review of interim remedial measures are the members of the Topock Consultative Work Group (CWG), constituted under California's Site Designation Process, and consisting of representatives of DTSC, the CRBRWQCB, the Arizona Department of Environmental Quality (ADEQ), the Metropolitan Water District of Southern California, the various federal agencies who own or manage adjacent property, and other project stakeholders.

1.2 Project Documents and Approvals

The IM-3 project required PG&E to conduct site investigations to characterize groundwater and hydrogeologic conditions in the planned injection area, and to design and install the necessary groundwater monitoring, compliance, and injection wells for the IM-3 facilities. For the IM-3 project, 12 groundwater observation wells (four well clusters), two injection wells, and eight compliance monitoring wells (four well clusters) were installed in a phased program. The IM-3 investigations and fieldwork were conducted in accordance with several approved work plans, outlined below. The work plans described the specific objectives, well siting and design, field activities, schedule and permitting for the individual drilling and site investigations.

The IM-3 groundwater and hydrogeologic investigations were implemented under the following work plans, documents and agency approvals:

- *Revised-Final Field Activities Summary for Observation Well Installation and Groundwater Characterization under IM No. 3*, Technical Memorandum dated September 1, 2004 (CH2M HILL 2004b). The Field Activity plan was conditionally approved by DTSC in a letter dated September 3, 2004 (DTSC 2004b).
- *Final Work Plan for Injection Well Installation on Parcel 650-151-06,* dated November 15, 2004 (CH2M HILL 2004c). The work plan was conditionally approved by DTSC in a letter dated November 2, 2004 (DTSC 2004c).
- *Selection of Locations for Compliance Monitoring Wells,* Technical Memorandum dated November 9, 2004 (CH2M HILL 2004d). The compliance wells selection plan was conditionally approved by DTSC in a letter dated December 23, 2004 (DTSC 2004d).
- Draft Design Plan for Groundwater Compliance Monitoring, PG&E Topock Compressor Station, Needles, California, dated November 23, 2004 (CH2M HILL 2004e). The design plan was conditionally approved by DTSC in a letter dated December 23, 2004 (DTSC 2004d). The design plan was conditionally approved by the CRBRWQCB in a letter dated December 1, 2004 (CRBRWQCB 2004c). The Final Design Plan for Groundwater Compliance Monitoring, PG&E Topock Compressor Station, Needles, California (CH2M HILL 2005b) was submitted on January 5, 2005.

An additional document relevant to the IM-3 groundwater investigation and compliance monitoring system is the Monitoring and Reporting Program (MRP) No. R7-2004-0103, adopted by the CRBRWQCB and attached to the WDR (CRBRWQCB 2004a, 2004b). The MRP specifies the startup, operation and maintenance, monitoring, and reporting requirements for the treatment facility, injection wells, and compliance monitoring system for the injection well field. In accordance with the MRP, a *Groundwater Compliance* *Monitoring Plan for the Interim Measures No. 3 Injection Area* was submitted to DTSC and CRBRWQCB on June 17, 2005 (CH2M HILL 2005c).

1.3 Report Organization

This report describes and documents the groundwater and hydrogeologic investigations completed for the IM-3 project through May 2005. The report presents the results and assessment of the following characteristics of the IM-3 Injection Area:

- Drilling and hydrogeologic characterization
- Baseline groundwater quality characterization and geochemical modeling
- Injection well testing and capacity

Following this Introduction, the report is organized as follows:

Section 2.0 – Background Section 3.0 - Purpose and Objectives Section 4.0 – Summary of Investigation and Characterization Activities Section 5.0 – Hydrogeologic Characterization Section 6.0 - Groundwater Quality Characterization Section 7.0 – Hydraulic Testing Results Section 8.0 – Conclusions

2.0 Background

This section provides brief descriptions of the project site, the IM-3 Injection Area, prior groundwater investigations, and the general site hydrogeology as background for this groundwater investigation report.

2.1 Site Description

The Topock Compressor Station is located in eastern San Bernardino County, approximately 15 miles to the southeast of Needles, California (Figure 2-1). The Topock facility began operations in 1951 to compress natural gas supplied from the southwestern United States for transport through pipelines to PG&E's service territory in central and northern California. The facility occupies approximately 65 acres owned by PG&E. The facility includes the compressor building, two water cooling towers, and an electric generator building for supplying power to the facility.

In September 2004, PG&E purchased San Bernardino County Parcel No. 650-151-06 from the Metropolitan Water District of Southern California. The Parcel encompasses 100 acres and is located approximately 1,650 feet north of the PG&E Compressor Station property. Figure 2-2 shows the locations of Parcel No. 650-151-06, the IM-3 groundwater investigation area, and site features. The IM-3 treatment plant is being constructed in the southeast portion of the parcel. The observation and injection wells are located in the southern portion of the parcel approximately 1,150 feet west of the treatment plant. The compliance monitoring wells surround the observation and injection wells and are located approximately 700 to 1,500 feet to the west of the treatment plant. Topography ranges from 450 to 550 feet above mean sea level (msl). Further description of the site features are discussed below and in Sections 4 and 5.

2.2 Prior Investigations

Beginning in 1997, PG&E conducted a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) to implement corrective measures to address constituents of concern released in the Bat Cave Wash area near the compressor station. The primary constituents of concern at the Topock site are hexavalent chromium (Cr[VI]) and total chromium (Cr[T]). The source was Cr(VI) salts historically used as a corrosion inhibitor in the station's cooling towers.

From 1997 through June 2004, five phases of RFI investigations were completed at the Topock site. A total of 56 groundwater monitoring wells and three groundwater test/extraction wells were installed. The majority of the hydrogeologic investigations were conducted east of and within Bat Cave Wash. The drilling completed for the RFI in the vicinity of the IM-3 Injection Area was confined to several shallow monitoring well installations. 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 RFI Report (CH2M HILL 2005d).

2.3 Site Hydrogeologic Setting

Located in the southern portion of the Mohave Valley, the PG&E Topock Compressor Station and the adjoining IM-3 Injection Area lie on the north-sloping piedmont alluvial terrace between the Chemehuevi Mountains and the floodplain of the Colorado River. Land forms in the study area are characterized by alluvial terraces and incised drainage channels. One of the largest incised channels is Bat Cave Wash, located west of the compressor station. Parcel No. 650-151-06 and the IM-3 Injection Area comprise the terraces and smaller drainage channels and washes immediately west of Bat Cave Wash.

The geology at the study area 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. The alluvial fan and lacustrine deposits are generally found in the western portion of the study area, while the fluvial deposits predominate in the eastern area adjacent to the Colorado River. The relative age and distribution of stratigraphic units in the study area are shown on Figure 2-3.

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 water table in the Alluvial Aquifer is very flat throughout the site and typically equilibrates to an elevation within 2 to 3 feet of the river level. 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 IM-3 Injection Area is located west of Bat Cave Wash, and the general hydrostratigraphy for this area is summarized in Figure 2-3. As confirmed by the recent IM-3 drilling investigation (discussed in Section 5), the stratigraphic units within the saturated zone in the IM-3 Injection Area include the lower portion of Quaternary Older Alluvium (Qoa unit) and Tertiary Oldest Alluvium (upper unit designated Toa2 and lower unit designated Toa1) (Figure 2-3). The Alluvial Aquifer is underlain with bedrock formations which include the consolidated Miocene conglomerate and associated megabreccia deposits (Tmc unit), and pre-Tertiary metamorphic and igneous bedrock (pTbr unit). The reader is referred to the Draft RFI Report for more information on the site hydrogeologic setting (CH2M HILL 2005d).

The purpose of this report is to present a baseline characterization the hydrogeologic conditions in the general vicinity of the injection wells. It is intended that this report will be used by the DTSC and the CRBRWQCB in their assessment of the suitability of this area for injection of treated water. This report presents data from a set of recently-completed wells that includes 12 observation wells, eight compliance monitoring wells, and two injection wells. Most of these wells were installed in or around the East Mesa Area. One observation well cluster (OW-3) was installed on the West Mesa Area. This report also includes data from existing and recently-installed monitoring wells to the east of the injection well field area.

The DTSC has identified the following five criteria to be addressed:

- 1. The subsurface geology and hydrogeology needs to be understood in the area impacted by the injection.
- 2. The injection wells must demonstrate the capability to accept the maximum expected flow rate of treated water plus a 50 percent contingency factor. This equates to a minimum flow of 200 gpm, which must be available at all times, even when one well is offline for maintenance.
- 3. The extent of groundwater contamination in the area impacted by the injection needs to be characterized.
- 4. A sufficient number of monitoring and observations wells need to be installed to monitor the aquifer during injection.
- 5. The estimated flow and rate of movement of injected groundwater needs to be modeled and understood.

The monitoring well network is described and discussed in Sections 4.0 and 5.0. The geology and hydrogeology is also addressed in Section 5.0 of this report. The extent of groundwater contamination in the area impacted by injection is addressed in Section 6.0. The capacity of the injection wells and hydraulic properties of the aquifer are addressed in Section 7.0. The groundwater modeling to assess movement of injected water and the effects of the injection on the chromium plume is provided as Appendix F.

4.0 Summary of Investigation and Characterization Activities

As part of the IM-3 investigation, three separate mobilization efforts were undertaken to install one monitoring well (MW) cluster, four observation well (OW) clusters, four compliance well (CW) clusters, and two injection wells (IW). In order to assess the aquifer conditions, the monitoring well cluster and four observation well clusters were installed first. Injection wells were installed next to further evaluate the aquifer conditions in the planned injection area. The compliance wells were installed last after the injection wells were in place and tested.

This section provides documentation of the observation, injection, and compliance well installations; groundwater quality sampling and analysis; geophysical logging; and hydraulic testing that have been conducted as part of the IM-3 investigation. The results of the hydrogeologic investigations, groundwater characterization, and injection well testing are presented in Sections 5.0, 6.0, and 7.0, respectively. Appendix A contains the drilling, well construction, and well development logs.

Three general areas were identified on Parcel 650-151-06 as potential sites for installation of injection wells. Two primary areas identified as the East and West Mesas were selected based on the topography of the site, representing areas of relatively flat ground that could be made accessible to drilling equipment with only minor grading. A secondary area identified as the Center Mesa, which is relatively flat but not easily accessible, was identified as a contingency area that would be used only if hydrogeologic conditions turned out to be unfavorable for injection wells on one or both of the primary areas. Initial investigations (installation of observation wells) were conducted on the East and West Mesas. Based on favorable hydrogeologic conditions and proximity to the new treatment system, it was decided to further investigate the East Mesa as an injection well site. An investigation of Center Mesa was not undertaken after it was determined that sufficient injection capacity could be obtained by wells on the East Mesa alone.

Site preparation for the observation, injection, compliance, and monitoring well installations involved grading existing roadways and grading paths for equipment access where no roadways existed. Prior to moving equipment onto Parcel 650-151-06, 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.

4.1 Observation Well Installation

The objectives of the observation well installation were to provide data needed to design the injection wells and to monitor groundwater levels and quality during the operation of the injection wells. Each observation well location includes a three-well cluster with screened intervals at different depths. Monitoring the various depth intervals in the Alluvial Aquifer in the vicinity of the injection wells was considered during screen interval selection. The

screened intervals were selected in consultation with DTSC based on lithology, with screens placed across the more permeable units within the upper-depth, middle-depth, and lower-depth intervals of the Alluvial Aquifer.

As part of this same installation effort, a monitoring well cluster (MW-41) was installed in Bat Cave Wash, approximately 685 feet north of existing MW-13. The MW-41 cluster wells are screened in the upper-depth, middle-depth, and lower-depth intervals of the Alluvial Aquifer.

Observation wells were installed from September to December 2004. Refer to Figure 4-1 for well locations. Sonic drilling methods were used to install the observation wells because it offered the advantages of minimal waste production, ability to penetrate through cobbles and caliche layers, provision of core for lithologic logging and laboratory sampling, and results in wells that are easier to develop than wells drilled by the mud rotary method. Refer to the *Field Activities Summary for Observation Well Installation* (CH2M HILL 2004b) for installation methods and waste management procedures.

Observation wells and the monitoring well were constructed of 2-inch polyvinyl chloride (PVC) screen and casing. The screen intervals ranged from 20 to 40 feet in length. Longer well screens were used in some observation wells in order to obtain average heads in the aquifer during injection and average groundwater quality in the vicinity of the injection wells. Table 4-1 summarizes the drilling and well information for the observation wells installed.

During drilling, groundwater samples were bailed from the open borehole at approximately 60-foot intervals throughout the saturated zone. Samples from the borehole were screened in the field for specific conductance, pH, and dissolved Cr(VI). Groundwater samples were submitted for laboratory analyses of dissolved Cr(T) and TDS. The purpose of these samples was to assess the vertical distribution of TDS and chromium concentrations at the drilling sites and to assist in selecting well screens.

After well construction and annular seal placement, the observation wells and monitoring well 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 stabilize and turbidity was reduced to less than 50 nephelometric turbidity units (NTU).

Selected samples of core from each deep observation well boring was submitted for grainsize analysis. The analysis was used to aide in the design of the gravel pack and screen size for the injection wells. Samples were selected that represented a cross-section of the different types of geologic materials encountered during drilling.

4.2 Injection Well Installation

The primary objective of the injection well installation was to install wells that would accept up to 200 gpm of treated groundwater from the IM-3 treatment plant (the peak design flow of injected water is 135 gpm; an additional 65 gpm was added as a contingency). The injection well drilling program involved drilling, installation, development, and testing of two injection wells on the East Mesa of Parcel 650-151-06. Screen intervals were selected in consultation with DTSC based on the preference to target transmissive zones, minimization of potential hydraulic mounding, protection of shallow groundwater quality, and increasing the TDS content for matching water quality. Hydraulic testing was conducted on the aquifer to provide data on the capacity of each well and the hydraulic properties of the aquifer. Because aquifer properties were found to be favorable and each of the injection wells was capable of accepting far more than the design flow rates, these were the only two injection wells needed to meet the design capacity.

Mud rotary drilling methods were used for injection well drilling. Mud rotary is the most commonly used method for the installation of larger-diameter production wells and was used successfully to install other wells at the Topock site. Refer to the *Final Work Plan for Injection Well Installation on Parcel 650-151-06* (CH2M HILL 2004c) for installation methods and field procedures.

Six-inch-diameter pilot boreholes were advanced to 411 feet below ground surface (bgs) (IW-2) and 412 (IW-3) feet bgs. Refer to Figure 4-1 for well locations. Core samples were collected from the bottom portion of the pilot holes to determine the lithology. After completion of the pilot boreholes, 12-inch-diameter boreholes were then reamed to 340 feet bgs (IW-2) and 330 feet bgs (IW-3). Injection well IW-2 was screened from 170 to 330 feet bgs and IW-3 was screened from 160 to 320 feet bgs. Refer to Table 4-1 for well construction details.

After well construction and annular seal placement, the injection 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 NTU.

Grain-size analysis was conducted on samples collected from the saturated aquifer during the observation well drilling effort. The observation well grain-size analysis data was used to design the gravel pack and screen size for the injection wells. Prior to well construction, PG&E conferred with DTSC regarding gravel pack and screen size.

A full suite of geophysical logs (resistivity, conductivity, gamma ray, spontaneous potential, and sonic) were collected in the open injection well pilot boreholes for hydrogeologic characterization and to aide with well construction design. Following construction, the injection wells were developed, and step and constant-rate pumping tests, and injection tests were conducted. The results of the hydraulic tests are discussed in Section 7.

4.3 Compliance Well Installation

The primary objective of the compliance drilling program was to install wells to monitor potential adverse effects on aquifer water quality due to the operation of the injection wells. The compliance monitoring wells also will be used in conjunction with the observations wells to:

- Better define the hydrogeology of the aquifer in the vicinity of the injection wells.
- Provide baseline groundwater quality data for the well field and adjacent area prior to the start of injection.

• Monitor any changes in groundwater elevations to evaluate the hydraulic effects of the injection well fields.

Following the decision to use two injection wells on the East Mesa site, candidate locations for the compliance monitoring wells were determined using a groundwater flow model. WDR R7-2004-0103 required a minimum of one upgradient and two downgradient compliance monitoring wells. The DTSC indicated that, where possible, compliance monitoring wells should be located within a distance representing about 2 years of groundwater travel time from the injection well fields. The steep topography of the site combined with the presence of sensitive cultural and biological resources presented significant constraints on where well drilling activities could occur.

A technical memorandum addressing the selection of locations for the compliance monitoring wells with consideration of access and cultural and biological constraints was submitted to DTSC on November 9, 2004 (CH2M HILL 2004d). DTSC provided conditional approval of the proposed well locations in a letter to PG&E dated December 23, 2004 (DTSC 2004d). The proposed locations for the compliance wells were approved by the CRBRWQCB in a letter to PG&E dated December 1, 2004 (CRBRWQCB 2004c). Figure 4-1 indicates the location of the four compliance monitoring well clusters (CW-1 through CW-4) installed under this investigation.

Sonic drilling methods were used to install the compliance monitoring wells. The well casing and screen were installed in the borehole through the sonic drill casing (approximate 7-inch outside diameter). The well specifications and construction details are provided on Table 4-1. Refer to the *Final Design Plan for Groundwater Compliance Monitoring* (CH2M HILL 2005b) for installation methods and field procedures.

During drilling, groundwater samples were bailed from the open borehole at approximately 60-foot intervals throughout the saturated zone. Samples from the borehole were screened in the field for specific conductance, pH, and Cr(VI). Groundwater samples were submitted for laboratory analyses of dissolved Cr(T) and TDS. The purpose of these samples was to assess the vertical distribution of TDS and chromium concentrations at the drilling sites and to assist in selecting well screens.

In order to monitor a substantial thickness of the aquifer with selectively screened wells, it was necessary to install well clusters with two wells each screened at different discrete intervals located a few feet apart. Each compliance well has a 50-foot screened interval. Screens were not installed across thick sequences of fine-grained sediments in order to avoid creating conduits for vertical flow in the aquifer. Wells were constructed of 2-inch PVC screen and casing. Refer to Table 4-1 for compliance well construction details.

The depth of the screened intervals in the compliance well clusters were similar to those in the injection wells, which were designed to be screened from about 60 feet below the water table to near the bottom of the Alluvial Aquifer. The screened interval of each compliance well was selected in consultation with the DTSC and CRBRWQCB, with screen selections based on lithologic information collected during drilling.

After well construction and annular seal placement, the compliance wells were developed using a surge block, bailer, and submersible pump. During development, temperature, pH, specific conductance, and turbidity were measured using field instruments (Appendix A).

4.4 Other Monitoring Wells in Investigation Area

In addition to the IM-3 observation, injection, and compliance wells, there are four previously installed monitoring wells in the IM-3 investigation area (Figure 4-1). Monitoring wells MW-13, MW-14, and MW-18 (all screened in the shallow groundwater zone) were installed during the RFI investigations in 1997. Well cluster MW-37 was installed as part of the IM No. 1 groundwater investigations in April 2004. MW-14 is located approximately 800 feet southwest of MW-37, adjacent to Route 66, and well MW-18 is located approximately 150 south of the Center Mesa. The screen intervals and other well information for these wells are summarized in Table A-1 in Appendix A.

4.5 Groundwater Quality Sampling and Analysis

After well development, the new wells were purged and sampled for the initial water quality characterization. The sampling activity followed the procedures, analytical methods, reporting limits, and quality control plan used for the Topock groundwater monitoring program as described in the *Sampling and Analysis Plan, Groundwater and Surface Water Monitoring* (CH2M HILL 2004f).

After development, the observation wells and MW-41 were purged and sampled for initial groundwater quality characterization. Samples were analyzed for Cr(VI), Cr(T), TDS, specific conductance, pH, aluminum, barium, boron, copper, lead, manganese molybdenum, nickel, total iron, and zinc. Samples from wells OW-1M, OW-1D, OW-3S, OW-3M, and OW-3D were analyzed for chloride, sulfate, nitrate/nitrite, ammonia carbonate/bicarbonate, orthophosphate, and TOC. Samples from observation well OW-1D were analyzed for : volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), perchlorate, polychlorinated biphenyls (PCBs), and California Code of Regulations, Title 22 metals (i.e., aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, magnesium, manganese, mercury, molybdenum, selenium, silver, thallium, vanadium, and zinc). Field water quality parameters (temperature, pH, specific conductance, oxidation-reduction potential, and turbidity) were also measured. Results of this sampling are provided in Section 6.

After development, the compliance wells were purged and sampled for Cr(VI), Cr(T), TDS, specific conductance, pH, aluminum, ammonia (as nitrogen), antimony, arsenic, barium, boron, calcium, chloride, carbonate/bicarbonate, copper, fluoride, lead, magnesium, manganese, molybdenum, nickel, nitrate/nitrate (as nitrogen), total Kjeldahl nitrogen, potassium, selenium, sodium, sulfate, total iron, and zinc. A second round of compliance well sampling was performed two weeks after the initial event; the same analyte list was used. Groundwater samples for metals analyses were filtered to obtain dissolved metals concentrations. Field water quality parameters (temperature, pH, specific conductance, oxidation-reduction potential, and turbidity) were also measured. At DTSC's request, groundwater samples from well CW-2D were also analyzed for VOCs and SVOCs.

The injection wells were sampled during pumping tests for analysis of TDS and Cr(T) or Cr(VI). Results are included in Section 6.

As part of the IM-3 groundwater characterization, wells MW-13, MW-14, MW-18, and MW-37 cluster were sampled for Cr(VI), Cr(T), specific conductance, pH, aluminum, ammonia (as nitrogen), barium, calcium, chloride, carbonate/bicarbonate, copper, fluoride, lead, magnesium, manganese, molybdenum, nickel, nitrate/nitrate (as nitrogen), orthophosphate, potassium, sodium, sulfate, total iron, and zinc. Groundwater samples for metals analyses were filtered to obtain dissolved metals concentrations. Field water quality parameters (temperature, pH, specific conductance, oxidation-reduction potential, and turbidity) were also measured.

In letter dated April 25, 2005 (DTSC 2005b), DTSC requested the three East Mesa observation well clusters (OW-1, OW-2, and OW-5) and adjacent wells MW-14 and MW-18 be sampled for Cr(VI), Cr(T), general chemistry (cations and anions), VOCs, SVOCs, and Title 22 metals. The wells were sampled in May 10-11, 2005. Sampling results of the May 2005 event are presented in Section 6.

During the May 2005 supplemental sampling, the East Mesa shallow observation wells OW-1S and OW-2S were not sampled due to field conditions. The sampling pump could not be lowered to the water table in OW-1S due to suspected curvature in the shallow portion of the well casing. A smaller diameter pump will be used for future sampling of OW-1S. In well OW-2S, the sampling pump was lowered to the well screen; however, it would not pump. The pump was inspected and confirmed operational. It appears the water column above the pump was insufficient to allow for pumping to the surface. Sampling crews will evaluate an alternate purging method for future sampling well OW-2S.

4-1 Hydrogeologic and Geophysical Logging

Geophysical logging was conducted in selected observation wells, monitoring well MW-41, injection wells, and compliance wells. The suite of logs that were run on the open boreholes of the injection wells included spontaneous potential, natural gamma ray, long and short resistivity, induction, and a caliper log. Natural gamma ray and induction logs were run on the compliance wells, selected observation wells, and MW-41.

The purpose of the geophysical logging was to confirm the contact depth of the bedrock formation, assess the hydrogeologic characteristics of the Alluvial Aquifer, and assist in well screen selection. The geophysical logs were also used to support the site conceptual hydrogeologic model.

Following well development, a downhole spinner velocity log was run in both injection wells to assess which portions of the screened interval were more transmissive. The results of the spinner log were used for further hydraulic characterization of the injection wellfield and to support the site hydrogeologic/groundwater model.

4-2 Injection Well Hydraulic Testing

The principal objective of hydraulic testing at each injection site was to estimate the sustainable injection capacity for the constructed well. Given schedule and water disposal constraints, long-term hydraulic testing for the purpose of improving the model was a lower priority. CH2M HILL took full advantage of all observed hydraulic data from the short-term tests and updated hydraulic property distribution accordingly. The MLU (Multi-Layer Unsteady state) software (Hemker 1999) was used to analyze the hydraulic data.

Step-drawdown testing was performed in the injection wells immediately following development. The pumping rates were varied at approximately half-hour intervals, with three to four pumping intervals. Each step-drawdown test was run at rates form approximately 60 to 190 gpm, and produced approximately 20,000 gallons of water and lasted for up to 4 hours. A 180 gpm constant-rate pumping test was also performed at IW-2 that produced approximately 50,000 gallons of water. The pumped water was contained in up to five 20,000-gallon frac tanks on Parcel 650-151-06 near the well site. A total volume of approximately 100,000 gallons of water was produced from each extraction well during pumping development and pumping tests. The injection well and nearby monitoring wells were outfitted with pressure transducers to measure water levels before, during, and following the step-drawdown tests.

The water pumped from each injection well during the step test was analyzed for chromium. Chromium concentrations in the extracted water were less than the WDR R7-2004-0103 maximum daily effluent discharge limitations of 16 micrograms per liter (μ g/L) Cr(VI) and 50 μ g/L Cr(T); therefore, the water from the step test and constant rate test was injected back into the injection well at a constant rate of 140 gpm (IW-2) and 250 gpm (IW-3, in a test conducted with larger pump and injection piping) until the tanks were empty. Groundwater levels were measured in the injection well and in nearby monitoring wells, and these data were used to estimate the capacity of the injection well and hydraulic properties of the aquifer.

A longer-term pumping test for the injection wells is not feasible until conveyance and treatment systems are in place. As stated above, the main purpose of this hydraulic testing was to evaluate injection capacity. Measured aquifer properties indicated that the wells had more than the required capacity; therefore, longer-term testing was not necessary for this assessment. The initial hydraulic testing and startup of the injection wells were sufficient to characterize the aquifer properties of the wellfield. Further discussion of the hydraulic testing results is provided in Section 7.0.

5.0 Hydrogeologic Characterization

This section presents the results of the hydrogeologic investigations for characterizing the groundwater and subsurface conditions in the IM-3 Injection Area. The drilling, geologic/geophysical logging, well installation, groundwater quality sampling, and hydraulic testing activities were summarized in Section 4.

5.1 Hydrogeologic Investigations in the IM-3 Investigation Area

5.1.1 Overview of Investigations

As discussed in Section 4, the IM-3 drilling and well installation investigations were conducted in the southern portion of PG&E Parcel 650-151-06 (Figure 4-1). In the project work plans (CH2M HILL 2004a, 2004b), three general areas were identified as potential sites for installation of injection wells. Two areas (East and West Mesas) were selected for the injection and observation well drilling based on site access and topography. A third area (Center Mesa, Figure 4-1) was identified as a contingency area that would be used only if hydrogeologic conditions turned out to be unfavorable for injection wells on one or both of the primary areas. Initial investigations involving logging/installation of observation clusters OW-1, OW-2, and OW-3 were conducted on the East and West Mesas. Based on favorable hydrogeologic conditions and proximity to the IM-3 treatment facilities, it was decided to further investigate the East Mesa as an injection well site. Hydrogeologic investigation of the Center Mesa was not performed.

For presentation and discussion in this report, the overall area for the IM-3 groundwater and hydrogeologic investigations is divided into the following areas (see Figure 4-1):

- **Bat Cave Wash area**, including monitoring well clusters MW-41 (installed during this investigation) and MW-37, and shallow monitoring wells MW-13 and MW-14.
- East Mesa area, including observation well clusters OW-1, OW-2, and OW-5; injection wells IW-2 and IW-3; pilot boring location IW-1; and compliance well clusters CW-1, CW-2, CW-3, and CW-4.
- West Mesa area, including observation well cluster OW-3 (installed during this investigation) and shallow monitoring well MW-18.

For this groundwater investigation, the Alluvial Aquifer is subdivided into the following three depth intervals: (a) **Upper depth**, comprising the shallow saturated interval of the Alluvial Aquifer from the water table (average elevation of 454 feet msl) to an approximate elevation of 400 feet msl; (b) **Middle depth**, comprising the Alluvial Aquifer saturated interval between approximate elevations of 310 to 400 feet msl; and (c) **Lower depth**, comprising the deeper saturated interval from an approximate elevation of 310 feet msl to the base of the Alluvial Aquifer. The depth intervals defined above include all unconsolidated deposits in the saturated zone. The three depth intervals are based on

grouping wells screened at common elevations and do not represent individual hydrostratigraphic units or separate aquifer zones.

Figure 5-1 presents a hydrogeologic cross-section extending east-west across Parcel 650-151-06 and the IM-3 investigation area (see Figure 4-1 for location). The depth and well screen intervals for the majority of the IM-3 groundwater investigations are shown on this cross-section, identified as Section A. Along this line of section (southern portion of the Parcel 650-151-06), the Alluvial Aquifer ranges in thickness from less than 160 feet on the east to approximately 280 feet on the west. As noted in Section 2.3, the Alluvial Aquifer in the IM-3 area is comprised mostly of the alluvial fan deposits of the Tertiary Oldest Alluvium stratigraphic unit (Toa). The drilling completed for this investigation did not encounter the lacustrine deposits of the Bouse Formation (Tb stratigraphic unit).

The hydrogeologic characterization results for the drilling and well investigations conducted in the Bat Cave Wash Area and West Mesa Area are discussed below. The results and hydrogeologic characterization for the more comprehensive well drilling investigations conducted in the East Mesa Area are presented in Section 5.2.

5.1.2 Investigation Results in Bat Cave Wash Area

For the IM-3 investigation, one exploratory boring was drilled at the MW-41 drill site (Figure 4-1) and a cluster of three groundwater monitoring wells was installed (MW-41S, MW-41M, MW-41D). The MW-41 boring was drilled and continuously cored to a depth of 320 feet. The boring encountered the Miocene conglomerate bedrock at a depth of 300 feet (Figure 5-1). The boring log and well construction information for the MW-41 cluster are included in Appendix A. The Toa alluvial deposits encountered in the saturated zone were mostly gravelly sand interbedded with sandy gravel and were generally coarser-grained aquifer material than encountered in other IM-3 borings.

During MW-41 drilling, groundwater grab samples were collected from the borehole at three intervals in the saturated zone for water quality screening (Section 4.1). Dissolved Cr(T) was detected in the lower two sample intervals at concentrations of $31.3 \ \mu g/L$ (middle interval) and $2.3 \ \mu g/L$ (lower interval). TDS ranged from 2,200 $\ \mu g/L$ (Upper zone) to 9,410 mg/L (lower interval). The field and laboratory analyses of the grab samples are included in Table C-1 in Appendix C. The cased-well geophysical logs and a grain-size log plot for MW-41 are presented in Figure B1-1 in Appendix B1. The induction geophysical log confirms increasing formation water salinity with depth, consistent with grab sample results.

5.1.3 Investigation Results in West Mesa Area

In the West Mesa area, one exploratory boring was drilled at the OW-3 drill site (Figure 4-1) and a cluster of three groundwater observation wells was installed (OW-3S, OW-3M, OW-3D). The OW-3D boring was drilled and continuously cored to a depth of 275 feet, which was at the limit of the drill rig's capacity in the formation drilled at this location. As shown on Figure 5-1, three observation wells were installed in the upper, middle, and lower depth intervals of the aquifer at the West Mesa drill site. The Toa alluvial deposits logged in the OW-3 boring were primarily clayey sand and silty sand, with occasional interbeds of gravelly sand. The boring log and well construction information for OW-3 cluster are

included in Appendix A. The results of grain-size analyses from selected core samples from OW-3D are included in Table B-1 in Appendix B.

Groundwater grab samples were collected from the OW-3D borehole at two intervals in the saturated zone for water quality screening. Dissolved Cr(T) was not detected in the borehole intervals sampled. TDS averaged 2,660 mg/L (middle interval). The results of field and laboratory analyses of the grab samples are included in Table C1-1 in Appendix C1. The cased-well geophysical logs and a grain-size log plot for OW-3D are presented in Appendix Figure B1-2.

5.2 East Mesa Hydrogeologic Characterization

The locations of the IM-3 groundwater investigations completed in the East Mesa area are shown on Figure 5-2. The hydrogeologic investigation in this area included extensive exploratory drilling, core logging, and well installation on the East Mesa injection area (three observation well clusters and three injection well borings) and in the nearby compliance well sites (four compliance well clusters). Injection wells were installed at two sites (IW-2 and IW-3). Based on the results of initial well testing, a third injection well was not installed in this drilling effort, although a pilot boring was drilled at the IW-1 location.

Two hydrogeologic cross-sections depicting the drilling results and installed observation, injection, and compliance monitoring wells in the East Mesa area are included in Figure 5-3 (Section EM-1) and Figure 5-4 (Section EM-2). Figure 5-2 shows the locations of the East Mesa hydrogeologic sections. The hydrogeologic characterization results of the East Mesa area is described below for each of the drilling programs.

5.2.1 Investigation Results from East Mesa Observation Wells

On East Mesa, exploratory borings were drilled at the OW-1, OW-2, and OW-5 drill sites (Figure 5-2) and separate groundwater well clusters were installed at each location to characterize the hydrogeology and serve as observation wells for the injection well field. The drilling depths and screen intervals for the OW-1, OW-2, and OW-5 well clusters are shown on Figures 5-3 and 5-4. The OW-5 pilot boring encountered weathered Miocene conglomerate bedrock (Tmc unit) at total depth of 350 feet bgs. The other observation well borings were terminated at the limits of the drill rig's capacity at those locations. The boring logs and well construction information for the East Mesa observation wells are included in Appendix A.

The results of grain-size distribution and hydrometer analyses of selected core samples from the OW-1D, OW-2D, and OW-5D borings are included in Appendix Table B-1. The grainsize data from these observation well locations were used to confirm the injection well screen and filter-pack specifications. The Toa alluvial deposits logged in the OW-1, OW-2, and OW-5 borings were generally similar and composed primarily of silty and clayey sand with gravel interbedded with well-graded sand and sandy gravel sediments.

Groundwater grab samples were collected from each of the observation well boreholes at three intervals in the saturated zone for general water quality screening and to assist in selecting the screen intervals. Dissolved Cr(T) was detected in the shallow borehole samples

(upper-depth interval) in OW-1D and OW-5D at concentrations of 5 μ g/L and 17.6 μ g/L, respectively. None of the other grab samples from the East Mesa observation well borings contained detectable concentrations of Cr(T). TDS ranged from 820 mg/L in the shallow sample at OW-2D to 7,500 mg/L in the deep sample from OW-5D. The results of the field laboratory Cr(VI) and laboratory Cr(T) and TDS analyses of the grab samples are included in Appendix Table C1-1.

Cased-well geophysical logging was conducted in OW-1D. The results of this logging and the grain-size core plot for OW-1D are presented in Figure 5-5. The predominant sediment in the saturated interval of OW-1D boring is silty sand with 5-10 percent gravel. The conductivity geophysical log shows increasing formation water salinity with depth which is consistent with the grab sample water quality results (Appendix Table C1-1).

5.2.2 Investigation Results from East Mesa Injection Wells

Mud rotary exploratory borings were drilled at three locations on the East Mesa to characterize aquifer conditions in the IM-3 Injection Area and confirm the final design for the injection wells. The pilot borings at the IW-1, IW-2, and IW-3 locations (Figure 5-2) were drilled to bedrock and were terminated at depths of 411, 412, and 411 feet, respectively. As described in Section 4.2, a complete suite of geophysical logs were collected for each boring, and supplemental geologic logging was provided by rock coring in selected intervals and drill cuttings logging. The injection well drilling logs are included in Appendix A.

In the three injection well borings, bedrock was encountered at approximate depths of 340-350 feet bgs. The bedrock formations observed in the injection well borings are characterized by a variety of metamorphic and sedimentary rock types as opposed to the lithologically uniform Miocene conglomerate (Tmc unit) which comprises the uppermost bedrock in the Bat Cave Wash Area and the floodplain area farther east. The drill cuttings recovered in lower portions of the injection well borings were primarily very hard rock fragments (metadiorite, gneiss, quartzite, and other metamorphic/felsic rock types). Due to the hardrock nature of these formations, only limited core samples were recovered. However, the majority of the recovered core material in the injection well borings was metamorphic rocks.

The drill cuttings and limited core recovered in the bottom of the IW-2 and IW-3 borings comprised a mixture of metamorphic rocks and consolidated reddish brown conglomerate and silty sandstone. Based on the alternation of rock types in the drilling logs, it appears that some of the bedrock formation may be a megabreccia deposit, wherein large blocks of metamorphic rocks are enclosed within a matrix of consolidated fanglomerate deposits. Based on published mapping in the nearby Chemehuevi Mountains (see Draft RFI Report, Section 2.3 [CH2M HILL 2005d]), the Miocene conglomerate stratigraphic unit locally includes megabreccia deposits. The generalized stratigraphic relationships of the bedrock formations in IM-3 Injection Area are shown on Figure 2-1.

Injection Wells IW-2 and IW-3 Summary

Based on the East Mesa logging results, injection wells IW-2 and IW-3 were installed at the locations shown on Figure 5-2, and as described in Section 4.2. Cross-section EM-2

(Figure 5-4) shows the well depths and screen intervals for the injection wells and observation wells on the East Mesa. Well construction logs for IW-2 and IW-3 are included in Appendix A.

Figure 5-6 presents a graphical summary of the geophysical logs, grain-size log plot for the drill site, and the well construction for injection well IW-2. Also presented in the graphical summary is the production spinner test (downhole velocity log) for well IW-2. The velocity log was recorded during a short duration well extraction test with a pumping rate of 80 gallons per minute (gpm). The velocity log indicates that the largest water production occurs in the lower 55 feet of the screened interval. A secondary zone of production was recorded in the upper 40 feet of the IW-2 well screen.

Figure 5-7 presents a graphical summary of the geophysical logs, grain-size log plot for the drill site, well construction diagram, and spinner velocity log for well IW-3. The velocity log (well pumping rate at 70 gpm) indicates that the largest water production occurs in the lower 50 feet of the screened interval. Similar to the IW-2 velocity log, the middle portion of the IW-3 well screen had the smallest flow contribution. The spinner log data for IW-2 and IW-3 are discussed further in Section 7.2 (Hydraulic Testing).

In summary, the drilling and hydrogeologic logging of the East Mesa injection well and observation well borings indicate the Alluvial Aquifer in the injection area has a total saturated thickness of over 250 feet and is composed primarily of silty sand with gravel interbedded with sandy gravel and sandy clay sediments characteristic of alluvial fan deposits. The spinner tests indicate that the aquifer interval screened in the injection wells is characterized by variations in permeable and transmissive materials.

5.2.3 Investigation Results from East Mesa Compliance Wells

For the IM-3 compliance monitoring program, exploratory borings were drilled at four locations (CW-1, CW-2, CW-3, and CW-4, Figure 5-2) and groundwater well clusters were installed at each location (Section 4.3). The objectives of the compliance drilling investigation was to characterize the hydrogeology in the areas peripheral to the East Mesa and install the compliance monitoring wells for the injection well field.

The number and location of the compliance monitoring wells was initially proposed in a technical memorandum (CH2M HILL 2004d) submitted prior to issuance of the *Draft Design Plan for Groundwater Compliance Monitoring* (CH2M HILL 2004e). The well locations were selected based on model simulations of groundwater travel time (sites selected within 2-year travel time from the injection well field), drill site accessibility, and cultural and biological resource preservation requirements. The design and locations of the compliance monitoring well clusters was approved in December 2004 (CRBRWQCB 2004c, DTSC 2004d).

The pilot borings at the CW-1, CW-2, CW-3, and CW-4 locations were drilled to depths of 360, 385, 360, and 337 feet bgs, respectively. At locations CW-1, CW-2, and CW-4, the borings were terminated in Miocene conglomerate bedrock. Metamorphic bedrock (or Tmc megabreccia) was also encountered at total depth at location CW-4. Boring CW-3 did not encounter bedrock at the total depth of 360 feet bgs, which was at the limit of the drill rig's capacity at this location. The drilling depths and screen intervals for the CW-2 and CW-4 compliance wells are shown on Figure 5-3. Figure 5-4 shows the drilling depths and screen

intervals for compliance wells CW-1 and CW-3. The pilot borings were continuously cored within the saturated zone. The boring logs and well construction information for the four compliance well clusters are included in Appendix A.

At each of the compliance well locations, groundwater grab samples were collected at five intervals in the saturated zone for general water quality screening and to assist in selecting the screen intervals for the compliance well cluster wells. At location CW-1, dissolved Cr(T) was detected in only the shallowest borehole sample (Upper zone) at a concentration of 13.1 μ g/L. TDS ranged from 920 mg/L (Upper zone) to 5,960 mg/L (Lower zone). At borings CW-2 and CW-3, dissolved Cr(T) was not detected in any of the five borehole intervals sampled. At these compliance locations, TDS ranged from 1,830 mg/L (Upper zone) to 13,200 mg/L (Lower zone), confirming the increasing salinity with depth profile observed in other observation well drill sites on East Mesa. At location CW-4, dissolved Cr(T) was detected in only the shallowest borehole sample (Upper zone) at a concentration of 4.9 μ g/L. TDS ranged from 745 mg/L (Upper zone) to 6,500 mg/L (Lower zone). The results of field water quality measurements and laboratory analyses of the grab samples collected in the compliance drill sites are included in Appendix Table C1-1.

The cased-well geophysical logs and grain-size core plots for the four compliance well locations are presented in Figures B2-1 through B2-4 in Appendix B2. The predominant sediment in the saturated interval of CW-1 boring is well-graded silty sand with 5-15 percent gravel. The predominant sediment in the saturated interval of CW-2 and CW-3 well sites boring is silty sand with 5-10 percent gravel. The predominant sediment in the saturated interval of CW-4 boring is well-graded silty sand with 10-20 percent gravel. The conductivity geophysical logs for all of the compliance wells shows increasing formation water salinity with depth, which is consistent with the grab sample water quality results (Appendix Table C1-1).

In summary, four compliance monitoring well clusters were installed at locations and depths appropriate for monitoring groundwater conditions and water quality within the overall aquifer interval targeted for subsurface injection (approximate elevation interval 370 to 220 feet msl). The compliance well network will be supplemented with selected observation wells for the compliance monitoring program.

5.3 Water Level Measurements and Groundwater Gradient

The IM-3 Injection Area is located approximately 3,000 feet from the Colorado River in the north-central portion of the project site. Figure 4-1 shows the locations of the monitoring wells in the IM-3 study area. During this groundwater investigation, water level data from the new wells were collected during groundwater sampling and during the hydraulic testing of the injection wells.

A summary of the manual water level measurements and groundwater elevations from September 2004 through May 2005 for the 22 new wells installed for this investigation and the 5 previously installed wells in the study area is included in Appendix Table B-2. During the period March-May 2005, pressure transducers were installed in the IM-3 injection, observation, and compliance monitoring wells, and pressure transducer data collection will be incorporated in the compliance monitoring program and injection well field operations. To evaluate the hydraulic gradients in the IM-3 investigation area, manual water level measurement surveys were conducted on March 22 and May 18, 2005. The water level measurement surveys involved the manual collection of static water levels in the study area wells over an approximately 1- to 2-hour period. The elevation and gradient data collected from each survey reflect a "snap-shot" view of hydraulic conditions in the aquifer at one point in time. The groundwater elevation maps were prepared from salinity/temperature adjusted manual water level measurements collected at the shallow, mid-depth, and deep monitoring and observation wells in the IM-3 Injection Area. The resultant lateral gradients depicted on these maps show transient conditions in the aquifer at the time of measurement and may not reflect the expected average annual groundwater flow directions.

March 22, 2005 Water Level Survey. Figures 5-8a, 5-8b, and 5-8c present the groundwater elevations and contours for the shallow wells, mid-depth wells, and deep wells, respectively during the March 2005 snap-shot. The IM-3 monitoring wells were installed in late 2004 and early 2005 and several wells had not been adequately purged in March 2005. Therefore the wells did not have consistent salinity within the water column. Given these stratified salinity profiles, it is not appropriate to calculate equivalent freshwater heads using a single salinity value (obtained during sampling). To increase accuracy, the IM-3 monitoring wells and compliance wells were profiled using a downhole salinity probe on April 14, 2005 and May 3-4, 2005, respectively. The depth-weighted average salinity from the profiling was used to retroactively adjust the March 2005 water levels to freshwater equivalent heads, which are the groundwater elevations shown on Figures 5-8a, 5-8b, and 5-8c.

	Gradient		
Depth Interval	Magnitude (feet/ft)	Direction	
Upper	0.0003	East	
Middle	0.0002 - 0.0012	East	
Lower	0.0004 - 0.0023	Southeast to southwest	

The groundwater elevations for the shallow wells range from 454.26 feet msl to 453.35 feet msl; the horizontal gradients are summarized as follows:

Based on these gradients, an assumed effective porosity of 0.2, and an average hydraulic conductivity of the aquifer of 50 ft/day (based on hydraulic testing results presented in Section 7), the estimated lateral groundwater flow velocity ranges from 0.05 to 0.58 ft/day. The largest hydraulic gradients and highest groundwater flow velocities are in the lower-depth interval in the southeast portion of the IM-3 area, closest to the TW-2D extraction well, also screened in the lower portion of the aquifer. It is likely that gradients in the southeast portion of the aquifer. It is likely that gradients in the TW-2D.

May 18, 2005 Water Level Survey. Figures 5-9a, 5-9b, and 5-9c present the groundwater elevations and contours for the shallow wells, mid-depth wells, and deep wells, respectively during the May 2005 snap-shot. The horizontal gradients estimated from the May 2005 survey are summarized as follows:

	Grad	lient
Depth Interval	Magnitude (feet/ft)	Direction
Upper	0.0002 - 0.0008	South to southeast
Middle	0.0004	South to southeast
Lower	0.0012 - 0.0022	South to southeast

Based on these gradients, an assumed effective porosity of 0.2, and an average hydraulic conductivity of the aquifer of 50 ft/day (based on hydraulic testing results presented in Section 7) the estimated lateral groundwater flow velocity ranges from 0.05 to 0.55 ft/day. The largest hydraulic gradients and highest groundwater flow velocities are in the lower-depth interval in the southeast portion of the IM-3 area, closest to the TW-2D extraction well, also screened in the lower portion of the aquifer. It is likely that gradients in the southeast portion of the area shown on Figures 5-9b and 5-9c are affected by the pumping at TW-2D.

The aquifer across the Topock site responds to seasonal and daily changes in river level. Wells near the river respond to daily and seasonal fluctuations within hours. Wells located in upland areas further from the river show less response to daily fluctuations and the response to seasonal changes in river level can take place over a period of weeks. Because river levels were very low during March 2005 and significantly higher in May 2005, both the March and May 2005 gradient maps for the IM-3 Injection Area reflect transient conditions as the aquifer adjusts to the very low and then rising river levels. The March and May snapshot water levels represent one point in time and do not reflect the expected average annual groundwater flow directions.

The March 22 and May 18, 2005 water level measurements were used to calculate vertical hydraulic gradients at well clusters in the survey area. It is expected that average vertical gradients across most of this site would be upward based on historical groundwater data at the site. Table 5-1 presents the vertical hydraulic gradients measured on both dates. The vertical gradients are primarily upward, ranging from 0.001 to 0.008 ft/ft (suspect water level measurement at CW-4M in March ignored). However, downward gradients were measured during at least one of the monitoring periods at three well clusters. The downward gradients ranged from 0.001 to 0.002 ft/ft. The downward gradients observed during this survey may be a result of transient conditions present at the time these water levels were measured. The vertical gradients are a similar order of magnitude or larger than the horizontal gradients.

The manual water level measurements used to calculate groundwater elevations, construct groundwater elevation contour maps, and calculate hydraulic gradients likely have some small errors due to fluctuations in groundwater levels at the wells. These fluctuations were observed in transducer data from the IM-3 wells during injection well hydraulic testing. The fluctuations appear to be diurnal and are likely the result of changes in river level, changes in atmospheric pressure, and changes in surface temperatures. Further evaluation of the fluctuations will require water level data measured with pressure transducers, which are now installed in all the IM-3 monitoring wells. At many sites, such minor fluctuations are insignificant. However at the IM-3 wells, head differences between wells are so small that even minor changes in groundwater elevation can result in different hydraulic data

interpretations. The pressure transducers will provide an additional source of groundwater elevation data that will be used in future hydraulic data evaluations.

6.0 Groundwater Quality Characterization Results

This section presents results and assessment of the groundwater quality investigation conducted at the IM-3 investigation area on Parcel 650-151-06. Data presented include:

- Groundwater analytical results for chromium,
- Groundwater analytical results for general chemistry,
- Groundwater analytical results for trace metals,
- Groundwater analytical results organic compounds,
- Groundwater and soil analytical results for special sampling at well CW-2D in response to soil core logging observations,
- Data quality assessment, and
- Geochemical modeling.

Data generated for this investigation were collected during installation and sampling of the observation wells, the compliance wells, and two monitoring wells (MW-37 and MW-41), as well as during GMP quarterly sampling events. The groundwater data used to characterize the IM-3 investigation area were collected between June 2004 and May 2005.

The wells in the IM-3 Injection Area are screened in the upper, middle, and lower-depth intervals of the Alluvial Aquifer (discussed in Section 5.0). The groundwater characterization results are presented based on average concentrations of the analytes detected in these depth intervals of the aquifer. Based on the location of three groups of monitoring wells, the IM-3 investigation area has been divided into the following geographic locations: the Bat Cave Wash Area (7 monitoring wells at 4 locations), the East Mesa Area (17 monitoring wells at 7 locations), and the West Mesa Area (4 monitoring wells at 2 locations). The screen intervals and other well information for the wells used for groundwater quality characterization are summarized in Table A-1 in Appendix A.

6.1 Chromium Groundwater Characterization

Table 6-1 summarizes the Cr(VI) and Cr(T) concentrations and the field water quality parameters (temperature, pH, specific conductance, and oxidation reduction potential [ORP]). Figure 6-1 shows the Cr(VI) and Cr(T) concentrations in groundwater within the IM-3 investigation area (hydrogeologic section A identified on Figure 4-1). For the purposes of this evaluation, the groundwater Cr(VI) plume is defined as chromium-bearing groundwater exceeding the California state MCL of 50 μ g/L for Cr(VI) or Cr(T) (CH2M HILL 2005d). Figures 6-2 through 6-4 present the Cr(VI) results for the recent sampling of the wells in the IM-3 investigation area that monitor the upper, middle, and

lower-depth intervals of the Alluvial Aquifer, respectively. Also shown on these figures are the approximate outline of Cr(VI) in groundwater greater than 50 μ g/L, based on the sampling results of site wells during March 2005 quarterly monitoring.

During drilling of the borings for the IM-3 observation, compliance, and monitoring wells, grab groundwater samples were collected and analyzed for Cr(T), TDS, specific conductance and pH. Grab samples from borings MW-41, OW-1D, and OW-3D were additionally screened for Cr(VI) using the field test method. Results of these grab samples are summarized in Appendix Table C1-1. These samples were obtained from open boreholes during drilling and are therefore considered screening-level data.

6.1.1 Bat Cave Wash Area

There are four monitoring well locations associated with the Bat Cave Wash area: MW-13, MW-14, MW-37, and MW-41. Wells MW-13, MW-37, and MW-41 are located within the geographic footprint of Bat Cave Wash. MW-14 is located approximately 300 feet south of Parcel 650-151-06 and 700 feet west of Bat Cave Wash. The average concentrations of Cr(VI) in samples obtained since June 2004 from the three shallow wells (MW-13, MW-14, and MW-41S) range from 12.0 μ g/L to 32.6 μ g/L, with an overall average of 23.9 μ g/L (Table 6-1). The highest concentrations of Cr(VI) were detected in MW-14, which is not located in the actual wash, but rather to the southwest. The average concentrations of Cr(T) in the three wells range from 11.3 μ g/L to 33.0 μ g/L, with an overall average of 23.6 μ g/L.

Wells MW-37S (this well has an "S" designation but is screened in the mid-depth interval of the aquifer) and MW-41M are the only Bat Cave Wash area wells screened in the mid-depth interval of the aquifer. The average concentrations of Cr(VI) in samples obtained since June 2004 from these wells range from 5.8 μ g/L to 6.0 μ g/L, with an overall average concentrations of Cr(T) in the wells range from 4.4 μ g/L to 5.5 μ g/L, with an overall average concentration of 5.1 μ g/L.

MW-37D and MW-41D are the only wells screened in the lower-depth interval of the aquifer in the Bat Cave Wash area. MW-41D has not had Cr(VI) present above the reporting limits (1 and 2 μ g/L). Cr(T) concentrations in MW-41D have indicated the presence of 8.10 μ g/L of Cr(T) in November 2004; results since then (December 2004 and March 2005) have been ND (1.0 μ g/L). MW-37D has an average concentration of Cr(VI) of 1,323 μ g/L in the lower-depth interval of the aquifer. Cr(T) measured at MW-37D has an average concentration of 1,304 μ g/L.

6.1.2 East Mesa Area

There are three observation well clusters (OW-1, OW-2, and OW-5), two injection wells (IW-1 and IW-3), and four compliance well clusters (CW-1 through CW-4) associated with the East Mesa area. The three observation wells are the only wells screened in the upper –depth interval of the Alluvial Aquifer. The shallow wells were sampled in December 2004. Cr(VI) concentrations in these samples ranged from non-detect (<0.2 μ g/L) in OW-2S to 32.6 μ g/L in OW-5S, with an average Cr(VI) concentration of 16.0 μ g/L. The average Cr(T) concentration was 16.8 μ g/L.

Three observation wells and four compliance wells are screened in the middle-depth interval (OW-1M, OW-2M, OW-5M, CW-1M, CW-2M, CW-3M, and CW-4M) and lower-

depth interval (OW-1D, OW-2D, OW-5D, CW-1D, CW-2D, CW-3D, and CW-4D) of the Alluvial Aquifer. The average concentrations of Cr(VI) in wells completed in the middle-depth interval range from 3.6 μ g/L to 14.2 μ g/L, with a median concentration of 9.7 μ g/L from all mid-depth wells. The average concentrations of Cr(T) in the middle-depth interval of the aquifer ranges from 6.5 μ g/L to 15.1 μ g/L, with a median concentration of 9.7 μ g/L from all Mid-depth wells (Table 6-1).

Concentrations of Cr(VI) have not been detected in wells screened in the lower-depth interval of the aquifer (OW-1D, OW-3D, OW-5D, and CW-1D through CW-4D). Cr(T) was detected at $4.8 \mu g/L$ in one sample from well OW-1D.

The injection wells are screened over both the middle and the lower-depth intervals of the Alluvial Aquifer. Samples collected from the injection wells were only analyzed for screening-level data. Because these wells are constructed with stainless-steel screens, the wells are not considered appropriate for monitoring trace metals including chromium. Table 6-2 presents the initial chromium and TDS sampling results for wells IW-2 and IW-3.

6.1.3 West Mesa Area

Because the East Mesa area proved a successful location for the injection wells, only a single observation well cluster was installed in the West Mesa area. This new observation well cluster, OW-3, along with an existing shallow monitoring well, MW-18, provides data on the groundwater conditions in the West Mesa. The average Cr(VI) concentrations in the upper-depth interval of the aquifer of the West Mesa area range from 16.3 μ g/L (OW-3S) to 28.6 μ g/L (MW-18), with an overall average of 25.4 μ g/L. The average Cr(T) concentrations the Upper-zone aquifer range from 13.6 μ g/L (OW-3S) to 28 μ g/L (MW-18), with an overall average of 25.7 μ g/L.

OW-3M is the only well screened in the middle-depth aquifer interval of the West Mesa area. The average concentrations of Cr(VI) and C(T) are 12.2 $\mu g/L$ and 11.2 $\mu g/L$, respectively. Neither Cr(VI) nor Cr(T) has been detected above the reporting limits in well OW-3D, which is completed in the lower-depth interval of the aquifer.

6.1.4 Assessment of Chromium Distribution in the Investigation Area

Data presented above characterize the vertical and lateral extent of chromium in groundwater in the injection area, in areas that will be impacted by injection, and in areas farther downgradient. The injection wells are screened in the middle and lower-depth intervals of the Alluvial Aquifer in the East Mesa area. This will be the receiving aquifer for the injection water. Based on data for the East Mesa wells (OW-1, OW-2, OW-5, and CW-1 through CW-4), the middle and lower-depth zones of the Alluvial Aquifer contain chromium below naturally-occurring concentrations. The median concentration of Cr(VI) and C(T) for the two zones are 2.3 μ g/L and 4.0 μ g/L, respectively. The average ORP reading is -111 millivolts (mV).

Figures 6-2 through 6-4 present the recent (September 2004 – May 2005) Cr(VI) sampling results for the shallow, mid-depth, and deep monitoring wells in the investigation area, respectively. Also shown on these figures are the Cr(VI) plume boundaries for the upper, middle, and lower-depth intervals of the Alluvial Aquifer based on March 2005 sampling.

Figure 6-4 shows that the boundary of the Cr(VI) plume in the lower-depth interval of the Alluvial Aquifer lies beneath the southern portion of the Bat Cave Wash area approximately 1,000 feet to the east of the East Mesa Injection Area. The concentrations detected in the lower-depth interval of the aquifer in Bat Cave Wash exceed 50 μ g/L, while in the concentrations in the upper and mid-depth intervals of the aquifer are lower. This zone of elevated chromium in the lower interval extends to the south; its northern, western, eastern, and vertical extent have been defined. This is consistent with the site conceptual model that was developed and presented in the RFI, based on six years of site investigation data and historical information (CH2M HILL 2005d). Refer to Section 13.2 of the Draft RFI Report (CH2M HILL 2005d) for further discussion of the evaluation of historical groundwater conditions in the vicinity of the compressor station and original discharge area in Bat Cave Wash.

6.1.5 Evaluation of Occurrence and Distribution of Chromium in Shallow Groundwater

Table 6-1 presents the results of recent groundwater sampling of monitoring and observation wells in the IM-3 Injection Area and in Bat Cave Wash. The average Cr(VI) concentration in the shallow-depth wells in the East and West Mesa areas are 16.0 and 25.4 μ g/L, respectively. The largest concentrations of Cr(VI) found in the injection area were 32.6 and 34.1 μ g/L found in wells OW-5S and MW-18, respectively. The Cr(VI) concentrations in shallow wells are generally higher than in the middle- and lower-depth wells in the injection area, but are believed to be within the range of naturally-occurring background concentrations, as explained below.

The IM-3 Injection Area is not located downgradient of the former cooling tower blowdown discharge area in upper Bat Cave Wash. Although the average Cr(VI) concentration in shallow-depth wells are similar in lower Bat Cave Wash and the injection area (Table 6-1), the lower-depth MW-37D well in Bat Cave Wash clearly shows the presence of the Cr(VI) plume, while middle- and lower-depth wells in the injection area have low or non-detectable concentrations of Cr(VI). The absence of elevated concentrations of Cr(VI) in the middle- and lower-depth wells in the IM-3 Injection Area is inconsistent with the pattern shown for wells affected by the former discharge and consistent with the assumption that the Cr(VI) in the shallow-depth wells is naturally-occurring.

The meta-diorite bedrock that comprises the surrounding hills is the source rock for the alluvial matrix of the aquifer in the IM-3 Injection Area. Given this source, the alluvium is composed primarily of feldspar with pyroxene and mica minerals. Although chromium is most abundant in ultramafic and mafic rocks such as peridotite, serpentinite, and gabbro (Hem 1985), occurrence of chromium would be expected from the pyroxene and mica minerals, since chromium commonly substitutes for magnesium in these minerals (Krauskopf 1979). Diorite is an intermediate rock between mafic and granitic rocks, which means that diorite contains an intermediate abundance of iron- and magnesium-bearing minerals. Because chromium is primarily associated with magnesium minerals, diorite contains intermediate concentrations of chromium, typically about 50 milligrams per kilogram (Krauskopf 1979). Chromium associated with these minerals is in the trivalent state [Cr(III)] but following release to solution during weathering, the Cr(III) may be oxidized to Cr(VI). The Cr(III) - Cr(VI) oxidation rate is enhanced in the presence of

manganese oxides which are also commonly associated with diorite weathering. Naturallyoccurring concentrations of Cr(VI) are expected to vary around the site area as concentrations of magnesium-bearing minerals are not uniformly distributed.

The mineralogy of the Topock site is not dissimilar to the mineralogy of other areas of the desert Southwest where naturally-occurring concentrations of chromium have been documented. Pyroxenes and mica were among those cited in a similar geologic environment in three separate studies of natural water chemistry in central and southern Arizona (Robertson 1975, 1991), and in the Mohave Desert area of California (Ball and Izbicki 2004). The Mohave Desert study found natural Cr(VI) up to $36 \,\mu g/L$ in groundwater in alluvium with granitic parent material, which on average contains less chromium than the dioritic source rocks at the Topock site. Another study (Robertson 1991) reported background concentrations of Cr(VI) up to 50 μ g/L in groundwater in Sacramento Valley, Arizona, immediately east of Mohave Valley where the Topock site is located. These studies show that Cr(VI) occurs naturally in groundwater in geologic environments similar to the Topock site. As such, the local geology near the Topock site would be expected to yield modest concentrations of Cr(VI) (up to about 50 μ g/L) to groundwater. Concentrations of Cr(VI) in the shallow depth monitoring wells described above are consistent with other wells in the western portion of the site (CH2M HILL 2005d) and the published ranges of naturallyoccurring Cr(VI) in similar parent materials found in alluvial basins in Arizona and southern California, as cited above.

In the IM-3 Injection Area, there is a general positive correlation between ORP and Cr(VI) concentration. The average ORP values in the shallow-, middle-, and lower -depth West Mesa wells are 107, -39, and -225 mV, respectively. In the East Mesa wells, the average ORP values are -76, -0.3, and -207 mV in shallow-, middle- and lower-depth wells, respectively. Thus, there is a general trend in the injection area of more strongly reducing conditions in the lower depths of the aquifer. Cr(VI) is not stable under reducing conditions, which are associated with strongly negative ORP readings. The suggested conceptual model for Cr(VI) occurrence is one where the concentration is related to ORP but is also very much controlled by the location of the monitoring point. Individual monitoring locations have an average Cr(VI) concentration that is related to localized mineralogy. While the presence of oxidizing conditions allows for stability of Cr(VI), conversion of solid phase Cr(III) to Cr(VI) does not occur to a significant degree without dissolution in the presence of oxidants such as manganese oxides. Therefore, a rise in ORP alone would not be expected to produce Cr(VI). However, a significant drop in ORP would be expected to remove Cr(VI) as the reduction reaction is relatively fast and is usually irreversible.

Groundwater sampled in the deep wells within the IM-3 Injection Area does not have detectable concentrations of Cr(VI). This is consistent with the reducing nature of the deeper groundwater. The reducing conditions in lower-depth wells could be related to the age of the groundwater in the deeper portion of the aquifer. Being at the downgradient, southern end of the Mohave Basin and at the toe of the Chemehuevi Mountains, deep groundwater near the Topock site is likely to be significantly older than shallow groundwater. The older, deep groundwater, being in contact with bedrock, could have become depleted of oxygen through oxidation of minerals and mineralized through the dissolution of minerals from the rocks. This older water would be expected to have low ORP values and high TDS, consistent with what is observed in the deeper monitoring wells in the injection area. The difference

between Cr(VI) concentrations in shallow- and middle-depth wells has previously been discussed, with the middle-depth wells having intermediate ORP and Cr(VI) concentrations. In the IM-3 Injection Area, depth stratification for Cr(VI) and ORP appears to be in keeping with stratification of other naturally-occurring constituents (such as major ions and TDS), where the progression from shallow to deep follows what is expected to occur with normal groundwater evolution in an arid basin.

A background study is presently underway to evaluate naturally-occurring background concentrations of Cr(VI) are in the vicinity of the Topock site. This study will not be complete for at least a year, however the initial round of sampling indicates that Cr(VI) concentrations similar to those found in the shallow wells in the IM-3 Injection Area are present in other wells far from the Topock site. At this point, there are no data to suggest that the Cr(VI) in the shallow wells in the injection area is not naturally-occurring.

6.2 General Chemistry Groundwater Quality

This section presents the results and assessment of the general chemistry analyses in the IM-3 investigation area. Table 6-3 summarizes the general chemistry results of groundwater samples collected from the upper, middle, and lower-depth intervals of the Alluvial Aquifer. Figures 6-5 and 6-6 indicate the results of TDS (laboratory measurement), specific conductance (field measurement), ORP (field measurement), and pH (field measurement) in the IM-3 investigation area (the location of hydrogeologic sections EM-1 and EM-2 are shown on Figure 5-2).

The general chemistry of the Topock area groundwater is dominated by sodium and chloride, with a few exceptions. TDS of groundwater in this area increases with depth, ranging from around 1,000 mg/L in the Upper zone to about 10,000 mg/L in the lower – depth aquifer interval. General water chemistry is shown graphically on Stiff diagrams provided in Appendix C2. Appendix C1 contains a summary of TDS analyses conducted on the grab groundwater samples collected during the installation of the IM-3 observation and compliance wells.

A comparison of Cr(VI) concentration and groundwater geochemical parameters was performed. The geochemical parameters that were reviewed were nitrate, iron, manganese, and ORP. The parameters that show the clearest correlation with Cr(VI) concentration are ORP and nitrate and, to a lesser degree, iron and manganese. The presence of iron and manganese, which are reduced metals, indicate even stronger reducing conditions than does the absence of nitrate.

6.2.1 Bat Cave Wash Area

Samples collected from MW-13, MW-14, and MW-41S were used to characterize shallow groundwater quality in the Bat Cave Wash area (Table 6-3). Average TDS concentrations ranged from 860 mg/L to 2,850 mg/L, with an overall average concentration of 1,750 mg/L. Average specific conductance concentrations ranged from 1,488 mg/L to 4,890 mg/L, with an overall average concentration of 2,210 mg/L. Nitrate ranged from 1.33 mg/L to 5.5 mg/L, with an overall average concentration of 4.49 mg/L. ORP readings ranged from 170 mV to -99 mV (Table 6-1).
Samples were collected from MW-37S and MW-41M to characterize the middle-depth interval of the Alluvial Aquifer. Average TDS concentrations ranged from 2,400 mg/L to 8,465 mg/L, with an overall average of 6,440 mg/L. Average specific conductance concentrations ranged from 4,390 mg/L to 14,150 mg/L, with an overall average of 8,290 mg/L. Nitrate concentrations ranged from 0.638 mg/l to 1.30 mg/L, with an overall average of 1.0 mg/L. Manganese was detected at 0.22 mg/L in one sample (MW-37S), which is above the secondary MCL of 0.05 mg/L. Iron was not present above the reporting limit. ORP readings ranged from 36 mV to -115 mV (Table 6-1).

Samples were collected from MW-37D and MW-41D to characterize the lower-depth interval of the Alluvial Aquifer. Average TDS concentrations ranged from 8,900 mg/L to 12,050 mg/L, with an overall average of 11,000 mg/L. Average specific conductance concentrations ranged from 13,866 mg/L to 20,100 mg/L, with an overall average of 15,700 mg/L. Nitrate ranged from not detected (above the reporting limit) to 2.10 mg/L, with an overall average of 2.1 mg/L. Manganese was detected at 0.09 mg/L, which is above the secondary MCL of 0.05 mg/L. Iron was not detected above the reporting limit. ORP readings ranged from 21 mV to -244 mV (Table 6-1).

6.2.2 East Mesa Area

Groundwater samples were collected from wells OW-1S, OW-2S, and OW-5S to characterize shallow groundwater quality in the East Mesa area. TDS concentrations in the three wells ranged from 908 mg/L to 1,190 mg/L, with an average of 1,020 mg/L. Specific conductance ranged from 1,620 mg/L to 2,090 mg/L, with an average of 1,790 mg/L. Manganese was detected twice (at 0.006 and 0.131 mg/L); the latter detection exceeds the secondary MCL of 0.05 mg/L. Iron was detected in OW-1S at 0.407 mg/L, which is above the secondary MCL of 0.3 mg/L. ORP reading ranged from -91 mV to -197 mV.

Samples were collected from both the observation and the compliance wells to characterize the middle-depth interval of the Alluvial Aquifer. Average concentrations of TDS detected in the wells ranged from 2,700 mg/L to 8,020 mg/L, with an overall average of 3,810 mg/L. Average concentrations of specific conductance detected in the wells ranged from 4,340 mg/L to 8,260 mg/L, with an overall average of 6,000 mg/L. Nitrate concentrations in the sampled wells ranged from 0.51 mg/L to 1.57 mg/L, with an average concentration of 1.04 mg/L. Manganese concentrations ranged from 0.001 mg/L to 0.0541 mg/L, and averaged 0.0319 mg/L. Iron was detected in two wells up to a concentration of 0.053 mg/L. ORP readings ranged from 116 mV to -144 mV (Table 6-1).

Samples were collected from both the observation and the compliance wells to characterize the lower-depth interval of the Alluvial Aquifer. Average concentrations of TDS detected in the wells ranged from 5,823 mg/L to 9,800 mg/L, with an overall average of 7,080 mg/L. Average concentrations of specific conductance detected in the wells ranged from 9,105 mg/L to 15,150 mg/L, with an overall average of 11,700 mg/L. Nitrate concentrations in the sampled wells ranged from non-detect to 0.58 mg/L, with an average concentration of 0.367 mg/L. Manganese and iron were detected at average concentrations of 0.35 mg/L and 0.261 mg/L, respectively. ORP readings for the deep wells in the East Mesa area ranged from -82 mV to -263 mV.

6.2.3 West Mesa Area

Samples were collected from OW-3S and MW-18 to characterize the shallow groundwater quality in the West Mesa area. The average concentration of TDS in OW-3S is 666 mg/L; MW-18 was sampled once and contained 870 mg/L. The average specific conductance concentrations in the wells ranged from 963 mg/L to 1,285 mg/L, with an overall average of 1,140 mg/L. Nitrate concentrations ranged from 2.53 mg/L to 3.90 mg/L, with an average of 3.44 mg/L. ORP readings for the shallow wells in the West Mesa area ranged from 16 mV to 183 mV (Table 6-1).

OW-3M is the only well screened in the mid-depth aquifer interval in the West Mesa area. In well OW-3M, the average concentration of TDS is 2,380 mg/L, the average concentration of specific conductance is 4,260 mg/L, and the average concentration of nitrate is 1.5 mg/L. ORP readings for well OW-3M ranged from -10 mV to -71 mV. In the deep well OW-3D, the average concentration of TDS is 2,990 mg/L, the average concentration of specific conductance is 5,430 mg/L, the average concentration of nitrate is 0.36 mg/L, and the average concentration of manganese was 0.13 mg/L. Iron was detected once at 0.132 mg/L. ORP readings for well OW-3D ranged from -215 mV to -232 mV.

6.2.4 General Chemistry Water Quality Characterization

The general chemistry results indicate elevated concentrations of TDS, specific conductance, chloride, sulfate, and sodium that are consistent with the naturally-occurring constituents found in groundwater of the Topock area. Concentrations of these parameters were also consistent with those found in the RFI (CH2M HILL 2005d). Nitrate was not detected or detected at low concentrations (up to 1 mg/L) in the lower-depth interval in the East Mesa area and the middle-depth aquifer interval in the Bat Cave Wash area (Table 6-3).

Figure 6-7 presents a summary of selected water quality parameters TDS, ORP, pH, specific conductance, iron, and manganese for wells in the East Mesa Injection Area. Average concentrations of these parameters are listed for the individual compliance wells and the set of East Mesa observation wells (OW-1, OW-2, and OW-5). Also listed on Figure 6-7 are the average concentrations from the <u>combined</u> middle-depth and deep wells that comprise the overall aquifer injection interval.

Manganese and iron were detected in the lower-depth aquifer interval of the East Mesa area, and manganese was detected in the middle-depth interval in the Bat Cave Wash area. ORP readings in the Lower aquifer zone of the East Mesa Area and the Bat Cave Wash area were as low as -263 mV and -115 mV, respectively. Chromium was either not detected or detected at low concentrations (average of $5.2 \mu g/L Cr[VI]$) in these two areas. These results indicate a reducing environment in the lower aquifer interval of the East Mesa Injection Area and the middle-depth interval in the Bat Cave Wash area.

The highest concentrations of nitrate were present in the upper-depth interval in the Bat Cave Wash and West Mesa areas. Conversely, both manganese and iron were not detected in these two areas, ORP readings were generally positive, and chromium was present.

The middle-depth aquifer interval in the East Mesa area (one of the aquifer intervals that will be receiving injected groundwater along with the deeper interval) contains an average

of 1.04 mg/L of nitrate, 0.0319 mg/L of manganese, and 0.202 mg/L of iron. The average ORP reading in the mid-depth wells in the East Mesa area is -0.3 mV (Table 6-1).

Using the analytical results presented in Table 6-3, the average concentrations for selected general chemistry parameters in the East Mesa aquifer receiving the injection water (the middle and lower-depth intervals of the Alluvial Aquifer) were calculated. The average concentrations for the combined aquifer interval are:

- TDS: 5,445 mg/L.
- Specific conductance: 8,850 mg/L.
- Nitrate: 0.702 mg/L.
- Manganese: 0.363 mg/L.
- Iron: 0.145 mg/L.
- ORP: -104 mV.

6.3 Trace Metals in Groundwater

This section presents the results and assessment of the trace metals in the IM-3 Injection Area. Table 6-4 summarizes the metals results of groundwater samples collected in the IM-3 Injection Area from the upper, middle, and lower-depth intervals of the Alluvial Aquifer.

Trace metal analytes were not present above the method detection limits in samples from the shallow wells in the Bat Cave Wash area. Groundwater samples from the mid-depth wells were not analyzed for trace metals. Groundwater samples from the deep wells in the Bat Cave Wash area contain concentrations of copper (average concentration 6.25 μ g/L), molybdenum (average concentration 44.3 μ g/L), nickel (average concentration 5.7 μ g/L), selenium (average concentration 10 μ g/L), and zinc (average concentration 35.9 μ g/L). Trace metal results did not exceed the primary drinking water MCLs.

Groundwater samples collected from the shallow wells in the East Mesa area contain molybdenum (average 35.3 mg/L), nickel (average 5.55 mg/L), and zinc (average 28.4 mg/L). These results are below MCLs. Groundwater collected from mid-depth well OW-5M in the East Mesa area contains every metal analyzed for except mercury and thallium. All concentrations are below the primary drinking water standard MCLs with the exception of arsenic, which was detected at a concentration of 14.4 µg/L. The primary drinking water MCL for arsenic is 10 µg/L. Other mid-depth wells contain molybdenum (average 28.1 µg/L), nickel (5.47 µg/L), vanadium (average 91 µg/L), and zinc (average 38.6 µg/L). Groundwater from the lower-depth wells contains concentrations of lead (average 2.9 µg/L), molybdenum (average 55.6 µg/L), nickel (average 5.48 µg/L), selenium (average 17.0 µg/L), and zinc (average 23.2 µg/L).

Groundwater from the OW-3 wells and MW-18 in the West Mesa area contain concentrations of lead (range 2.1 to 4.6 μ g/L), molybdenum (range 3.6 to 43.7 μ g/L), vanadium (range 3.37 to 9.5 μ g/L), and zinc (range 10.4 to 71.2 μ g/L). Trace metal concentrations in the West Mesa area wells did not exceed the primary drinking water MCLs (Table 6-4).

6.4 Organic and Other Compounds

At the request of DTSC, groundwater samples were collected from MW-37D (June 2004), OW-1D (September 2004), and CW-2D (February 2004) and analyzed for VOCs and SVOCs. A groundwater sample from well OW-1D was additionally analyzed for PCBs. In May 2005, at DTSC request, additional VOC and SVOC sampling was conducted in the East Mesa observation wells (OW-1, OW-2, and OW-5). Table 6-5 provides the organic compound results.

The June 2004 sample from well MW-37D did not indicate the presence of any organic compounds except chloroform at 0.5 μ g/L. Chloroform is a common laboratory contaminant and is also a byproduct of water chlorination.

The September 2004 sample collected from OW-1D indicated the presence of benzene at 0.8 μ g/L, carbon disulfide at 0.7 μ g/L, and toluene at 1.1 μ g/L. The benzene and toluene results did not exceed the primary drinking water MCLs or 5 μ g/L and 1,000 μ g/L, respectively. There is no MCL for carbon disulfide.

The February 2005 groundwater sample obtained from CW-2D was collected due to the presence of sweet-smelling soil detected during drilling activities (refer to Section 6.5 and Appendix D2 for details). Results did not indicate the presence of any organic compounds above the method detection limits.

During the May 2005 sampling, no VOCs or SVOCs were detected in the groundwater samples collected at wells OW-1M, OW-1D, OW-2M, OW-2D, OW-5S, OW-5M, and OW-5D (Table 6-5).

6.5 Groundwater and Soil Results for CW-2

During sonic drilling and sampling of compliance well CW-2, a sweet-smelling odor was noticed in a soil core sample from approximately 375 feet bgs. Samples for laboratory analyses were collected from both soil and groundwater in response to the detection of odor. Refer to Appendix D for the CW-2 soil and groundwater analysis data (including laboratory reports).

The odor was noticed on January 21, 2005, during inspection of the last core barrel recovered, collected from 378 to 385 feet bgs before refusal was reached in CW-2D at 385 feet bgs. The odor was noticed in core from 378 to 380 feet bgs. On January 22, two soil samples were collected from the core, which had been left sealed overnight, at depths corresponding to 380 and 385 feet bgs. One groundwater sample was collected on January 22 by bailing from the open borehole from 368 to 385 feet bgs. The samples were submitted to Truesdail Laboratories, Inc. for analyses for VOCs and SVOCs.

The laboratory did not find any reportable concentrations of target analytes in the SVOC and VOC analyses of soil and groundwater samples. The laboratory also performed a tentatively-identified compound (TIC) search of the unidentified peaks in the total ion chromatogram, as requested. CH2M HILL chemists evaluated the associated TICs reported by the laboratory and qualified the data during data validation in accordance with the U.S. Environmental Protection Agency's (USEPA's) *National Functional Guidelines for Organic*

Data Review (USEPA 1999). The review resulted in only one TIC being reported (9-octadecenamide at 1.58 mg/kg in the sample from CW-2-380 and 1.10 mg/kg in the sample from CW-2-385). The other TICs detected by the laboratory were eliminated for reporting due to the detected concentrations in the samples being similar to those detected in the laboratory method blank, or because the TIC was a target analyte of another definitive analytical procedure and was determined not to be present in the sample by that analysis.

After installation and at DTSC's request, well CW-2D was sampled for VOCs and SVOCs on February 23, 2005 during the second round of water quality characterization sampling. The groundwater samples from well CW-2D were non-detect for all VOC or SVOC target analytes. The groundwater analyses and laboratory report for the February 2005 VOC and SVOC sampling are included in Appendix D2.

Based on these results, the odor was likely due to natural soil organic matter present in the subsurface. Fine-grained sediments with clay that are likely to have organic matter content were encountered in the core samples. The slow and difficult drilling conditions near total depth resulted in a hot core barrel that may have contributed to volatilizing trace amounts of soil organic matter in the CW-2D core samples.

6.6 Data Quality Assessment

The laboratory analytical data generated during the IM-3 Injection Area were independently reviewed by project chemists to assess data quality and identify deviations from analytical requirements. Detailed discussion of data quality for all sampling data are presented 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.

Data validation was conducted on samples collected from September 2004 through February 2005 as part of the observation well, compliance well, and injection well installations. No significant analytical deficiencies were identified in the data. Over the course of the sampling effort only the following 5 sample results were rejected for project decision-making: acrolein and tert-butyl alcohol were rejected due to calibration outliers in sample OW-1D; hexavalent chromium results for samples OW-01D-049 and IW2-STEP1 were rejected due to matrix interference; and acrolein and acetone were rejected in sample CW-2005-002 due to calibration outliers. Overall, this is a small amount of rejected data and with a few other minor exceptions, the analyses and data quality met QAPP criteria. The analytical data are considered acceptable as qualified for the intended purpose of investigating groundwater conditions at the site.

Field water quality parameters were collected during the installation, and sampling of the IM-3 Injection Area wells was validated in the field. In some cases field parameters were rejected because of problems with the field instruments or suspect parameter values. When parameters were questionable, it was documented in the field forms.

The samples collected during grab groundwater sampling were electronically validated using automated routines that evaluated sample hold-time compliance, laboratory and matrix spike recoveries, and laboratory contamination. Data validation qualifiers were applied to the data and the validation qualifiers/reason were captured in the database. Electronic validation of the grab sample data was determined appropriate since the locations were scheduled to be developed and sampled again after completion of the well installation. No significant analytical deficiencies were identified in the data.

Laboratory data for the soil collected during the drilling of CW-2D were reviewed by project chemists. No significant analytical deficiencies were identified in the data.

6.7 Geochemical Modeling

Geochemical modeling was used to assess the possibility of unwanted precipitates that could form during injection of treated groundwater. Mixing was simulated using representative analyses of the East Mesa area groundwater and anticipated injection water chemistry. The USGS geochemical model code PHREEQC was used to simulate various degrees of mixing between the two waters. Model output was examined to determine whether common scaling precipitates, such as calcium carbonate or silicates, were expected to form during injection.

The water chemistry data used in the simulations are shown in Table 6-6. The East Mesa area groundwater chemistry was calculated by first averaging concentrations for each well in the observation well and compliance well series (not including the OW-3 cluster, located on the West Mesa). This was done to eliminate undue bias towards wells that have been sampled more frequently. Next, the average concentrations for each depth interval of the Alluvial Aquifer (upper, middle, lower) were calculated using the averages for the wells in each depth interval. Finally, each of the three aquifer interval averages was used to compute the overall average for East Mesa groundwater. In computing the averages, non-detected concentrations were treated as one-half of the reported detection limit. Silica concentrations were available for the TW-2D (20-bench) area, but not for East Mesa wells. However, silica has been fairly consistent in site groundwater. The full suite of general chemistry, including silica, will be analyzed in East Mesa groundwater. The full suite of general chemistry, including silica, will be analyzed in East Mesa well samples in July 2005. Because most of the injected water will initially flow into the lower-depth aquifer interval, Table 6-6 also includes the average concentrations of that zone only.

Simulated injection water chemistry was derived in several steps. The first step involved compiling a recent representative water chemistry for extraction well TW-2D. Selected parameters were compiled from results of groundwater samples from TW-2D obtained in June and December 2004. The treatment process at the proposed plant will remove Cr(VI) by addition of ferrous chloride followed by pH adjustment and filtration. The expected chemical changes associated with this process were applied to the TW-2D groundwater analysis, resulting in removal of Cr(VI) and a modest increase in sodium and chloride, and a slight decrease in alkalinity. A portion of this treated water will then be passed through a reverse osmosis process, removing 99 percent of the dissolved solids. Anticipated removal percentages for all constituents were applied to the treated water chemistry to derive a simulated reverse osmosis (RO) permeate. Injection water will be a blend of the RO permeate and the treated water, such that the TDS is similar to that of the local groundwater. The representative TDS value for East Mesa groundwater is approximately 4,200 mg/L, as shown in Table 6-6 footnote, and this required a mixture of 35-percent RO permeate with 65-percent treated water. This mixing percentage was applied to all chemical constituents to calculate a final injection water chemistry, shown in Table 6-6.

The target TDS of 4,200 mg/L was calculated using all shallow, mid-depth, and deep well sampling data for the IM-3 Injection Area. The injection wells IW-2 and IW-3 are screened only over the middle and lower intervals, where the average TDS is about 4,200 mg/L and 7,300 mg/L, respectively. By contrast, the median TDS for the upper interval is 966 mg/L. Geologic and geophysical data indicate that the majority of injected flow will occur in the deeper zones of the aquifer, where TDS is highest. The overall average of 4,200 mg/L is therefore being used as a more conservative target because it is significantly lower than the deeper interval TDS average value. Some of the injected water will mix with the upper interval groundwater as it approaches the slough and river, while the remainder of injected water will be captured by TW-2D, screened across the deeper interval of the Alluvial Aquifer. For comparison, simulations were also run using only the deeper interval concentrations.

The raw groundwater influent to the treatment plant from TW-2D has a TDS of approximately 6,300 mg/L. The initial plan is for the plant to treat a minimum 50-gpm stream for 8 to 9 months out of the year, with 3 to 4 peak months at higher rates. Assuming an average flow rate of 70 gpm for 4 months and 50 gpm for 8 months, over 500,000 pounds of salts would be removed by the treatment plant annually with the targeted injection TDS of 4,200 mg/L. Thus, the overall impact of the treatment and injection system will be to remove substantial quantities of salt from the aquifer along with Cr(VI). Therefore, there will be a net improvement in average groundwater quality in the aquifer as a result of operating this system.

The model code PHREEQC uses a thermodynamic database to calculate concentrations of all chemical species in solution and identify minerals that are controlling solubility. When mixing of the injection water and groundwater is simulated, model output is examined to determine whether injection causes a likelihood of mineral precipitation. Iron and manganese oxides, calcium carbonate, and silicate minerals are the most common scaling compounds.

Five simulation scenarios were run with PHREEQC, as requested by DTSC: (1) Mixing of blended injection water with average East Mesa groundwater, (2) mixing of post-treatment water with average East Mesa groundwater, (3) mixing of RO permeate water with average East Mesa groundwater, (4) mixing of blended water with the deeper interval East Mesa groundwater, and (5) mixing of post-treatment water with the deeper interval East Mesa groundwater. (Model output files are provided on a CD-ROM in Appendix G.) Three mixing ratios of groundwater to injected water were examined in each scenario: 75/25, 50/50, and 5/95. These represent anticipated reactions near the injection front, at the middle of injection volume, and near the well screen, respectively.

In each case, water to be injected was heated up to 77°C to simulate the worst-case scenario of heating during transfer from the treatment plant to the injection wellfield. Precipitation of magnesium silicates or calcium phosphate hydroxide (hydroxylapatite) can occur if temperatures rise to these levels. Potential problems could occur if suspended precipitates were transferred into the injection well and deposited in the well screen. It was found that maintaining plant effluent pH around 7.0 provides stability even at these temperatures, with no more than 0.1 mg/L suspended solids predicted from the blended water. As a further precaution, plans are underway to bury the transfer pipeline to keep temperatures in the pipe below 50°C.

The model output for all scenarios is provided in Appendix G. Each input water chemistry is displayed with all aqueous species concentrations listed, followed by mineral phase saturation calculations. A saturation index for a given mineral is the log of ratio of the ion activity product to the mineral solubility product. A value of zero indicates that the water is in equilibrium with that mineral (also known as "saturated"). A value significantly less than zero (i.e. less than about -0.5) indicates undersaturation, and that mineral would not likely be controlling solubility and so probably does not exist in the aquifer matrix. Values significantly greater than zero indicate supersaturation, and usually imply that the mineral would not form under the current geochemical conditions. As a general rule, mineral phases with saturation indices between -0.5 and +0.5 are likely to be present and controlling solubility. According to model output, average East Mesa groundwater is controlled by calcium carbonate (aragonite), barium sulfate (barite), simple silicates, and iron and manganese oxides/hydroxides.

The model results indicated that solids were not likely to form during injection. Thermodynamic data indicated a tendency away from precipitation (i.e., a decrease in saturation index) by injecting the treated blend, rather than towards precipitation. This was expected, as alkalinity (a factor in carbonate solubility) is lower in the injected water than in the groundwater, and the injected concentration of silica is modest. As noted above, the sitewide average silica concentration was assumed for East Mesa groundwater. A problem is not anticipated, however, due to consistency of silica data from other alluvial aquifer wells.

Concentrations of iron and manganese were close to or below detection limits in the East Mesa groundwater samples. These are two common-scale sources in injection wells, but they are not anticipated to be a problem at the Topock site because their concentrations in groundwater appear to be very low. Injection of oxygenated water into a more reducing aquifer can result in the oxidation of natural ferrous iron and manganese, causing precipitation of insoluble salts on the well screen, sometimes causing clogging. Even small concentrations such as those assumed for the model result in predicted precipitation of oxides, though the total mass would not be expected to impact injection well production. These conditions will be closely monitored as injection proceeds.

7.0 Hydraulic Testing

Hydraulic testing conducted at injection wells IW-2 and IW-3 is summarized in Table 7-1 and includes:

- Step drawdown tests.
- Spinner tests (or velocity logs).
- Constant rate extraction tests.
- Constant rate injection tests.

Water levels were monitored in the injection well and all IM-3 nearby observation and monitoring wells, using both pressure transducers and by manual water level soundings. Transducers recorded water levels every 5 minutes in the monitoring wells and every 1 minute in the injection wells.

All hydraulic test graphical results are included in Appendices E1 through E8.

7.1 Step Drawdown Tests

Step drawdown tests were conducted at both IW-2 and IW-2 to estimate well efficiency and maximum yield. IW-2 was pumped at rates ranging from 73 to 185 gpm in a series of steps lasting from 15 to 55 minutes. The specific capacity of the well ranged from 33 to 30 gpm/ft. The results of the IW-2 step drawdown test are summarized in Table 7-1, and a graph of water levels during the step test is provided on Appendix Figure E1-1.

IW-3 was pumped at rates ranging from 80 to 195 gpm in a series of 30-minute-long steps. The specific capacity of the well ranged from 51 to 42 gpm/ft. The results of the IW-3 step drawdown test are summarized in Table 7-2, and a graph of water levels during the step test is provided on Appendix Figure E1-2.

The step drawdown tests were analyzed using the Hantush-Biershenk method (Kruseman and de Ridder 1991). The results of these analyses are provided on Appendix Figures E1-3 and E1-4. To calculate drawdown associated with a specific pumping rate, this method uses the following equation:

$$s = BQ + CQ^2 \tag{1}$$

Where:

s = the drawdown in the well.

B = the intercept of the line of best fit.

C = the slope of the line of best fit.

Q = the pumping rate.

For well IW-2, B = 0.0277 and C = 3.0×10^{-5} . For well IW-3, B = 0.017 and C = 4.0×10^{-5} . Depth to water in both of these wells is approximately 100 feet. The wells could be operated with water levels in the well 30 feet below ground level without any risk of water emerging as springs in banks of the washes. Therefore, the available water level rise (*s*) in these wells is approximately 70 feet. The theoretical injection rates needed to produce this much water level rise would be approximately 1,100 gpm in each well. The design capacity of each well was 200 gpm, which equates to the maximum capacity of the treatment plant plus a 50-precent excess safety factor. It is clear that these wells each have more than the requisite 200 gpm design capacity. Appendix Figure E1-5 shows the projected water level change the wells with pumping or injection flow rate based on the Hantush-Biershenk analysis of the step drawdown tests.

Although the Hantush-Biershenk analysis is meant for projecting drawdown, it can be used to project increase in water level due to injection if the well in question performs in a similar manner during injection and pumping. This appears to be the case with wells IW-2 and IW-3. Well IW-2 was injection tested at flow rates ranging from 125 to 140 gpm. The water levels during this test are shown on Appendix Figure E4-1. Throughout the majority of the test, there was between 4 and 5 feet of water level increase. The projected water level increase from Appendix Figure E1-5 for flow rates in this range would be between 4 and 4.8 feet. For well IW-3, the water level increase at 251 gpm injection rate was between 6.5 and 7 feet (Appendix Figure E1-5 was approximately 6.8 gpm. The close correlation between water levels projected from the step drawdown tests and water levels measured during the injection tests indicates that there is little difference between the performance of these wells during pumping versus during injection; therefore, the Hantush-Biershenk analysis can be used to project the injection capacity of these wells.

The Hantush-Biershenk equation projects drawdown in a well, but it can be used to estimate the increased head during injection. Often it is observed that the specific capacity of a well is less during injection than during extraction, sometimes by 20 percent or more. During the constant rate injection tests conducted at IW-2 and IW-3, the observed specific capacity during injection was consistent with the specific capacity measured during the step drawdown testing.

Initial estimates of transmissivity shown in Tables 7-2 and 7-3 were calculated from the specific capacity measured during the step drawdown tests using methods described by Driscoll (1986) and Kruseman and de Ridder (1991). Transmissivities estimated by this method ranged from about 8,000 to about 16,000 ft²/day. Because these transmissivities are based on short-term, single-well pumping data, they should be considered as approximate. Better estimates of transmissivity were computed from the results from longer-term, multiple-well tests described in Section 7.3.

7.2 Spinner Tests

Spinner tests (or velocity logs) were conducted in IW-2 and IW-3 on December 22, 2004 and January 12, 2005, respectively. Pumping rates for the IW-2 and IW-3 tests were 70 and 80 gpm, respectively, and drawdown was less than two feet for both tests. All depth measurements were made relative to top of casing (i.e., depths are below top of casing).

At IW-2, three down runs (spinner tool being lowered) were conducted at different line speeds (rates of decent). The initial depth to water was 94.6 ft and the pumping rate was

approximately 80 gpm for all tests. The pump was installed at 170 ft, near the top of the screen. Drawdown stabilized at 96.54 ft and remained at this level for the duration of the tests (approximately 50 minutes). Logging was conducted from 168 ft (near the top of screen) to within the sump at 339 ft. The yield or the relative permeability of the formation is summarized in Table 7-4.

At IW-3, three down runs were conducted each at different line speeds. The initial depth to water was 99.93 ft and the pumping rate was approximately 70 gpm for all tests. The pump was installed at 150 ft, near the top of the screen. Drawdown stabilized at 101.4 ft for the duration of the tests (72 min). Logging began at 152 ft and continued to 329 ft. The yield or the relative permeability of the formation is summarized in Table 7-5.

7.3 Constant Rate Extraction and Injection Tests

Constant rate extraction and injection tests were conducted at both wells to evaluate aquifer properties and well performance. Water levels were monitored in the pumped/injected well and the nearby IM-3 monitoring wells. Table 7-1 provides a summary of the tests, including date and time of test, pumping/injection rate, duration of test, and total volume extracted. Tables 7-6 and 7-7 summarize maximum response (drawdown or drawup) at the pumping/injection well and the monitoring wells for select IW-2 and IW-3 tests. Plots of drawdown at extraction wells and monitoring wells during the IW-2 and IW-3 constant rate extraction tests are provided in Appendices E3 and E6, respectively. Plots of draw-up at injection wells, and at monitoring wells during the IW-2 and IW-3 constant rate injection tests are provided in Appendices E4, E5, and E7.

Injection tests for both IW-2 and IW-3 were evaluated to determine aquifer properties. The evaluation included analysis of the injection well drawup using the Cooper and Jacob method (Cooper and Jacob 1946) and a multi-layered analysis of the injection and monitoring well data using MLU (Hemker 1999a, 1999b, 2002). The results of the evaluations are summarized in Table 7-8 and Appendix E8.

Transmissivity values estimated by the MLU method range from 2,000 ft/day in the upper (unscreened) portion of the aquifer to 11,000 ft/day in the lower portion of the screened aquifer. This is consistent with the velocity logs that indicate a larger portion of flow enters the well deeper in the aquifer. The storativity of the middle and lower portion of the aquifers are estimated to be 1×10^{-4} and 2×10^{-4} , respectively. The storativity of the upper portion of the aquifer is estimated to be 6×10^{-3} .

Aquifer analyses using the MLU software calculate aquifer properties by simultaneously matching observed water levels at multiple observation wells. Fits often depart from the observed data in part because of aquifer heterogeneity and anisotropy and differences in well completion depths (within the simulated layers). During the IW-2 injection test, the pumping rate was also variable, particularly towards the end of the test as filters were clogging, making the MLU matches less accurate. With modified filters and a larger pump, more constant flow rates were maintained during the IW-3 test and the MLU fits closely match the observed data.

8.0 Conclusions

This section summarizes the conclusions of a multiple-phase well drilling, groundwater sampling, and testing program conducted from September 2004 to May 2005 to characterize the hydrogeology and groundwater quality conditions in the IM-3 investigation area. The study area encompasses the southern portion of PG&E Parcel 650-151-06 and includes groundwater investigations in the Bat Cave Wash, East Mesa, and West Mesa areas.

The following hydrogeologic and groundwater investigations were completed for this study:

- The drilling and installation of 12 groundwater observation wells in the East Mesa area (three well clusters) and West Mesa area (one well cluster),
- The drilling and installation of an additional groundwater monitoring cluster (MW-41) in the lower Bat Cave Wash area,
- The drilling and logging of three deep mud rotary exploration borings in the East Mesa injection area,
- The installation, production logging, and hydraulic testing of two injection wells on East Mesa (designated IM-3 injection wells IW-2 and IW-3),
- The drilling and installation of eight groundwater compliance monitoring wells (four well clusters) in the area surrounding the East Mesa injection well field, and
- Groundwater sampling and analysis for establishing baseline water quality conditions in the IM-3 investigation area.
- Additional groundwater sampling and baseline water quality characterization conducted in May 2005.

8.1 Hydrogeologic Characterization

The Alluvial Aquifer in the IM-3 investigation area has a total saturated thickness of over 250 feet and is composed primarily of moderately-consolidated, sandy gravel and silty/clayey gravel alluvial fan deposits of Tertiary age (Toa stratigraphic unit). These deposits comprise a thick sequence of undeformed oldest alluvium that unconformably overlies older Miocene and pre-Tertiary metamorphic bedrock formations. In the East Mesa injection area, bedrock is encountered at approximate depths of 340-350 feet bgs and is characterized by both metamorphic (metadiorite, gneiss) and sedimentary rock types. Based on the alternation of rock types in the drilling logs, it appears that some of the bedrock formation may be a megabreccia deposit, wherein large blocks of metamorphic rocks are enclosed within a matrix of consolidated Miocene conglomerate deposits.

For the IM-3 hydrogeologic characterization, the Alluvial Aquifer is subdivided into upperdepth, middle-depth, and lower-depth intervals, based on well screen elevations in the saturated zone. In the IM-3 investigation area, groundwater occurs under unconfined to semi-confined conditions. The depth to groundwater ranges from 110 feet bgs in higher mesa areas to 25 feet bgs in lower Bat Cave Wash (eastern portion of Parcel 650-151-06).

Aquifer characteristics were also evaluated using field and laboratory analyses of groundwater grab samples collected during the observation well and compliance well drilling and from geophysical logging of injection well boreholes and selected groundwater wells. In the majority of the boreholes sampled, a consistent increasing trend in TDS and specific conductance with depth in the aquifer was observed. TDS in the borehole grab samples ranged from about 1,000 mg/L in the Upper zone of the aquifer to TDS concentrations of 7,000 to 13,200 mg/L in samples from the base of the aquifer. The conductivity geophysical logs collected in the majority of the IM-3 wells confirm increasing formation water salinity with depth, consistent with the borehole grab sample results.

The installed IW-2 and IW-3 injection wells are screened from approximately 65 feet below the water table to the lower portion of the Alluvial Aquifer (total screen interval of 160 feet in each well). Downhole spinner velocity logging were performed at pumping rates of 70 and 80 gpm to evaluate the production interval permeability of the injection wells. The velocity logs indicate the largest water production occurs in the lower portion of the screened intervals. The spinner tests indicate that the aquifer interval screened in the injection wells is characterized by variations in permeable and transmissive materials.

Four compliance well clusters were installed at locations and depths appropriate for monitoring groundwater conditions and water quality within the overall aquifer interval targeted for subsurface injection. Two monitoring wells were installed at each compliance well location to serve for compliance monitoring of the IM-3 injection well field. Both the compliance well clusters and other observation/monitoring wells installed for this investigation are available for the IM-3 compliance monitoring program.

8.2 Groundwater Quality Characterization

Groundwater samples from the IM-3 investigation area wells have been collected and analyzed during various field investigations from June 2004 through May 2005. Groundwater has generally been analyzed for Cr(VI), Cr(T), general chemistry parameters, trace metals, and field water quality parameters.

The general chemistry of the groundwater is dominated by sodium and chloride, with a few exceptions. TDS in the IM-3 Injection Area groundwater ranges from 2,640 mg/L to over 10,000 mg/L, increasing with depth. The median average TDS concentration in the East Mesa Injection Area is 5,180 mg/L. Redox indicators show a trend of more reducing conditions with depth, similar to other Alluvial Aquifer wells at the site. Conditions are particularly more reducing in the deeper wells in the East Mesa and Bat Cave Wash areas.

Data indicate that elevated concentrations of chromium (i.e., greater than 50 μ g/L) are limited to the lower-depth interval of the Alluvial Aquifer beneath Bat Cave Wash and south of well MW-41D. This is expected as the original release occurred in the upper Bat Cave Wash area.

The upper –depth interval of the IM-3 Injection Area contains a median Cr(VI) concentration of about 19.8 μ g/L and a range of <0.2 to 32.6 μ g/L. This range is considered to be a natural background level on the basis of Cr(VI) disposal locations, present and historical groundwater flow direction, and published data in the region. An ongoing background study will address this further in 2005-2006. The median concentration of Cr(VI) in the middle and lower-depth intervals of the IM-3 Injection Area is 2.3 μ g/L, reflecting the natural background in the more reducing conditions in these zones.

Proposed injection in the East Mesa well field will be designed so that injected water will be of similar quality to average groundwater. The target TDS of injectate will be about 4,200 mg/L, the average of East Mesa groundwater. This is over 1,000 mg/L lower than that of the raw groundwater pumped from TW-2D, so there will be a net reduction in site groundwater salinity. Geochemical modeling of the injection shows no predicted scaling or clogging effects from mixing groundwater with injected water.

8.3 Injection Well Capacity

Step drawdown tests were conducted in injection wells IW-2 and IW-2 to estimate well efficiency and maximum yield. IW-2 was pumped at rates ranging from 73 to 185 gpm in a series of steps lasting from 15 to 55 minutes. The specific capacity of the well ranged from 33 to 30 gpm/ft. IW-3 was pumped at rates ranging from 80 to 195 gpm in a series of 30-minute-long steps. The specific capacity of the well ranged from 51 to 42 gpm/ft. The step drawdown tests were analyzed using the Hantush-Biershenk method.

Depth to water in both of these wells is approximately 100 feet. The wells could be operated with water levels in the well 30 feet below ground level without any risk of water emerging as springs in banks of the washes. Therefore, the available water level rise(*s*) in these wells is approximately 70 feet. The theoretical injection rates needed to produce this much water level rise would be approximately 1,100 gpm in each well. The design capacity of each well was 200 gpm, which equates to the maximum capacity of the treatment plant plus a 50-precent excess safety factor. Hydraulic tests confirm that each of the injection wells has much more than the requisite 200 gpm design injection capacity.

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Tables

TABLE 4-1

Summary of IM-3 Well Drilling, Installation, and Testing Details Groundwater and Hydrogeologic Investigation Interim Measures No. 3. Injection Area, PG&E Topock Compressor Station

Site Location	Exploratory Boring ID	Boring Depth (ft bgs)	Borehole Logging & Core Sampling	Wells Installed	Approx. Water Level (ft bgs)	Screen Interval (ft bgs)	Well Logging and Testing
East Mesa	IW-1	411	Selected rock core	None			
East Mesa	IW-2	412	Selected rock core	IW-2	96	170 - 330	Geophysical logs Spinner production log Step & constant-rate tests Injection test
East Mesa	IW-3	411	Selected rock core	IW-3	100	160 - 320	Geophysical logs Spinner production log Step & constant-rate tests Injection test
East Mesa	CW-1D	360	Core log in saturated interval	CW-1D	112	250 - 300	Cased-well geophysical
		195		CW-1M	112	150 - 190	
East Mesa	CW-2D	385	Core log in saturated interval	CW-2D	95	285 - 335	Cased-well geophysical
		203		CW-2M	95	150 - 200	
East Mesa	CW-3D	360	Core log in saturated interval	CW-3D	80	270 - 320	Cased-well geophysical
		223		CW-3M	80	173.4-223.4	
East Mesa	CW-4D	337	Core log in saturated interval	CW-4D	64	232 - 282	Cased-well geophysical
		170		CW-4M	64	119.5-169.5	
East Mesa	OW-1D	291	Continuous core log	OW-1D	95	258 - 278	Cased-well geophysical
		186		OW-1M	95	165 - 185	
		115		OW-1S	95	83.5 - 113.5	
East Mesa	OW-2D	347	Continuous core log	OW-2D	95	310 - 330	
		260		OW-2M	94	190 - 210	
		102		OW-2S	94	70 - 100	
East Mesa	OW-5D	350	Continuous core log	OW-5D	98	300 - 320	
		252		OW-5M	97	210 - 250	
		112		OW-5S	97	70 - 110	
West Mesa	OW-3D	275	Continuous core log	OW-3D	103	242.5 - 262.5	Cased-well geophysical
		202	Selective coring (160-190 ft)	OW-3M	103	180 - 200	
		118	<u></u>	OW-3S	103	86 - 116	
Bat Cave	MW-41D	320	Continuous core log	MW-41D	26	271 - 291	Cased-well geophysical
Wash		190		MW-41M	26	170 - 190	
		60		MW-41S	27	40-60	

Note: bgs = below ground surface

TABLE 5-1Vertical Hydraulic Gradients in Well ClustersGroundwater and Hydrogeologic InvestigationIM No. 3 Injection Area, PG&E Topock Compressor Station

Shallow Well Screen Interval (feet bgs) avg. salinity	Deep Well Screen Interval (feet bgs) avg. salinity	Date	Shallow Well Adjusted Elevation (feet MSL)	Deep Well Adjusted Elevation (feet MSL)	Water Level Elevation Difference (feet)	Vertical Distance between Screens (feet)	Vertical Hydraulic Gradient (feet/foot)	Direction
CW-1M	CW-1D	22-Mar-2005	453.89	454.34	-0.45	110	-0.0041	upward
140-190	250-300	18-May-2005	455.56	455.88	-0.32	110	-0.0029	upward
salinity 0.23%	salinity 0.58%							
CW-2M	CW-2D	22-Mar-2005	453.82	454.50	-0.68	129	-0.0053	upward
156-206	285-335	18-May-2005	455.79	456.27	-0.48	129	-0.0037	upward
salinity 0.62%	salinity 0.94%							
CW-3M	CW-3D	22-Mar-2005	453.84	454.69	-0.85	101	-0.0084	upward
172-222	273-323	18-May-2005	455.83	456.50	-0.67	101	-0.0066	upward
salinity 0.62%	salinity 0.94%							
CW-4M	CW-4D	22-Mar-2005	454.02*	456.52	-2.50	113	-0.0227	upward
120-170	233-283	18-May-2005	455.77	456.14	-0.37	113	-0.0033	upward
salinity 0.23%	salinity 0.58%							
OW-1S	OW-1D	22-Mar-2005	453.80	454.05	-0.25	168	-0.0015	upward
84-114	257-277	18-May-2005	455.75	455.58	0.17	168	0.0010	downward
salinity 0.07%	salinity 0.30%							
OW-3S	OW-3D	22-Mar-2005	454.26	454.08	0.18	144	0.0013	downward
102-116	243-263	18-May-2005	455.92	455.62	0.30	144	0.0021	downward
salinity 0.07%	salinity 0.30%							
OW-5S	OW-5D	22-Mar-2005	453.96	454.25	-0.29	220	-0.0013	upward
70-110	300-320	18-May-2005	455.74	455.49	0.25	220	0.0011	downward
salinity 0.20%	salinity 1.5%	``						
MW-41S	MW-41D	22-Mar-2005	453.48	454.80	-1.32	231	-0.0057	upward
40-60	271-291	18-May-2005	455.84	456.65	-0.81	231	-0.0035	upward
salinity 0.49%	salinity 1.43%							
					1		1	

NOTES:

1. Groundwater elevations listed are adjusted groundwater head elevations corrected for salinity and temperature

2. Vertical distance between well screens represents the distance between screen midpoints.

* Water level is abnormally low and is likely incorrect.

		Concentrat	ions in µg/L	Field	Water Q	uality Parame	ters	
		Certified	Lab Data					
Location	Sample	Hexavalent	Dissolved Total	Temperature	e pH	Specific Conductance	ORP	Dissolved oxygen
ID	Date	Chromium	Chromium	(º Celsius)	(pH units) (µS/cm)	(mV)	(mg/L)
East Mesa	Area - Shallow Wells							
OW-01S	21-Dec-04	4.90	3.40	23.7	7.79		-128	2.8
OW-02S	29-Dec-04	ND (0.2)	3.40	25.9	8.02	3740	-197	
OW-05S	21-Dec-04	32.6	29.5	28.7	8.11	4800	-70	6.4
OW-05S	11-May-05	22.3	24.3	29.0	7.98	2600	91	6.3
OW-05S	FD 11-May-05	19.8	23.4					
	Average: ¹	16.0	16.8	26.8	7.98	3710	-76	5.2
	Median: ¹	19.8	23.4	27.3	8.00	3740	-99	6.3
East Mesa	Area - Middle-Depth \	Vells						
OW-01M	01-Oct-04	7.50	7.00	30.2	8.06		-8	4.6
OW-01M	18-Nov-04	8.30 J		27.0	8.59		-138	4.3
OW-01M	21-Dec-04	9.70	8.80	28.2	8.04		-144	.4
OW-01M	10-May-05	14.5	13.8	29.6	8.18	6190	110	3.3
OW-02M	27-Jan-05	2.30	8.90	27.7	7.93		-144	.4
OW-02M	11-May-05	4.90	4.00	29.6	7.93	7520	68	2.8
OW-05M	13-Jan-05	8.00	6.20	26.5	8.41	9230	-73	
OW-05M	11-May-05	8.90	7.40	30.2	7.98	9310	61	2.5
CW-01M	08-Feb-05	13.4	12.8	28.1	7.85	4460	93	3.7
CW-01M	22-Feb-05	14.9	15.8	27.4	7.53	4380	116	
CW-02M	09-Feb-05	13.0	11.6	28.1	8.11	5760	43	2.7
CW-02M	FD 09-Feb-05	13.1	11.9					
CW-02M	23-Feb-05	14.6	18.6	25.8	8.39	6830	73	4.9
CW-03M	10-Feb-05	5.70	6.40	27.8	8.11		-44	1.3
CW-03M	22-Feb-05	6.30	7.70	27.4	7.56	7830	100	
CW-04M	07-Feb-05	11.1	10.5	28.2	7.99	5900	-81	
CW-04M	23-Feb-05	15.6	14.9	26.7	8.44	7390	-36	5.0
	Average: ¹	10.1	10.4	28.0	8.07	6800	-0.3	3.0
	Median: ¹	9.7	9.7	28.0	8.05	6830	18	3.0

		Concentrat	ions in µg/L	Field	Water Q	uality Parame	ters	
		Certified	Lab Data					
Location	Sample	Hexavalent	Dissolved Total	Temperature	e pH	Specific Conductance	ORP	Dissolved oxygen
ID	Date	Chromium	Chromium	(º Celsius)	(pH units) (µS/cm)	(mV)	(mg/L)
East Mesa	Area - Deep Wells							
OW-01D	30-Sep-04	ND (2.0)	ND (1.0)	31.6	8.00		-239	5.0
OW-01D	18-Oct-04			30.0	8.31		-223	5.3
OW-01D	18-Nov-04	ND (1.0)		29.1	8.38		-181	4.0
OW-01D	21-Dec-04	ND (0.2) R	4.80	28.9	7.87		-213	.3
OW-01D	10-May-05	ND (1.0)	ND (1.0)	30.5	8.00	9400	-225	2.6
OW-02D	02-Dec-04				8.30	3900		
OW-02D	13-Jan-05	ND (1.0)	ND (1.0)	29.8	8.36	13900	-246	
OW-02D	10-May-05	ND (1.0)	ND (1.0)	30.4	7.94	14000	-199	2.2
OW-05D	22-Dec-04	ND (0.2) J	ND (1.0)	29.8	7.77		-210	.3
OW-05D	FD 22-Dec-04	ND (0.2) J	ND (1.0)					
OW-05D	11-May-05	ND (1.0)	ND (1.0)	30.7	7.98	10600	-248	1.7
CW-01D	07-Feb-05	ND (1.0)	ND (1.0)	27.1	7.76	11500	-166	
CW-01D	22-Feb-05	ND (1.0)	ND (1.0)	28.5	7.68	8960	-82	
CW-02D	08-Feb-05	ND (1.0)	ND (1.0)	28.8	8.02		-230	
CW-02D	23-Feb-05	ND (1.0)	ND (1.0) J	27.4	8.61	15500	-174	4.5
CW-03D	08-Feb-05	ND (1.0)	ND (1.0)	27.5	8.08	18300	-208	
CW-03D	22-Feb-05	ND (1.0)	ND (1.0)	28.1	7.77	13700	-189	
CW-04D	07-Feb-05	ND (1.0)	ND (1.0)	28.6	8.25	15000	-263	
CW-04D	23-Feb-05	ND (1.0)	ND (1.0) J	28.0	8.62	15900	-225	4.5
	Average:1		4.8	29.1	8.09	12600	-207	3.0
	Median:1		1.0	28.9	8.01	13800	-213	3.3

		Concentrat	ions in µg/L	Field \	Nater Qu	ality Parame	ters	
		Certified	Lab Data					
Location	Sample	Hexavalent	Dissolved Total	Temperature	рН	Specific Conductance	ORP	Dissolved oxygen
U	Date	Chromium	Chromium	(º Celsius)	(pH units)	(µS/cm)	(mV)	(mg/L)
Bat Cave Wash A	rea - Shallow V	Vells						
MW-13	09-Jun-04	18.8	17.6	28.4	7.54	2270	10	
MW-13	29-Jul-04	18.1	17.6					
MW-13 FD	29-Jul-04	18.1	17.1					
MW-13	24-Sep-04	19.7	20.9	28.4	7.83	1950	107	6.5
MW-13 FD	24-Sep-04	19.7	19.7					
MW-13	16-Dec-04	19.3	16.0	28.2	7.64	1750	152	7.6
MW-13	11-Mar-05	19.2	19.0	29.2	7.47	1950	69	5.6
MW-14	08-Jun-04	32.6	36.3	29.6	7.77	2930	73	
MW-14 FD	08-Jun-04	32.2	34.3					
MW-14	08-Sep-04			30.4	6.50		170	5.4
MW-14	09-Sep-04			29.2	7.43	1570		6.3
MW-14	20-Sep-04	33.6	30.3	28.9	7.45	1590	47	6.5
MW-14 FD	20-Sep-04	33.4	31.4					
MW-14	16-Dec-04	31.3	24.2	26.5	7.76	1350	156	8.2
MW-14	09-Mar-05	32.0	32.5	28.9	7.68	1640	160	6.5
MW-14	07-Apr-05	34.3	38.0	28.7	7.66		75	6.6
MW-14	11-May-05	32.0	36.9	28.6	7.08	1680	185	6.3
MW-41S	18-Nov-04	7.40	7.30	26.7	8.43	1690	-99	4.4
MW-41S	16-Dec-04	11.8	11.0	28.7	7.91	4260	-19	6.3
MW-41S	10-Mar-05	16.8	15.6	29.5	7.83	5080	87	2.5
	Average:1	23.9	23.6	28.6	7.60	2290	84	6.1
	Median: ¹	19.7	20.3	28.7	7.66	1750	81	6.3
Bat Cave Wash A	rea - Middle-De	pth Wells						
MW-37S	10-Jun-04	2.80	2.70	29.5	7.76	5180	-60	4.1
MW-37S	23-Sep-04	7.50	6.80	29.6	7.46	4380	16	5.5
MW-37S	13-Dec-04	6.20	7.00	28.7	7.74	4470	-66	2.6
MW-37S	11-Mar-05	7.40	5.40	29.4	7.88		36	5.2
MW-37S	07-Apr-05	5.90	5.40	31.1	7.67		-68	2.0
MW-41M	18-Nov-04	4.10	3.50	26.0	8.21	20800	-115	4.0
MW-41M	15-Dec-04	5.30	5.20	29.1	7.68	18800	-102	5.3
MW-41M	11-Mar-05	8.10	4.90	30.0	7.74	16100	-66	.8
	Average:1	5.91	5.11	29.2	7.77	11600	-53	3.7
	Median: ¹	6.1	5.3	29.4	7.74	10640	-66	4.1

		Concentrat	ions in µg/L	Field	Water Q	uality Paramet	ters	
		Certified	Lab Data					
Location	Sample	Hexavalent	Dissolved Total	Temperature	e pH	Specific Conductance	ORP	Dissolved oxygen
ID	Date	Chromium	Chromium	(º Celsius)	(pH units) (µS/cm)	(mV)	(mg/L)
Bat Cave Was	h Area - Deep Well	s						
MW-37D	11-Jun-04	951	854	30.6	7.62	13800	-152	.4
MW-37D	24-Sep-04	1250	1310	30.4	7.49	11900	-41	4.8
MW-37D FD	24-Sep-04	1250	1250					
MW-37D	14-Dec-04	1480	1520	29.8	7.70	17000	3	6.2
MW-37D FD	14-Dec-04	1480	1490					
MW-37D	11-Mar-05	1610	1530	30.8	7.99		21	4.4
MW-41D	18-Nov-04	ND (2.0)	8.10	28.3	8.29	21600	-181	3.5
MW-41D	15-Dec-04	ND (1.0)	ND (1.0)	29.8	7.80		-222	5.0
MW-41D	11-Mar-05	ND (1.0)	ND (1.0)	29.6	7.90	22700	-244	.6
	Average: ¹	892	885	29.9	7.83	17400	-117	3.6
	Median: ¹	1,250.0	1,250.0	29.8	7.80	17000	-152	4.4
West Mesa Are	ea - Shallow Wells			I				
OW-03S	28-Oct-04	13.5	12.1	27.9	8.18	1000	53	8.8
OW-03S	16-Nov-04	17.7		29.5	7.90	1290	17	7.3
OW-03S	15-Dec-04	17.7	15.1 J	27.0	8.09	1400	39	7.4
MW-18	09-Jun-04	24.5	25.6	28.5	7.54	1660	101	
MW-18	29-Jul-04	26.9	24.6					
MW-18	08-Sep-04			32.5	6.67		164	5.2
MW-18	09-Sep-04			29.5	7.27	1310	16	6.5
MW-18	24-Sep-04	29.1	30.9	28.4	7.47	1280	132	8.1
MW-18	16-Dec-04	30.6	25.2	26.0	7.76	1120	183	8.7
MW-18	09-Mar-05	34.1	34.6	28.6	7.58	1290	150	8.3
MW-18 FD	09-Mar-05	33.3	36.0					
MW-18	11-May-05	26.5	27.1	28.4	7.51	1600	159	7.0
MW-18	12-May-05			28.4	7.51	1600	159	7.0
	Average: ¹	25.4	25.7	28.6	7.59	1360	107	7.4
	Median: ¹	26.7	25.6	28.4	7.54	1300	132	7.4
West Mesa Are	ea - Middle-Depth	Wells						
OW-03M	28-Oct-04	10.4	11.2	29.8	8.10	2950	-10	6.6
OW-03M FD	28-Oct-04	10.3	9.40					
OW-03M	16-Nov-04	12.6		30.0	7.81	4760	-37	5.6
OW-03M	15-Dec-04	15.7	12.9	28.0	7.86	5790	-71	5.7
	Average: ¹	12.2	11.2	29.3	7.92	4500	-39	6.0
	Median: ¹	11.5	11.2	29.8	7.86	4760	-37	5.7

Groundwater Analytical Results - Chromium and Field Quality Parameters Groundwater and Hydrogeologic Investigation Interim Measures No 3. Injection Area, PG&E Topock Compressor Station

		Concentrat	ions in µg/L	Field V	Vater Q	uality Paramet	ters	
		Certified	Lab Data					
Location	Sample	Hexavalent	Dissolved Total	Temperature	pН	Specific Conductance	ORP	Dissolved oxygen
ID	Date	Chromium	Chromium	(º Celsius)	(pH units) (µS/cm)	(mV)	(mg/L)
West Mesa Area	a - Deep Wells							
OW-03D	28-Oct-04	ND (0.2)	ND (1.0)	30.5	7.82	3360	-232	4.5
OW-03D	16-Nov-04	ND (0.2)		30.2	7.61	5690	-228	5.4
OW-03D	14-Dec-04	ND (0.2)	ND (1.0)	29.8	7.98	6950	-215	6.1
	Average:1			30.2	7.80	5330	-225	5.3
	Median: ¹			30.2	7.82	5690	-228	5.4

Notes:

¹ average concentration. The reporting limit is used when nondetect. Rejected data is not used in the calculation

µg/L results in micrograms per liter

FD field duplicate

ND parameter not detected at the listed reporting limit.

--- not applicable

R rejected data

J estimated value

Analytical Results for IW-2 and IW-3 Injection Wells Groundwater and Hydrogeologic Investigation Interim Measures No 3. Injection Area, PG&E Topock Compressor Station

				Concentrations	
Location ID	Sample ID	Sample Date	Hexavalent Chromium µg/L	Dissolved Total Chromium µg/L	Total Dissolved Solids mg/L
IW-02	IW2-STEP1_A	22-Dec-04	6.40 J^		
IW-02	IW2-STEP1	22-Dec-04	5.60 R		6260
IW-02	IW2-1504	05-Jan-05	2.00		
IW-03	IW3-011305	13-Jan-05		3.50 ^	6410 ^

Notes:

ua/l	micrograms	per liter
µy/L	morograms	permen

mg/L

results in milligrams per liter parameter not detected at the listed reporting limit. automated data validation NĎ

۸

J estimated value

parameter not analyzed ----

rejected R

										C	oncentratio	ns and MO	CLs in mg/	/L							
Maximum Cont	aminent Level:	500 ¹	NA	250 ¹	250 ¹	1	NA	0.3	NA	0.05	NA	NA	45	1	NA	NA	NA	NA	NA	NA	NA
Location ID	Sample Date	Total Dissolved Solids	Specific Conductanc (µS/cm)	ce Chloride	Sulfate	Barium	Calcium	Iron	Magnesiun	n Manganese	Potassium	Sodium	Nitrate as N	Nitrite as N	TKN	Ammonia	Alkalinity (Total)	Orthophosphate	e TOC	Boron	Bromide
East Mesa Area	- Shallow Wells	1																			
OW-01S	21-Dec-04	1190	2090			0.0662	78.8	0.407	14.1	ND (0.05)	12.6	291								0.374	
OW-02S	29-Dec-04	966	1620			0.0319	33.7	ND (0.3)	5.56	0.131	11.3	218								0.707	
OW-05S	21-Dec-04	908	1650			0.0513	52.5	ND (0.3)	8.06	ND (0.05)	11.8	194								0.442	
OW-05S FD	11-May-05			400	107	0.0644	55.2	ND (0.1)	9.30	0.00647	6.71	280	3.13								ND (0.5)
OW-05S	11-May-05			401	108	0.053	54.2	ND (0.1)	9.12	0.00535	6.64	274	3.18								ND (0.5)
	Average: ²	1020	1790	401	108	0.0534	54.9	0.41	9.23	0.0486	9.81	251	3.16							0.508	
	Median: ²	966	1650	401	108	0.053	54	0.30	9.1	0.05	11.3	274	3.2							0.4	
East Mesa Area	- Middle-Depth V	Vells																			
OW-01M	01-Oct-04	2890	5110	1550	260	0.0597	99.8	ND (0.3)	7.95	ND (0.05)	19.9	1260	0.91	0.046		ND (0.5)	59.0	ND (0.02)	ND (3.0)	0.974	
OW-01M	18-Nov-04	3280						ND (0.021)	ND (0.01)											ND (0.4)
OW-01M	21-Dec-04	3220	5460			0.0581	96.8	ND (0.3)	8.05	ND (0.05)	15.8	863								0.998	
OW-01M	10-May-05			1650	291	0.0516	94.8	ND (0.1)	7.93	0.00107	9.30	1130	0.892								ND (0.5)
OW-02M	27-Jan-05	3680	7010																		
OW-02M	11-May-05			2080	316	0.0603	142	ND (0.1)	11.8	0.0442	10.8	1310	0.574								ND (0.5)
OW-05M	13-Jan-05	8020	8260			0.0601	290	ND (0.05)	10.4	ND (0.05)	26.0	1220								1.34	
OW-05M	11-May-05			2590	386	0.0511	182	ND (0.1)	13.2	0.00283	12.9	1820	0.51								ND (0.5)
CW-01M	08-Feb-05	2640	4430	1210	478	0.0444	91.0	ND (0.05)	13.0	ND (0.05)	14.4	570	1.55	0.0184	ND (0.8)	ND (0.5)	64.0			0.836	
CW-01M	22-Feb-05	2760	4250	1250	239	0.0509	94.9	ND (0.5)	13.3	0.00509	10.3	732	1.57	ND (1.0)	ND (0.5)	ND (0.5)	74.5 J			0.772	
CW-02M FD	09-Feb-05	3220	5620	1550	294	0.068	87.8	0.0533	7.50	ND (0.05)	16.4	833	1.08	0.014	ND (0.8)	ND (0.5)	61.0			1.12	
CW-02M	09-Feb-05	3010	5630	1600	280	0.0684	85.7	ND (0.05)	7.34	ND (0.05)	15.7	837	1.08	0.0143	ND (0.8)	ND (0.5)	61.0			1.25	
CW-02M	23-Feb-05	3940	5800	1620	289	0.0596	98.2	ND (0.5)	7.58	ND (0.005)	10.1	1190	0.945	ND (1.0)	ND (0.5)	ND (0.5)	67.1 J			1.08	
CW-03M	10-Feb-05	4600	7390	2370	352	0.0611	152	ND (0.05)	14.6	0.0541	24.4	1080	0.87	0.0437	ND (0.8)	ND (0.5)	51.0			1.58	
CW-03M	22-Feb-05	5180	7820	2250	351	0.0543	186	ND (0.5)	15.5	0.0232	12.5	1530	0.604	ND (1.0)	ND (0.5)	ND (0.5)	87.0 J			1.10	
CW-04M	07-Feb-05	3290	5690	1600	241	0.0699	124	0.0509	10.4	ND (0.05)	17.9	751	1.48	0.0203	ND (0.8)	ND (0.5)	58.0			0.847	
CW-04M	23-Feb-05	3580	5510	1590	237	0.0674	113	ND (0.5)	9.48	0.0152	9.80	1010	1.46	ND (1.0)	ND (0.5)	ND (0.5)	64.6 J			0.719	
	Average: ²	3810	6000	1760	309	0.059	129	0.202	10.5	0.0319	15.1	1080	1.04	0.416			64.7			1.05	
	Median: ²	3285	5630	1600	291	0.060	100	0.05	10.4	0.05	14.4	1080	0.9	0.04			62.5			1.0	

										Co	oncentratio	ns and M	CLs in mg	/L							
Maximum Conta	aminent Level:	500 ¹	NA	250 ¹	250 ¹	1	NA	0.3	NA	0.05	NA	NA	45	1	NA	NA	NA	NA	NA	NA	NA
Location ID	Sample Date	Total Dissolved Solids	Specific Conductanc (µS/cm)	e Chloride	Sulfate	Barium	Calcium	Iron	Magnesium	Manganese	Potassium	Sodium	Nitrate as N	Nitrite as N	TKN	Ammonia	Alkalinity (Total)	Orthophosphate	e TOC	Boron	Bromide
East Mesa Area -	- Deep Wells	1																			
OW-01D	30-Sep-04	5670	9350	3040	440	0.102	340	ND (0.3)	17.5	0.378	35.4	2580	0.35	0.0446		ND (0.5)	39.0	ND (0.02)	ND (3.0)	1.31	
OW-01D	18-Oct-04	6010																			
OW-01D	18-Nov-04	5780						ND (0.021))	0.301											ND (1.0)
OW-01D	21-Dec-04	5830	9530			0.113	234	ND (0.3)	18.8	0.332	33.4	1250								1.34	
OW-01D	10-May-05			3170	369	0.091	230	0.104	19.0	0.299	15.5	2140	0.252								ND (0.5)
OW-02D	13-Jan-05	7390	12800			0.0833	303	0.164	15.2	0.39	46.6	2000								1.80	
OW-02D	10-May-05			4460	535	0.0716	319	0.161	19.3	0.286	18.6	3000	0.107								ND (0.5)
OW-05D FD	22-Dec-04	6480	9950			0.0844	222	ND (0.3)	15.2	0.363	32.3	1480								1.54	
OW-05D	22-Dec-04	6670	10000			0.0784	212	ND (0.3)	14.6	0.371	30.2	1370								1.59	
OW-05D	11-May-05			3610	461	0.0658	254	0.237	16.8	0.269	17.0	2460	0.159								ND (0.5)
CW-01D	07-Feb-05	5000	9080	3410	344	0.0721	175	0.168	19.4	0.172	26.0	1320	0.58	0.0263	ND (0.8)	ND (0.5)	53.0			1.43	
CW-01D	22-Feb-05	6260	9130	2830	339	0.0693	225	ND (0.5)	19.6	0.169	15.1	1810	0.566	ND (1.0)	ND (0.5)	ND (0.5)	77.0 J			1.27	
CW-02D	08-Feb-05	7200	13700	5260	571	0.0766	280	0.0812	15.7	0.332	37.2	2080	0.28	0.0111	ND (0.8)	ND (0.5)	33.0			1.77	
CW-02D	23-Feb-05	8610	13400	4160	526	0.0702	278	ND (0.5)	16.3	0.245	19.0	2590	ND (0.5)	ND (1.0)	ND (0.5)	ND (0.5)	37.3 J			1.58	
CW-03D	08-Feb-05	8800	15100	5100	561	0.10	340	0.182	29.5	0.628	41.0	2160	0.34	0.02	ND (0.8)	ND (0.5)	43.0			1.60	
CW-03D	22-Feb-05	10800	15200	5060	546	0.119	346	ND (0.5)	29.2	0.81	26.4	3160	ND (0.5)	ND (1.0)	ND (0.5)	ND (0.5)	77.0 J			1.45	
CW-04D	07-Feb-05	7320	12500	4270	530	0.0741	287	0.114	18.6	0.302	34.2	1890	0.27	0.0146	ND (0.8)	ND (0.5)	54.0			1.59	
CW-04D	23-Feb-05	8410	12300	4130	508	0.0703	282	ND (0.5)	19.8	0.308	18.0	2530	ND (0.5)	ND (1.0)	ND (0.5)	ND (0.5)	39.7 J			1.46	
	Average:	7080	11700	4040	478	0.0838	270	0.261	19.0	0.35	27.9	2110	0.367	0.457			50.3			1.52	
	Median:	6670	12300	4145	517	0.081	279	0.17	18.7	0.33	28.3	2110	0.3	0.04			43.0			1.5	
Bat Cave Wash A	Area - Shallow V	Vells	4070	500	450	0.057	404		40.0		F 47	200	4.40				70.0				
	09-Jun-04	1300	1970	500	150	0.057	124	ND (0.5)	13.3	ND (0.01)	5.47	300	4.40			ND (0.1)	79.0	ND (0.5)	ND (3.0)		
	24-Sep-04		2120																		
IVIVV-13	24-Sep-04		2150																		
IVIVV-13	10-Dec-04		1910																		
			1650	210	140				0.10		 6 02	262	 E E0								
	08-Jun 04	860	1370	310	140	0.10	73.3 66 5		9.10	ND (0.01)	6.43	202	5.50			ND (0.1)	80.0	ND (0.5)	ND (3.0)		
M/N/-14	08-Sep-04	800	1340	310	140	0.11	00.5		9.00	ND (0.01)	0.43	237	5.50			ND (0.1)	09.0	ND (0.5)	ND (3.0)	0.31	
	20-Sep-04		1540					ND (0.021)	,				5.74	ND (0.005)						0.51	
MW-14 10	20 Sep-04		1520																		
MW-14	16-Dec-04		1520																		
MW-14 MW-14	09-Mar-05		1510																		
MW-14	11-May-05					0.0968	70 7	1 01	10.3	0.034	7 81	227									
MW-41S	18-Nov-04	2820																			ND (1.0)
MW-41S	16-Dec-04	2880	4950	1400	282		105		15.4		15.4	844	1.33			ND (0.5)	52.5		ND (0.5)	0 928	ND (0.5)
MW-41S	10-Mar-05		4830																		
	Average: ²	1750	2210	630	178	0.091	87.9	1.0	11.4	0.034	8.41	374	4.49				77.1			0.619	
	Median: ²	1300	1850	405	145	0.098	73	0.50	10.3	0.01	6.9	262	5.5				83.5			0.6	

										С	oncentratio	ns and M	CLs in mg/	/L							
Maximum Cont	taminent Level:	500 ¹	NA	250 ¹	250 ¹	1	NA	0.3	NA	0.05	NA	NA	45	1	NA	NA	NA	NA	NA	NA	NA
Location ID	Sample Date	Total Dissolved Solids	Specific Conductanc (µS/cm)	e Chloride	Sulfate	Barium	Calcium	Iron	Magnesium	n Manganese	Potassium	Sodium	Nitrate as N	Nitrite as N	TKN	Ammonia	Alkalinity (Total)	Orthophosphate	• TOC	Boron	Bromide
Bat Cave Wash	Area - Middle-De	pth Wells																			
MW-37S	10-Jun-04	2400		1100	210	0.11	144	ND (0.5)	19.9	0.22	8.63	701	1.30			ND (0.1)	69.0	ND (0.5)	ND (3.0)		
MW-37S	23-Sep-04		4430																		
MW-37S	13-Dec-04		4480																		
MW-37S	11-Mar-05		4260																		
MW-41M	18-Nov-04	8150																			ND (2.0)
MW-41M	15-Dec-04	8780	13800	4520	524		388		32.9		49.9	2200	0.638			ND (0.5)	37.3		ND (0.5)	1.48	ND (0.5)
MW-41M	11-Mar-05		14500																		
	Average: ²	6440	8290	2810	367	0.11	266		26.4	0.22	29.3	1450	0.969				53.1			1.5	
	Median: ²	8150	4480	2810	367	0.110	266		26.4	0.22	29.3	1451	1.0				53.2		1.8	1.5	
Bat Cave Wash	Area - Deep Well	s																			
MW-37D	11-Jun-04	8900		3800	620	0.055	384	ND (0.5)	19.1	0.09	16.9	3650	2.10			ND (0.1)	46.0	ND (0.5)	5.30	1.65	
MW-37D FD	24-Sep-04		14200			0.0659			20.2	ND (0.5)											
MW-37D	24-Sep-04		13900			0.065			20.8	ND (0.5)											
MW-37D FD	14-Dec-04		13900			0.0499	364	ND (0.3)	18.8	ND (0.05)	35.4	2230								1.79	
MW-37D	14-Dec-04		13900			0.0464	387	ND (0.3)	19.1	ND (0.05)	42.7	2180								1.77	
MW-37D	11-Mar-05		13800			0.0539	350	ND (0.05)	21.9	ND (0.05)	56.1	2600								1.88	
MW-41D	18-Nov-04	11700																			ND (2.0)
MW-41D	15-Dec-04	12400	19500	6910	713		365		30.2		74.5	2910	ND (0.5)			ND (0.5)	42.3		0.596 J	1.88	ND (0.5)
MW-41D	11-Mar-05		20700																		
	Average: ²	11000	15700	5360	667	0.056	370		21.4	0.09	45.1	2710	2.1				44.1		2.95	1.79	
	Median: ²	11700	13900	5355	667	0.054	365		20.2	0.07	42.7	2600	1.3				44.2		2.9	1.8	
West Mesa Area	- Shallow Wells																				
OW-03S	28-Oct-04	674		280	64.8	0.0206	27.2	ND (0.3)	4.53	ND (0.05)	10.3	183	2.53 J	0.0106 J		ND (0.5)	99.0	ND (0.02)	0.675	0.296	
OW-03S	16-Nov-04	675						ND (0.021)	ND (0.01)											0.39
OW-03S	15-Dec-04	650	1210			0.0167	21.1		4.01		5.35	174									
MW-18	09-Jun-04	870	716	340	87.0	0.082	106	ND (0.5)	13.6	ND (0.01)	7.11	171	3.90			ND (0.1)	82.0	ND (0.5)	ND (3.0)		
MW-18	08-Sep-04							ND (0.021)				3.88	ND (0.005)						0.184	
MW-18	24-Sep-04		1300																		
MW-18	16-Dec-04		1270																		
MW-18 FD	09-Mar-05		1180																		
MW-18	09-Mar-05		1190																		
MW-18	11-May-05					0.0831	105	0.298	16.0	0.00672	8.70	178								0.176	
	Average: ²	717	1140	310	75.9	0.0506	64.8	0.3	9.54	0.0067	7.87	177	3.44	0.011			90.5		0.68	0.219	0.39
	Median: ²	675	1200	310	76	0.051	66	0.30	9.1	0.01	7.9	176	3.9	0.01			90.5		1.8	0.2	0.39

Groundwater Analytical Results - General Chemistry Parameters Groundwater and Hydrogeologic Investigation Interim Measures No 3. Injection Area, PG&E Topock Compressor Station

		Concentrations and MCLs in mg/L																			
Maximum Contaminent Level:		500 ¹	NA	250 ¹	250 ¹	1	NA	0.3	NA	0.05	NA	NA	45	1	NA	NA	NA	NA	NA	NA	NA
Location ID	Sample Date	Total Dissolved Solids	Specific Conductance (µS/cm)	e Chloride	Sulfate	Barium	Calcium	Iron	Magnesium	n Manganese	Potassium	Sodium	Nitrate as N	Nitrite as N	TKN	Ammonia	Alkalinity (Total)	Orthophosphate	тос	Boron	Bromide
West Mesa Area	- Middle-Depth	Wells																			
OW-03M FD	28-Oct-04	2100	3970	1080	197	0.056	44.8	ND (0.3)	6.10	ND (0.05)	13.2	676	1.53	0.0114		ND (0.5)	61.0	ND (0.02)	0.563	0.828	
OW-03M	28-Oct-04	2110	4010	1060	219	0.0555	47.4	ND (0.3)	5.91	ND (0.05)	13.1	596	1.53	0.0122		ND (0.5)	62.0	ND (0.02)	0.645	0.781	
OW-03M	16-Nov-04	2560						ND (0.021)	ND (0.01)											ND (1.0)
OW-03M	15-Dec-04	2750	4790			0.0734	67.3		6.47		12.4	723									
	Average: ²	2380	4260	1070	208	0.0616	53.2		6.16		12.9	665	1.53	0.0118			61.5		0.604	0.805	
	Median: ²	2335	4010	1070	208	0.056	47		6.1		13.1	676	1.5	0.01			61.5		0.6	0.8	
West Mesa Area	- Deep Wells																				
OW-03D	28-Oct-04	2420	4630	1240	218	0.0407	54.5	ND (0.3)	7.37	0.125	15.8	743	0.36	0.0809		ND (0.5)	70.0	ND (0.02)	1.65	0.942	
OW-03D	16-Nov-04	3140						0.132		0.13											ND (1.0)
OW-03D	14-Dec-04	3400	6220			0.0634	96.0	ND (0.3)	8.68	0.136	17.2	956								1.08	
	Average: ²	2990	5430	1200	220	0.0521	75.3	0.13	8.03	0.13	16.5	850	0.36	0.081			70		1.6	1.01	
	Median: ²	3140	5425	1240	218	0.052	75	0.30	8.0	0.13	16.5	850	0.4	0.08			70.0		1.6	1.0	

Notes:

¹ Secondary California Maximum contaminent level (MCL)
 ² Average concentration. The reporting limit is used when nondetect. Rejected data is not included in the calculation.

results in milligrams per liter

field duplicate

mg/L FD ND parameter not detected at the listed reporting limit. not applicable rejected data

R

estimated value J

S screening data, level II validation

Groundwater Analytical Results - Other Metals Groundwater and Hydrogeologic Investigation

Interim Measures No 3. Injection Area, PG&E Topock Compressor Station

		Concentrations and MCLs in µg/L															
CA Maximum C	ontaminent Level :	1000	6	50	4	5	NA	1000 ¹	15 ²	2	NA	100	50	100 ¹	2	NA	5000 ¹
Location ID	Sample Date	Aluminum	Antimony	Arsenic	Beryllium	Cadmium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
East Mesa Area	- Shallow Wells																
OW-01S	21-Dec-04	ND (52)	ND (5.0)	ND (10)	ND (3.1)	ND (3.1)	ND (3.1)	ND (5.0)	ND (2.1)	ND (0.2)	27.3	8.70	ND (10)	ND (3.1)	ND (15)	12.1	26.4
OW-02S	29-Dec-04	ND (52)	ND (5.0)	ND (10)	ND (3.1)	ND (3.1)	ND (3.1)	ND (5.0)	ND (2.1)	ND (0.2)	89.3	ND (5.0)	ND (10)	ND (3.1)	ND (15)	7.00	33.3
OW-05S	21-Dec-04	ND (52)	ND (5.0)	ND (10)	ND (3.1)	ND (3.1)	ND (3.1)	ND (5.0)	ND (2.1)	ND (0.2)	21.3	ND (5.0)	ND (10)	64.9	ND (15)	12.9	25.6
OW-05S FD	11-May-05		ND (2.0)	2.22	ND (1.0)	ND (1.0)	1.25	2.26	ND (1.0)	ND (500)	19.4	4.90	2.82	ND (1.0)	ND (1.0)	5.43	14.5
OW-05S	11-May-05		ND (2.0)	1.95	ND (1.0)	ND (1.0)	1.07	1.55	ND (1.0)	ND (500)	19.0	4.14	2.82	ND (1.0)	ND (1.0)	5.50	16.6
	Average: ³			6.83			2.32	3.8			35.3	5.55	7.13	65		8.59	23.3
	Median: ³			10.0			3.1	5.0			21.3	5.0	10.0	3.1		7.0	25.6
East Mesa Area	- Middle-Depth W	ells															
OW-01M	01-Oct-04	ND (52)						ND (5.0)	ND (2.1)		26.8	ND (5.0)					46.1
OW-01M	18-Nov-04	ND (52)															
OW-01M	21-Dec-04	ND (52)	ND (5.0)	ND (10)	ND (3.1)	ND (3.1)	ND (3.1)	ND (5.0)	ND (2.1)	ND (0.2)	26.8	ND (5.0)	ND (10)	ND (3.1)	ND (15)	14.7	20.9
OW-01M	10-May-05		ND (2.0)	2.69	ND (1.0)	ND (1.0)	ND (1.0)	2.41	ND (1.0)	ND (500)	23.5	4.68	ND (1.0)	ND (1.0)	ND (1.0)	5.45	13.1
OW-02M	11-May-05		ND (2.0)	1.65	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (500)	35.3	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	2.96	11.3
OW-05M	13-Jan-05	ND (52)	11.1	14.4	8.80	10.5	10.0	10.6	10.2	ND (0.2)	50.1	20.1	18.6	20.0	ND (15)	22.9	37.3
OW-05M	11-May-05		ND (2.0)	1.70	ND (1.0)	ND (1.0)	ND (1.0)	1.60	ND (1.0)	ND (500)	39.0	1.28	ND (1.0)	ND (1.0)	ND (1.0)	2.61	ND (10)
CW-01M	08-Feb-05	ND (52)	ND (5.0)	ND (10)	ND (3.0)	ND (3.0)	ND (3.0)	ND (5.0)	ND (2.1)	ND (0.2)	19.6	ND (5.0)	ND (10)	ND (3.0)	ND (15)	97.7	80.2
CW-01M	22-Feb-05	ND (50)	ND (3.0)	ND (5.0)				ND (5.0)	ND (5.0)		20.1	ND (5.0)	ND (5.0)				ND (20)
CW-02M FD	09-Feb-05	ND (52)	ND (5.0)	ND (10)	ND (3.0)	ND (3.0)	ND (3.0)	ND (5.0)	ND (2.1)	ND (0.2)	28.0	ND (5.0)	ND (10)	ND (3.0)	ND (15)	124	15.8 J
CW-02M	09-Feb-05	ND (52)	ND (5.0)	ND (10)	ND (3.0)	ND (3.0)	ND (3.0)	ND (5.0)	ND (2.1)	ND (0.2)	29.2	ND (5.0)	ND (10)	ND (3.0)	ND (15)	116	33.2 J
CW-02M	23-Feb-05	ND (50)	ND (3.0)	ND (5.0)				ND (5.0)	ND (5.0)		26.7	ND (5.0)	ND (5.0)				ND (20)
CW-03M	10-Feb-05	ND (52)	ND (5.0)	ND (10)	ND (3.0)	ND (3.0)	ND (3.0)	ND (5.0)	ND (2.1)	ND (0.2)	37.8	5.00	ND (10)	ND (3.0)	ND (15)	98.3	42.4
CW-03M	22-Feb-05	ND (50)	ND (3.0)	ND (5.0)				ND (5.0)	ND (5.0)		34.2	ND (5.0)	ND (5.0)				ND (20)
CW-04M	07-Feb-05	ND (52)	ND (5.0)	ND (10)	ND (3.0)	ND (3.0)	ND (3.0)	ND (5.0)	ND (2.1)	ND (0.2)	11.5	ND (5.0)	ND (10)	ND (3.0)	ND (15)	95.3	31.6
CW-04M	23-Feb-05	ND (50)	ND (3.0)	ND (5.0)				ND (5.0)	ND (5.0)		12.3	ND (5.0)	ND (5.0)				ND (20)
	Average: ³		11	7.17	8.8	10	10	4.7	10		28.1	5.47	19	20		58.0	28.1
	Median: ³		5.0	10.0	3.0	3.0	3.0	5.0	2.1		28.0	5.0	10.0	3.0		59.1	31.6

Groundwater Analytical Results - Other Metals Groundwater and Hydrogeologic Investigation

Interim Measures No 3. Injection Area, PG&E Topock Compressor Station

		Concentrations and MCLs in µg/L															
CA Maximum C	Contaminent Level :	1000	6	50	4	5	NA	1000 ¹	15 ²	2	NA	100	50	100 ¹	2	NA	5000 ¹
Location ID	Sample Date	Aluminum	Antimony	Arsenic	Beryllium	Cadmium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
East Mesa Area	a - Deep Wells																
OW-01D	30-Sep-04	ND (52)	ND (5.0)	ND (10)	ND (3.0)	ND (3.1)	ND (3.0)	ND (5.0)	ND (2.1)	ND (0.2)	51.8	ND (5.0)	ND (10)	ND (3.1)	ND (15)	ND (3.0)	30.7
OW-01D	18-Nov-04	ND (52)															
OW-01D	21-Dec-04	ND (52)	ND (5.0)	ND (10)	ND (3.1)	ND (3.1)	ND (3.1)	ND (5.0)	ND (2.1)	ND (0.2)	35.6	ND (5.0)	ND (10)	ND (3.1)	ND (15)	10.7	36.0
OW-01D	10-May-05		ND (2.0)	4.77	ND (1.0)	ND (1.0)	ND (1.0)	2.52	ND (1.0)	ND (500)	43.4	1.05	ND (1.0)	ND (1.0)	ND (1.0)	1.69	ND (10)
OW-02D	13-Jan-05	ND (52)	ND (5.0)	ND (10)	ND (3.1)	ND (3.1)	ND (3.1)	ND (5.0)	2.90	ND (0.2)	66.5	13.5	17.1	8.50	ND (15)	17.7	17.4
OW-02D	10-May-05		ND (2.0)	3.30	ND (1.0)	ND (1.0)	ND (1.0)	3.11	ND (1.0)	ND (500)	57.0	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (10)
OW-05D FD	22-Dec-04	ND (52)	ND (5.0)	ND (10)	ND (3.1)	ND (3.1)	ND (3.1)	ND (5.0)	ND (2.1)	ND (0.2)	83.8	9.30	ND (10)	ND (3.1)	ND (15)	11.6	28.9
OW-05D	22-Dec-04	ND (52)	ND (5.0)	ND (10)	ND (3.1)	ND (3.1)	ND (3.1)	ND (5.0)	ND (2.1)	ND (0.2)	81.1	8.10	ND (10)	ND (3.1)	ND (15)	13.3	24.3
OW-05D	11-May-05		ND (2.0)	4.41	ND (1.0)	ND (1.0)	ND (1.0)	4.09	ND (1.0)	ND (500)	63.8	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (10)
CW-01D	07-Feb-05	ND (52)	ND (5.0)	ND (10)	ND (3.0)	ND (3.0)	ND (3.0)	ND (5.0)	ND (2.1)	ND (0.2)	51.8	ND (5.0)	ND (10)	ND (3.0)	ND (15)	89.3	18.5
CW-01D	22-Feb-05	ND (50)	ND (3.0)	ND (5.0)				ND (5.0)	ND (5.0)		49.9	ND (5.0)	ND (5.0)				ND (20)
CW-02D	08-Feb-05	ND (52)	ND (5.0)	ND (10)	ND (3.0)	ND (3.0)	ND (3.0)	ND (5.0)	ND (2.1)	ND (0.2)	50.1	5.60	ND (10)	ND (3.0)	ND (15)	121	52.2
CW-02D	23-Feb-05	ND (50)	ND (3.0)	ND (5.0)				ND (5.0)	ND (5.0)		51.8	ND (5.0)	ND (5.0)				ND (20)
CW-03D	08-Feb-05	ND (52)	ND (5.0)	ND (10)	ND (3.0)	ND (3.0)	ND (3.0)	ND (5.0)	ND (2.1)	ND (0.2)	59.0	7.60	ND (10)	ND (3.0)	ND (15)	115	27.6
CW-03D	22-Feb-05	ND (50)	ND (3.0)	ND (5.0)				ND (5.0)	ND (5.0)		59.9	ND (5.0)	ND (5.0)				ND (20)
CW-04D	07-Feb-05	ND (52)	ND (5.0)	ND (10)	ND (3.0)	ND (3.0)	ND (3.0)	ND (5.0)	ND (2.1)	ND (0.2)	39.1	5.60	ND (10)	ND (3.0)	ND (15)	109	25.7
CW-04D	23-Feb-05	ND (50)	ND (3.0)	ND (5.0)				ND (5.0)	ND (5.0)		44.2	ND (5.0)	ND (5.0)				ND (20)
	Average: ³			7.65				4.7	2.9		55.6	5.48	17	8.5		41.2	23.2
	Median: ³			10.0				5.0	2.1		54.4	5.3	10.0	3.0		12.4	25.0
Bat Cave Wash	Area - Shallow We	ells															
MW-13	09-Jun-04							ND (10)				ND (20)					ND (76)
MW-14 FD	08-Jun-04							ND (10)				ND (20)					ND (68)
MW-14	08-Jun-04							ND (10)				ND (20)					ND (68)
MW-14	08-Sep-04	ND (52)							ND (21)		ND (21)						
MW-14	11-May-05		ND (2.0)	1.24	ND (1.0)	ND (1.0)	1.01	3.48	1.38	ND (500)	10.8	12.5	3.65	ND (1.0)	ND (1.0)	6.52	19.6 J
	Average: ³			1.2			1.0	3.5	1.4		11	13	3.7			6.5	20
	Median: ³			1.2			1.0	10	11.1		15.8	20.0	3.7			6.5	68.0
Bat Cave Wash	Area - Deep Wells																
MW-37D		ND (50)	ND (4.2)	ND (10)	ND (3.0)	ND (3.0)	ND (3.0)	ND (5.0)	ND (5.0)	ND (0.5)	50.0	ND (5.0)	10.0	ND (3.0)	ND (5.0)	ND (3.0)	ND (10)
MW-37D FD	24-Sep-04	ND (500)	ND (5.0)	ND (10)	ND (3.0)	ND (3.0)	ND (3.0)	9.60	ND (5.0)	ND (0.2)	46.3	ND (5.0)	10.0	ND (3.0)	ND (15)	ND (3.0)	24.8
MW-37D	24-Sep-04	ND (500)	ND (5.0)	ND (10)	ND (3.0)	ND (3.0)	ND (3.0)	8.50	ND (5.0)	ND (0.2)	47.3	ND (5.0)	ND (10)	ND (3.0)	ND (15)	ND (3.0)	17.2
MW-37D FD	14-Dec-04	ND (52)	ND (5.0)	ND (10)	ND (3.1)	ND (3.1)	ND (3.1)	ND (5.0)	ND (2.1)	ND (0.2)	44.6	8.30	ND (10)	ND (3.1)	ND (15)	20.5.1	91.8.1
MW-37D	14-Dec-04	ND (52)	ND (5.0)	ND (10)	ND (3.1)	ND (3.1)	ND (3.1)	ND (5.0)	ND (2.1)	ND (0.2)	43.3	ND (5 0)	ND (10)	ND (3.1)	ND (15)	31.4.1	33.0.1
MW-37D	11-Mar-05	ND (52)	ND (5.0)	ND (10)	ND (3.1)	ND (3.1)	ND (3.1)	ND (5.0)	ND (2.1)	ND (0.2)		9 20	ND (10)	ND (3.1)	ND (15)	326	38.7
	, 3	110 (32)	110 (0.0)			100 (0.1)	(J.1)	110 (0.0)	(2.1)	110 (0.2)		0.20		ND (0.1)	100 (13)	520	00.7
	Average:							6.3			44.3	6.25	10.0			64.5	35.9
	Median:							5.0			45.5	5.0	10.0			11.8	28.9

Groundwater Analytical Results - Other Metals

Groundwater and Hydrogeologic Investigation

Interim Measures No 3. Injection Area,, PG&E Topock Compressor Station

		Concentrations and MCLs in µg/L															
CA Maximum Contaminent Level :		1000	6	50	4	5	NA	1000 ¹	15 ²	2	NA	100	50	100 ¹	2	NA	5000 ¹
Location ID	Sample Date	Aluminum	Antimony	Arsenic	Beryllium	Cadmium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
West Mesa Area	a - Shallow Wells																
OW-03S	28-Oct-04	ND (52)						ND (5.0)	4.60		23.9	ND (5.0)					20.4
OW-03S	16-Nov-04	ND (52)															
OW-03S	15-Dec-04		ND (5.0)	ND (10)	ND (3.1)	ND (3.1)	ND (3.1)	ND (5.0)	ND (2.1)	ND (0.2)	22.2	ND (5.0)	ND (10)	ND (3.1)	ND (15)	8.70	30.9
MW-18	09-Jun-04							ND (10)				ND (20)					ND (150)
MW-18	08-Sep-04	ND (52)							ND (21)		ND (21)						
MW-18	11-May-05	84.8	ND (2.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (500)	3.60	ND (1.0)	2.58	ND (1.0)	ND (1.0)	3.37	40.4 J
	Average: ³	85							4.6		17.6		2.6			6.04	59.9
	Median: ³	52							3.3		21.5		6.3			6.0	35.6
West Mesa Area	a - Middle-Depth W	ells															
OW-03M FD	28-Oct-04	ND (52)						ND (5.0)	ND (2.1)		20.5	ND (5.0)					ND (10)
OW-03M	28-Oct-04	ND (52)						ND (5.0)	ND (2.1)		20.6	ND (5.0)					ND (10)
OW-03M	16-Nov-04	ND (52)															
OW-03M	15-Dec-04		ND (5.0)	ND (10)	ND (3.1)	ND (3.1)	ND (3.1)	ND (5.0)	ND (2.1)	ND (0.2)	14.5	ND (5.0)	ND (10)	ND (3.1)	ND (15)	9.50	30.3
	Average: ³										18.5					9.5	30
	Median: ³										20.5					9.5	10.4
West Mesa Area	a - Deep Wells																
OW-03D	28-Oct-04	ND (52)						ND (5.0)	ND (2.1)		43.7	ND (5.0)					28.8
OW-03D	16-Nov-04	ND (52)															
OW-03D	14-Dec-04	ND (52)	ND (5.0)	ND (10)	ND (3.1)	ND (3.1)	ND (3.1)	ND (5.0)	2.40	ND (0.2)	31.0	ND (5.0)	ND (10)	ND (3.1)	ND (15)	8.40	71.2
	Average:3								2.4		37.3					8.4	50.0
	Median: ³								2.3		37.3					8.4	50.0

Notes:

¹ secondary MCL
 ² action level for lead, if more than 10% of samples exceed action level
 ³ average concentration. The reporting limit is used when nondetect. Rejected data is not used in the calculation

results in micrograms per liter

µg/L FD field duplicate

ND parameter not detected at the listed reporting limit.

not applicable ----

R

rejected data estimated value J

TABLE 6-5 Groundwater Analytical Results - Organic Compounds Groundwater and Hydrogeologic Investigation Interim Measures No 3. Injection Area, PG&E Topock Compressor Station

				Concentra	ations and	MCLs in µg/	L		
			V	OCs by SW8260	SVOCs by	PCBs by SW8082			
Maximum Cor	ntaminent Level :	5	NA	NA	1000	NA	NA	NA	0.5
Location ID	Sample Date	Benzene	Carbon Disulfide	Chloroform	Toluene	All Other Analytes	Naphthalene	All Other Analytes	All PCBs
East Mesa Area -	Shallow Wells						I		I
OW-05S FD	11-May-05	ND (1)	ND (1)	ND (1)	ND (1)	ND	ND (9.8)	ND	
OW-05S	11-May-05	ND (1)	ND (1)	ND (1)	ND (1)	ND	ND (9.8)	ND	
East Mesa Area -	Middle-Depth We	ells							
OW-01M	10-May-05	ND (1)	ND (1)	ND (1)	ND (1)	ND	ND (10)	ND	
OW-02M	11-May-05	ND (1)	ND (1)	ND (1)	ND (1)	ND	ND (9.5)	ND	
OW-05M	11-May-05	ND (1)	ND (1)	ND (1)	ND (1)	ND	ND (11)	ND	
East Mesa Area -	Deep Wells								
OW-01D	30-Sep-04	0.8	0.7	ND (0.5)	1.1	ND	1 J ^a	ND	ND
OW-01D	10-May-05	ND (1) J	ND (1) J	ND (1) J	ND (1) J	ND	ND (9.9)	ND	ND
OW-02D	10-May-05	ND (1)	ND (1)	ND (1)	ND (1)	ND	ND (9.8)	ND	
OW-05D	11-May-05	ND (1)	ND (1)	ND (1)	ND (1)	ND	ND (10)	ND	
CW-02D	23-Feb-05	ND (1)	ND (1)	ND (1)	ND (1)	ND	ND (10)	ND	
Bat Cave Wash A	rea - Deep Wells								
MW-37D	11-Jun-04	ND (0.5)	ND (0.5)	0.5	ND (0.5)	ND	ND (10)	ND	

Notes:

μg/L results in micrograms per liter
 ND parameter not detected at the listed reporting limit.
 --- parameter not analyzed

^a result measured using method SW8260

TABLE 6-6 Input Parameters for PHREEQC Runs Interim Measures No. 3 Injection Area, PG&E Topock Compressor Station

	Average E Ground	ast Mesa Iwater		Injected Water	
Constituent	All Zones	Deep Only	Post- Treatment	RO Permeate	Blend
Alkalinity (as CaCO ₃)	5.69E+01	4.92E+01	4.20E+01	8.40E-01	2.76E+01
Antimony	2.38E-03	2.21E-03	2.50E-03	7.50E-05	1.65E-03
Barium	6.39E-02	8.21E-02	2.48E-02	2.48E-04	1.62E-02
Beryllium	1.48E-03	1.32E-03	1.60E-03	4.80E-05	1.06E-03
Boron	1.04E+00	1.54E+00	1.56E+00	6.24E-01	1.23E+00
Cadmium	1.52E-03	1.32E-03	1.60E-03	4.80E-05	1.06E-03
Calcium	1.55E+02	2.74E+02	2.34E+02	8.86E-01	1.53E+02
Chloride	2.23E+03	4.04E+03	3.15E+03	3.15E+01	2.06E+03
Chromium	7.16E-03	6.05E-04	2.50E-02	1.25E-03	1.67E-02
Cobalt	1.54E-03	1.32E-03	1.60E-03	4.80E-05	1.06E-03
Copper	2.57E-03	2.66E-03	2.50E-03	7.50E-05	1.65E-03
Dissolved Oxygen	NS	NS	8.00E+00	8.00E+00	8.00E+00
Iron	1.35E-01	1.44E-01	1.50E-01	3.00E-03	9.87E-02
Lead	1.20E-03	1.08E-03	1.10E-03	3.30E-05	7.27E-04
Magnesium	1.33E+01	1.93E+01	1.68E+01	1.68E-01	1.10E+01
Manganese	1.44E-01	3.46E-01	2.50E-02	7.50E-04	1.65E-02
Molybdenum	4.29E-02	5.40E-02	4.48E-02	4.48E-03	3.07E-02
Nickel	4.54E-03	4.95E-03	5.10E-03	1.02E-04	3.35E-03
Nitrate (as N)	1.48E+00	2.80E-01	1.00E+01	3.00E-01	6.61E+00
Oxidation-Reduction Potential	-1.01E+02	-2.05E+02	NS	NS	NS
рН	8.01E+00	8.03E+00	7.50E+00	7.00E+00	7.00E+00
Phosphorus	ND	ND	3.00E-02	3.00E-04	1.96E-02
Potassium	1.78E+01	2.75E+01	3.21E+01	3.21E-01	2.10E+01
Selenium	4.78E-03	5.01E-03	5.00E-03	1.50E-04	3.31E-03
Silica (as SiO2)	2.30E+01	2.30E+01	2.04E+01	4.08E+00	1.47E+01
Silver	5.43E-03	1.82E-03	1.50E-03	4.50E-05	9.92E-04
Sodium	1.38E+03	2.39E+03	2.04E+03	2.03E+01	1.33E+03
Sulfate	3.01E+02	4.80E+02	8.04E+02	8.04E+00	5.26E+02
Temperature	2.77E+01	2.89E+01	3.00E+01	3.00E+01	3.00E+01

TABLE 6-6 Input Parameters for PHREEQC Runs Interim Measures No. 3 Injection Area, PG&E Topock Compressor Station

	Average E Ground	ast Mesa Iwater	Injected Water						
Constituent	All Zones	Deep Only	Post- Treatment	RO Permeate	Blend				
Vanadium	4.54E-02	6.50E-02	1.60E-02	1.60E-03	1.10E-02				
Zinc	2.90E-02	2.48E-02	2.87E-02	8.61E-04	1.90E-02				

Notes:

All values in mg/L, except oxidation-reduction potential (mV), pH, and temperature (degrees C).

ND = not detected; NS = not specified

All constituents that were consistently ND were not included in East Mesa chemistry.

When computing averages, NDs were assigned as one half of reported detection limit.

Averages of East Mesa Groundwater constituents were computed by averaging concentrations at each well, then averaging for each zone, then averaging the three zones.

Sodium and chloride were adjusted to achieve charge balance and to match measured total dissolved solids.

Arsenic and fluoride removed due to model convergence issues; they are not expected to influence precipitation reactions.

Post-Treatment concentrations were calculated as average TW-2D concentrations with chromium removed, alkalinity reduced, and sodium and chloride slightly increased by the treatment process.

RO Permeate concentrations were calculated by applying typical percent removal values for each constituent to the Post-Treatment concentrations.

The blend of Post-Treatment and RO Permeate was calculated to match the average TDS of the East Mesa groundwater (about 4,200 mg/L).
TABLE 7-1Summary of IM-3 Hydraulic TestsGroundwater and Hydrogeologic InvestigationInterim Measures No. 3 Injection Area, PG&E Topock Compressor Station

Well	Test	Date	Start Time	End Time	Duration (min)	Flow Rate(s) (gpm)	Volume Extracted/ Injected (gal)	Comments
Injecti	on Well IW-2							
	Constant Rate Extraction Test	01/06/05	10:45 AM	3:13 PM	272	188	51,100	Flow 190 gpm for first hour then 188 gpm.
	Constant Rate Injection Test #1	01/08/05	7:50 AM	3:50 PM	480	125-140	66,300	Flow 140 gpm for first 6 hrs; 125-135 gpm for final 2 hrs.
	Constant Rate Injection Test #2	01/09/05	8:00 AM	11:30 AM	270	140	29,400	Flow constant at 140 gpm for test duration.
	Step Test	12/22/05	2:18 PM	4:44 PM	146	73 - 185	~19,000	Flow rates of 73, 97, 125, 152, and 185 gpm.
	Spinner Test	12/22/05	9:43 AM	10:45 AM	58	80	~12,000	Flow rate measured by time to fill bucket.
Injecti	on Well IW-3							
	Constant Rate Extraction Test	01/14/05	12:15 PM	5:15 PM	300	183	54,900	
	Constant Rate Injection Test	01/20/05	8:00 AM	2:08 PM	368	251	92,400	
	Step Test	01/14/05	7:45 AM	10:20 AM	155	80 - 195	~21,000	Flow rates of 80, 100, 125, 155, and 195 gpm.
	Spinner Test	01/12/05	3:28 PM	4:39 PM	71	70	~12,000	Flow rate measured by time to fill bucket.

TABLE 7-2

Summary Step Test Results in IW-2 Groundwater and Hydrogeologic Investigation Interim Measures No. 3 Injection Area, PG&E Topock Compressor Station

Step	Average Pumping Rate (gpm)	Maximum Drawdown (cumulative ft)	Specific Capacity (gpm/ft)	Estimated Transmissivity (ft²/day)
1	72.2	2.1	33.7	9,000
2	96.8	3.0	32.7	8,700
3	124.8	3.8	32.9	8,800
4	152.2	4.8	31.7	8,500
5	184.6	6.1	30.5	8,200

Notes:

gpm = gallons per minute; ft = feet

TABLE 7-3

Summary Step Test Results in IW-3

Groundwater and Hydrogeologic Investigation

Interim Measures No. 3 Injection Area, PG&E Topock Compressor Station

Step	Average Pumping Rate (gpm)	Maximum Drawdown (cumulative ft)	Specific Capacity (gpm/ft)	Estimated Transmissivity (ft²/day)
1	80	1.7	47	12,600
2	100	2.1	48	12,700
3	125	2.6	48	12,900
4	155	3.5	44	11,800
5	195	4.7	41	11,100

Notes:

gpm = gallons per minute; ft = feet

IW-2 Velocity Log Interpreted Relative P	ermeability
Depth Range (ft BTOC)	Relative Permeability (gpm/ft)
170-183	0.32
183-192	0.90
192-209	0.42
209-247	0.16
247-273	0.34
273-291	1.15
291-305	0.89
305-321	0.64
321-330	0.42

TABLE 7-4

Note:

TABLE 7-5

ft BTOC = feet below top of casing

gpm/ft = gallons per minute per foot

Depth Range (ft BTOC)	Relative Permeability (gpm/ft)
160-178	0.30
178-195	0.27
195-218	0.17
218-240	0.12
240-274	0.13
274-312	0.65
312-320	3.01

Note:

ft BTOC = feet below top of casing gpm/ft = gallons per minute per foot

TABLE 7-6 Maximum Response at Wells During IW-2 Testing Groundwater and Hydrogeologic Investigation Interim Measures No. 3 Injection Area, PG&E Topock Compressor Station

					C	rawdown c	or Drawup (f	t) ¹			
		IW-2	OW-1S	OW-1M	OW-1D	OW-2S	OW-2M	OW-2D	OW-5S	OW-5M	OW-5D
Test	Distance (ft)	0	85	93	93	50	59	39	197	203	208
Injection Test #1	(125-140 gpm)	5.0	0.1	0.7	1.0	< 0.1	1.0	1.3	< 0.1	0.6	0.7
Injection Test #2	(140 gpm)	5.7	0.1	0.6	0.9	< 0.1	0.9	1.2	< 0.1	0.6	0.6
Extraction Test	(188 gpm)	6.1	0.0	0.8	1.1	< 0.1	1.2	1.6	0.0	0.6	0.8

Notes:

¹ Values are drawdown for extraction tests and drawup for injection tests.

TABLE 7-7

Maximum Response at Wells During IW-3 Testing Groundwater and Hydrogeologic Investigation Interim Measures No. 3 Injection Area, PG&E Topock Compressor Station

					Drawd	own or Drav	wup (ft) ¹				
		IW-3	OW-1S	OW-1M	OW-1D	OW-2S	OW-2M	OW-2D	OW-5S	OW-5M	OW-5D
Test	Distance (ft)	0	184	194	185	200	211	192	52	52	53
Injection Test	(140 gpm)	6.9	0.2	0.7	1.2	0.33	0.8	1.6	0.5	1.6	2.0
Extraction Test	(188 gpm)	4.4	< 0.1	0.4	0.8	NM	0.5	1.1	NM	1.0	1.4

Notes:

¹ Values are drawdown for extraction tests and drawup for injection tests.

NM = not measured.

TABLE 7-8 Summary of Aquifer Test Analyses Groundwater and Hydrogeologic Investigation Interim Measures No. 3 Injection Area, PG&E Topock Compressor Station

	Pumping Rate	Test Duration Analyzed	Trans	smissivity ((ft²/day)		Storativity	,		Top Resis	tance (day	y)
Method/Test	(gpm)	(minutes)	Upper	Middle	Lower	Upper	Middle	Lower	Upper	Middle	Lower	Bottom
MLU ^a												
IW-2 & IW-3 Injection Test	140 (IW-2) 251 (IW-3)	0 - 350 (IW-2) 0 - 290 (IW-3)	2,000	3,300	11,000	6.0E-03	1.4E-04	2.9E-04	1E12 ^c	56	211	1E12 ^c
Cooper Jacob ^b												
IW-2 Injection Test #1 - Early	140	0 - 100		14,500 ·		NA	NA	NA	NA	NA	NA	NA
IW-2 Injection Test #1 - Late	125 - 140	215 - 480		2,100 ^d -		73 - 185	NA	NA	NA	NA	NA	NA
IW-3 Injection Test	251	90 - 300		12,500 -		NA	NA	NA	NA	NA	NA	NA

Notes:

^a MLU analyses conducted iteratively using test data from IW-2 and IW-3; analyses used drawup data from both pumping and observation wells.
 ^b Cooper Jacob assumes fully penetrating wells; analyses used drawup data from pumping well only.
 ^c Top resistance set to impervious for top layer (i.e., confined aquifer) and bottom (i.e., leakance from bedrock).
 ^d May be invalid due to partial clogging of injection well.

Figures



315994.PS.07.IW_Figure 2-1 SiteLocMap-Final_3/31/05_ccc



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Shallow Groundwater Monitoring Well

Interim Measures Groundwater Extraction Well

Hexavalent Chromium [Cr(VI)] Sampling Results

Cr(VI) concentrations in micrograms per liter (μ g/L) for sampling dates September 2004 to May 2005



- **ND** not detected at listed reporting limit (RL)
- concentration or RL estimated by laboratory or J data validation
- Note: See Table 6-1 for additional chromium results and field parameters for shallow monitoring wells.

Cr(VI) Concentrations in Groundwater Samples

- ND (1.0) Not detected at listed reporting limit
- 23.4 Concentration between reporting limit and 50 µg/L

608 Concentration greater then 50 µg/L



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Approximate outline of Cr(VI) in upper depth interval of Alluvial Aquifer greater than 50 µg/L



1 inch equals 350 feet California State Plane NAD83 Zone 5 US Feet

FIGURE 6-2 **HEXAVALENT CHROMIUM RESULTS** FOR SHALLOW WELLS **SEPTEMBER 2004 - MAY 2005**

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IM-3 GROUNDWATER INVESTIGATION PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA



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 \odot Mid-depth Groundwater Monitoring Well

Hexavalent Chromium [Cr(VI)] Sampling Results

Cr(VI) concentrations in micrograms per liter (µg/L) for sampling dates September 2004 to May 2005



ND not detected at listed reporting limit (RL) J concentration or RL estimated by laboratory or data validation

Note: See Table 6-1 for additional chromium results and field parameters for mid-depth monitoring wells.

Cr(VI) Concentrations in Groundwater Samples

ND (1.0) Not detected at listed reporting limit

23.4 Concentration between reporting limit and 50 µg/L

608 Concentration greater then 50 µg/L



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Approximate outline of Cr(VI) in mid-depth interval of Alluvial Aquifer greater than 50 µg/L



1 inch equals 350 feet California State Plane NAD83 Zone 5 US Feet

FIGURE 6-3 **HEXAVALENT CHROMIUM RESULTS** FOR MID-DEPTH WELLS **SEPTEMBER 2004 - MAY 2005** IM-3 GROUNDWATER INVESTIGATION PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA



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Deep Groundwater Monitoring Well

Interim Measures Groundwater Extraction Well

Hexavalent Chromium [Cr(VI)] Sampling Results

Cr(VI) concentrations in micrograms per liter (µg/L) for sampling dates September 2004 to May 2005



ND not detected at listed reporting limit (RL) concentration or RL estimated by laboratory or .1 data validation

Note: See Table 6-1 for additional chromium results and field parameters for deep monitoring wells.

Cr(VI) Concentrations in Groundwater Samples

ND (1.0) Not detected at listed reporting limit

23.4 Concentration between reporting limit and 50 µg/L

608 Concentration greater then 50 µg/L



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Approximate outline of Cr(VI) in lower depth interval of Alluvial Aquifer greater than 50 µg/L



1 inch equals 350 feet California State Plane NAD83 Zone 5 US Feet

FIGURE 6-4 **HEXAVALENT CHROMIUM RESULTS** FOR DEEP WELLS **SEPTEMBER 2004 - MAY 2005** IM-3 GROUNDWATER INVESTIGATION PG&E TOPOCK COMPRESSOR STATION

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NEEDLES, CALIFORNIA





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	Nor Sectio	theast on EM-2	700
	014/2		600
	T	· · · · · · · · · · · · · · · · · · ·	550
			500
·¥.			450
		· · · · · · · · · · · · · · · · · · ·	400
	4,890 7,605 28 7,84		350
			300
	9,800 15,150 -198.5 7.93		250
·	- ? <u>360</u> ' - Tmc -		200
· · · · · · · · · · · · · · · · · · ·			150
1,000		1,200	100
FIGURE TDS AN HYDRO IM-3 GRC PG&E TC NEEDLES	6-6 D OTHER WATER QL GEOLOGIC SECTION DUNDWATER INVESTIGA POCK COMPRESSOR S S, CALIFORNIA	JALITY PARAMET EM-2 TION TATION	TERS



Appendix A Drilling and Well Construction Records



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TABLE A-1

Well Elevations and Construction Summary Groundwater and Hydrogeologic Investigation Interim Measures No. 3. Injection Area, PG&E Topock Compressor Station

			Well Ele	vation				TOP o	f Screen	BASE	of Screen		
Well ID LocID_Post	Well Note	Date Installed	Measure Pt. Elevation (ft MSL)	Ground Elevation (ft MSL)	Boring Total Depth (ft bgs)	Well Depth (ft bgs)	Approx Depth to Water (ft TOC)	Depth (ft bgs)	Elevation (ft MSL)	Depth (ft bgs)	Elevation (feet MSL)	Well Casing & Sump Length	Screen Length feet
Monitoring, Ob	servation, Compliand	e & Injection W	ells										
MW-13	GMP	Jul-97	488.64	487	50	49	32	29	458	49	438	4" PVC	20
MW-14	GMP	Jul-97	570.99	570	135	131	115	111	459	131	439	4" PVC	20
MW-18	GMP	Apr-98	545.32	544	110	105	89	85	459	105	439	4" PVC	20
MW-37S	GMP	Apr-04	486.72	484	84	84	30	64	420	84	400	2" PVC	20
MW-37D	GMP	Apr-04	486.75	484	228	225	30	180	304	200	284	2" PVC; 25' sump	20
MW-41S	IM Phase 2 - GMP	Nov-04	480.07	477	60	60	27	40	437	60	417	2" PVC	20
MW-41M	IM Phase 2 - GMP	Nov-04	479.84	477	190	190	26	170	307	190	287	2" PVC	20
MW-41D	IM Phase 2 - GMP	Nov-04	479.42	477	320	311	26	271	206	291	186	2" PVC - 20' sump	20
CW-1M	IM3 compliance MW	Jan-05	566.07	563	195	190	112	140	423	190	373	2" PVC	50
CW-1D	IM3 compliance MW	Jan-05	566.46	564	360	320	112	250	314	300	264	2" PVC - 20' sump	50
CW-2M	IM3 compliance MW	Jan-05 / Feb-05	549.45	547	203	202	95	152	395	202	345	2" PVC	50
CW-2D	IM3 compliance MW	Jan-05	549.43	547	385	355	96	285	262	335	212	2" PVC - 20' sump	50
CW-3M	IM3 compliance MW	Feb-05	534.10	532	223	222	80	172	359	222	309	2" PVC	50
CW-3D	IM3 compliance MW	Jan-05	534.14	532	360	340	80	270	262	320	212	2" PVC - 20' sump	50
CW-4M	IM3 compliance MW	Jan-05	518.55	516	170	170	64	120	396	170	346	2" PVC	50
CW-4D	IM3 compliance MW	Jan-05	518.55	516	337	303	65	233	283	283	233	2" PVC - 20' sump	50
OW-1S	IM3 observation well	Nov-04	550.15	548	115	114	95	84	464	114	434	2" PVC	30
OW-1M	IM3 observation well	Sep-04	550.36	548	186	189	92	165	383	185	363	2" PVC	20
OW-1D	IM3 observation well	Sep-04	550.37	548	291	277	92	257	291	277	271	2" PVC	20
OW-2S	IM3 observation well	Dec-04	548.75	546	104	101	94	71	475	101	445	2" PVC	30
OW-2M	IM3 observation well	Dec-04	548.52	546	210	210	94	190	356	210	336	2" PVC	20
OW-2D	IM3 observation well	Nov-04 / Dec-04	549.01	547	347	340	95	310	237	330	217	2" PVC - 10' sump	20
OW-3S	IM3 invest (West Mesa)	Oct-04	558.58	556	118	116	104	86	470	116	440	2" PVC	30
OW-3M	IM3 invest (West Mesa)	Oct-04	558.90	556	202	200	104	180	376	200	356	2" PVC	20
OW-3D	IM3 invest (West Mesa)	Oct-04	558.63	556	275	273	95	243	313	263	293	2" PVC - 10' sump	20
OW-5S	IM3 observation well	Nov-04	551.75	549	112	110	97	70	479	110	439	2" PVC	40
OW-5M	IM3 observation well	Nov-04	551.75	549	252	250	97	210	339	250	299	2" PVC	40
OW-5D	IM3 observation well	Nov-04	552.35	550	350	350	98	300	250	320	230	2" PVC - 30' sump	20
IW-2	IM3 injection well	Jan-05	550.11	547	412	340	96	170	377	330	217	6" SS - 10' sump	160
IW-3	IM3 injection well	Jan-05	554.44	551	411	330	100	160	391	320	231	6" SS - 10' sump	160
Exploration B	oring	Date Drilled											
IW-1	IM3 exploratory boring	Nov-04		548	411							no well installed	

NOTES:

1. Well elevations for IM-3 wells in feet above mean sea level (MSL) from PG&E well survey conducted 2/15/05.

2. Ground surface elevations and all well/screen depth and elevations rounded-off to whole-foot values.

3. Depth to water values are average depths in feet below top of well casing (TOC) rounded off to whole-foot values.

TABLE A-2

Well Survey Report Groundwater and Hydrogeologic Investigation Interim Measures No. 3 Injection Area, PG&E Topock Compressor Station

Station ID	Northing	Easting	Elevation	Elevation	Elevation	Elevation
			Top of PVC	Top of Steel Casing North Side	Concrete Pad North Side	Ground North Side
IM-3 Complia	nce Monitoring We	ells				
CW-1D	2102692.93	7613263.17	566.46	567.00	564.34	563.77
CW-1M	2102703.17	7613263.12	566.07	566.83	563.86	563.36
CW-2D	2103097.47	7613798.05	549.43	549.84	547.08	546.72
CW-2M	2103106.51	7613795.76	549.45	549.84	547.07	546.64
CW-3D	2103348.44	7613849.33	534.14	534.74	532.03	531.53
CW-3M	2103351.93	7613858.79	534.10	534.68	531.99	531.55
CW-4D	2103263.03	7612928.74	518.55	518.86	516.11	515.91
CW-4M	2103268.73	7612925.43	518.55	518.67	516.06	515.80
IM-3 Injection	n Wells					
IW-2	2103104.94	7613363.87	N/A	550.11	N/A	546.54
IW-3	2103007.18	7613237.80	N/A	554.44	N/A	551.43
IM-3 Observa	tion Wells					
OW-1D	2103030.90	7613420.85	550.37	551.32	548.37	547.77
OW-1M	2103038.38	7613428.89	550.36	551.07	548.07	547.75
OW-1S	2103040.48	7613419.20	550.15	550.65	547.97	547.59
OW-2D	2103142.09	7613374.28	549.01	549.84	547.01	546.68
OW-2M	2103160.57	7613382.67	548.52	549.08	546.45	545.87
OW-2S	2103153.89	7613373.77	548.75	549.42	546.72	546.17
OW-3D	2103286.35	7612161.22	558.63	559.39	556.37	555.91
OW-3M	2103276.78	7612157.98	558.90	559.51	556.62	556.20
OW-3S	2103267.64	7612152.99	558.58	559.29	556.34	555.83
OW-5D	2102998.32	7613185.55	552.35	552.95	550.10	549.52
OW-5M	2103008.06	7613185.86	551.75	552.64	549.62	549.01
OW-5S	2103017.60	7613186.81	551.75	552.43	549.57	549.12
MW-41D	2103536.66	7614578.85	479.42	479.96	477.40	476.88
MW-41M	2103527.41	7614583.19	479.84	480.51	477.81	477.06
MW-41S	2103518.07	7614588.78	480.07	480.79	478.07	477.41

Well survey conducted 2/15/05 by PG&E. Survey data provided from PG&E 3/8/05.

All observations are on northerly side and are a black mark with red paint dot.

All coordinates and elevations are based on a previous survey by Coast Surveying dated 2-17-04 to 2-19-04. Coast surveying used the following datums:

Coordinates are CCS NAD 83, Zone 5, 1991.35 Epoch. Based on values found on NGS data sheets EU1248 and EU0763.

Elevations are NAVD 88. Based on values found on NGS data sheet EU0763.

1	MAJOR DIVISIONS	SYM	BOLS	TYPICAL SOIL DESCRIPTIONS
T		GW	900	Well graded gravels or gravel-sand mixtures, little or no fines
(ezis	GRAVELS	GP	0.0.8	Poorly graded gravels or gravel-sand mixtures, little or no fines
OILS	(More than 1/2 of coarse fraction >	GM	0000	Silty gravels, gravel-sand-silt mixtures
NED S	No. 4 sieve size)	GC		Clayey gravels, gravel-sand-clay mixtures
GRAI		SW		Well graded sands or gravelly sands, little or no fines
ARSE n 1/2 o	SANDS	SP		Poorly graded sands or gravelly sands, little or no fines
CC ore tha	(More than 1/2 of coarse fraction >	SM		Slity sands, sand-silt mixtures
W)	NO. 4 SIEVE SIZE)	SC		Clayey sands, sand-clay mixtures
le size)	SILTS & CLAYS	ML		Inorganic slits and very fine sands, rock flour, silty or clayey fine sands or clayey slits with slight plasticity
ID SOILS	LL <50	CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
RAINE soll < h		OL	KA.	Organic slits and organic slity clays of low plasticity
NED G		мн	11	Inorganic silts, micaceous or diatomaceous fine sandy or silty solls, elastic silt
FI ore that	SILTS & CLAYS	СН		Inorganic clays of high plasticity, fat clays
(Mc	LL >50	он		Organic clays of medium to high plasticity, organic slity clays, organic slits
	HIGHLY ORGANIC SOILS	Pt	2.	Peat and other highly organic soils

IABLE A-3 UNIFIED SOIL CLASSIFICATION SYSTEM GROUNDWATER AND HYDROGEOLOGIC INVESTIGATION INTERIM MEASURES NO.3 INJECTION AREA, PG&E TOPOCK COMPRESSOR STATION

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A1: Observation Well and MW-41 Drilling and Construction Logs
SHEET 1 of 9)					PROJECT NUMBER: 326128.01.07.AR BORING NUMBER: OW-1			IG NUMBER: OW-1	
						SOIL BORING LO	G		•••• =	
PROJECT NAM	E:	- Investic	nation (PG&F Topc	nck	HOLE DEPTH (ft):	DRILLING CONTRAC	TOR:	Montolair CA	
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	in a weils,	DATE COMPLETED:	
547.8 ft. DRILLING MET	MSL HOD:		2,1	03,030.90		7,613,420.85	09/09/2004 DRILLING EQUIPME	NT:	09/22/2004	
Rotos	ionic	Parcel	No 650	151-06		<u> </u>	LOGGED BY:	Sonic	SS-15K	
		, Parcer i	10. 050	-131-00	1			J. Weigel		
	s	SAMPLE				SOIL DESCRIPTION		COMMENTS		
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHAI SITY/CONSISTENCY, STRUCTURE, M	R, ÞE, MINERALOGY, OISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.		
 		Box 1 Box 2	10		GRAVEL WI 50% f-c sand	ITH SAND AND SILT (SM) - It brr d, 25% f-m gravel, 25% fines, suba	hish gray (10YR 6/2), ng to subrnd clasts.	11:40,	dry-hot core barrel	
 15		Box 3	5	SM	-layers of GM/SM. (- 3" meta	f carbonate cement up to 3" thick, c Cemented zones from 11' to 15' bgs amorphic gneissic cobble	12:00, metam	3" cobble at 11 ft bgs, orphic gneiss		
 - 20		Box 4 Box 5	6		- 10YR6/. - wet col - think ce	2 fines decreasing, cemented layers or 7.5YR5/3 emented zones	: 1-2" thick	15:30,	set casing stage bins	
 <u>25</u>		Box 5 Box 6	5	GM/SM	WELL GRAL	DED GRAVEL WITH SAND AND S	nich grav to it grav			
 - 30 		Box 6 Box 7 Box 8	8	GM	(10YR 6/2 to gneiss, meta	c subrnd to subang gravel, 40% f-c	d, 10% fines, schist,	hot cor	e barrel	
	X									
35					<u> </u>			•	CH2MHILL	

SHEET 2 of	9					PROJECT NUMBER: 326128 01 07 A	R	BORING NUMBER: OW-1		
						SOIL BORING LO	G			
PROJECT NAM	E:	c Invectio	ation	DC&F Topo	ck	HOLE DEPTH (ft):	DRILLING CONTRA	CTOR:	Mantalain CA	
SURFACE ELE	VATIO	N: N	IORTH	ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	on & wells,	DATE COMPLETED:	
547.8 ft.	MSL		2,1	03,030.90		7,613,420.85	09/09/2004	FNT·	09/22/2004	
Roto	sonic							Sonic	SS-15K	
LOCATION: Ea	st Mesa	a, Parcel I	No. 650	-151-06			LOGGED BY:	J. Weigel	J. Weigel	
		SAMPLE				SOIL DESCRIPTION		COMMENTS		
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT COI DENS	SOIL NAME, USCS SYMBOL, COLOI MPOSITION, GRADING, GRAIN SHAP SITY/CONSISTENCY, STRUCTURE, MO	R, E, MINERALOGY, DISTURE.	DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.	
 - 40		Box 8	8	GM	WELL GRAE (10YR 6/2 to gneiss, meta - thin, we	DED SANDY GRAVEL (GM) - It brn o 7/2), 50% f-m gravel, 40% f-c sand morphic clasts. eakly cemented zones fining upward	ish gray to lt gray d, 10% fines, schist,			
 		Box 11	5	SM	SAND WITH sand, 30% f- moisture incr - white 10 subang-s	H GRAVEL AND SILT (SM) - It gra -c gravel, 20% silt, subrnd to subang reasing with depth. 0YR8/1, 50% f-c sand, 30% silt, 20° subrnd	y (10YR 7/2), 50% f-c g, little cementation, % gravel,			
 		Box 12 Box 13	5	SW	WELL GRAE 7/3), 75% f-(- igneous	DED SAND WITH GRAVEL (SW) - c sand, 25% gravel, subang to subrr s/metamorphic rock up to cobble size				
	-	Box 13 Box 14	4.5	ML/CL	SILT/CLAY 37% f-c sand	WITH SAND (ML/CL) - pale brn (d, < 3% gravel, wet, decreasing moi	10YR 6/3), 60% silt, sture with depth.	wet sar increas	nple, decreasing moisture with e in depth	
 - 60		Box 14 Box 15 Box 16	6	SW	SAND WITH sand, 30% g downwards, - gravel in	H GRAVEL AND FINES (SW) -It gr ravel, 10% silt, subrnd to subang, c relatively dry. ncreasing to 40% subang-ang	ay (2.5Y 7/1), 60% f-c oarsening	sample upper s	relatively dry compared to sections, coarsening downward	
 		Box 16 Box 17	6	SW/GM	SAND/GRA sand, 40% g - some m - metamo	VEL WITH SILT (SW/GM) - It gra ravel, 5% silt, ang to subrnd. ninor cementation, dissolves in water orphic and gneissic clasts	y (10YR 7/2), 55% f-c			
 70					- lt gray I gravel	10YR7/2 50% f-m sand, 30% silt, 20)% ang-subang			
								•	CH2MHILL	

SHEET 3 of	9					PROJECT NUMBER: 326128.01.07	7.AR	BORIN	IG NUMBER: OW-1		
						SOIL BORING L	OG		••••		
PROJECT NAM	E:	- Invectio	ation	PG&F Topo	ck	HOLE DEPTH (ft):		ACTOR:	Montoloir CA		
SURFACE ELEN		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	: DATE STARTED:	uon a wens,	DATE COMPLETED:		
547.8 ft. DRILLING ME	MSL FHOD:		2,1	.03,030.90		7,613,420.85 WATER LEVEL (ft):	09/09/2004 DRILLING EQUIPM	IENT:	09/22/2004		
Rotos	sonic st Mesa	Parcel I	No 650)-151-06			LOGGED BY:	Sonic	SS-15K		
		.,						J. Weigel			
	S	SAMPLE		UCCC		SOIL DESCRIPTION			COMMENTS		
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERN (ft)	CODE	PERCENT COI DENS	SOIL NAME, USCS SYMBOL, CO MPOSITION, GRADING, GRAIN SH SITY/CONSISTENCY, STRUCTURE,	LOR, IAPE, MINERALOGY, MOISTURE.	DRILLING DAILY ST REFUSAL	G OBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, .S, SAMPLING AND TESTING NOTES.		
		Box 18	6	SW/GM	SAND/GRA sand, 40% g -calcium	VEL WITH SILT (SW/GM) - It ravel, 5% silt, ang to subrnd.	gray (10YR 7/2), 55% f-c				
		Box 19 Box 20	6	SM	SAND WITH	H SILT AND CLAY (SM) - 80% 1 1-2"	f-c sand, 20% silt/clay.	clay on	a sides of core from core barrel		
80				ML/SM	SILT WITH fine sand.	SAND (ML/SM) - It gray (10YR	7/2), 50% silt/clay, 50%				
		Box 21	4	SW	WELL GRAI sand, 30% g - cement	DED SAND WITH SILT AND GF ravel, 10% fines, ang to subang. ed, not CaCO3	RAVEL (SW) - 60% f-c	5" silt z	zone		
					SAND WITH 45% silt, 5% - It gray : subrnd-a	H SILT (SM) - very pale brn (10) gravel, ang to subang. 10YR7/2, 65% well graded f-c sar ng gravel, fairly moist but drying	YR 7/3), 50% f-m sand, nd, 20% silt, 15% with depth, igneous				
 90 _ 		Box 22 Box 23	10	SM	- very pa fining up	le brn 10YR7/3, 50% sand, 30% ward, grain supported, quartzite a	silt/clay, 20% gravel, and mm clasts				
95					- compos	ition pale brn, 10YR6/3					
		Box 24	12		- lt gray - 40% sil	10YR7/2 t/clay, 30% f-c sand ang-subang,	, 10% gravel				
		Box 25			SILT WITH	SAND AND GRAVEL (ML) - It t	brnish gray (10YR 6/2).	ground from 1 [/]	lwater grab sample collected 00-116 ft bgs		
	+			ML	50% silt, 409	% f-c sand, 10% gravel, ang-subr	rnd, low plasticity.				
105				SW/SM	WELL GRAD	DED SAND WITH SILT AND GR	RAVEL (SW/SM) - It redd	ish			
								•	CH2MHILL		

SHEET 4 of	9					PROJECT NUMBER: 326128 01 07	AR	BORIN	IG NUMBER: OW-1
						SOIL BORING LO		<u> </u>	
PROJECT NAM	IE:	.				HOLE DEPTH (ft):	DRILLING CONTRAC	TOR:	
	geologi VATIO	C Investig	iortion, i	ING (CCS	NAD 27 Z 5):	291.0 EASTING (CCS NAD 27 Z 5):	WDC Exploratio	on & Wells,	Montclair, CA DATE COMPLETED:
547.8 ft.	. MSL		2,1	03,030.90	- /	7,613,420.85	09/09/2004	NT.	09/22/2004
DRILLING ME Roto	sonic					WATER LEVEL (ft):	DRILLING EQUIPME	Sonic	SS-15K
LOCATION: Ea	st Mesa	a, Parcel	No. 650	-151-06			LOGGED BY:	J. Weigel	l
	9	SAMPLE				SOIL DESCRIPTION			COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COL MPOSITION, GRADING, GRAIN SHA SITY/CONSISTENCY, STRUCTURE, I	OR, IPE, MINERALOGY, MOISTURE.	DRILLING DAILY SI REFUSAL	G OBSERVATIONS AND OPERATIONS, TART AND END TIMES , DRILL RATE, .S, SAMPLING AND TESTING NOTES.
				SW/SM	brn (5YR 6/3	3), 75% f-c sand, 15% fines, 10%	gravels, subrnd, grain		
 <u>110</u> 		Box 27 Box 28 Box 29	10	SM	WELL GRAI brn (SYR 6/3 WELL GRAI gray (SYR 5/ subrnd, grair - less cer	Min Class. DED SAND WITH SILT AND GR. 3), 75% f-c sand, 15% fines, 10% DED SAND WITH SILT AND GR. (2), 70% f-c sand, 25% fines, 5% of n supported, natural soil moisture. mented zone	AVEL (SW/SM) - It reddisl gravels, subrnd. AVEL (SM) - It reddish gravels, subang to	fell apa	art in core barrel
 					- 3-4" sa cobble-si - pale bri	ndy silt zone 55% silt, 45% f-c sar zed subang clasts n 10YR6/3, 50% fines, 45% f-c sar	nd, gneissic nd, 5% gravels		
 <u>120</u>	-	Box 30	7	CL/ML	- alternat CLAY AND 3 5/2), 65% m supported.	ting units are grain-supported and SILT WITH SAND AND GRAVEL ned plasticity silt/clay, 30% f-c sand	matrix-supported (CL/ML) - olive gray (5Y d, 5% gravel, matrix SULT AND CLAY (SM/SC		
 <u>125</u>	-	Box 31		SM/SC	- 55% f-c sa SILT AND C 4/3 to 4/4) ti 10% gravel	CLAY WITH GRAVEL AND SAND o It yellowish brn (2.5Y 6/4), 65%	(ML/CL) - olive brn (2.5Y silt/clay, 25% f-c sand, supported wet		
				ML/CL	- It olive	2.5Y5/3, 60% silt/clay, 35% f-c sa	nd, 5% gravel, dry	hot cor	re barrel
		Box 32 Box 33	10	SC	SAND WITI It olive gray subang. - fining u	H SILT, CLAY AND GRAVEL (SC (5Y 6/2), 60% f-m sand, 35% silt/ Ip sequence) - pale brn (10YR 6/3) to clay, 5% gravel, ang to		
 		Box 34		SM	SAND AND 50% f-c sand	SILT WITH GRAVEL (SM) - dar d, 40% silt/clay, 10% gravel, ang-s	k grayish brn (2.5Y 4/2), subang, med plasticity.		
 140		Box 35 Box 36	6		- 4" sean	n or low plasticity silt / clay			
								•	CH2MHILL

SHEET 5 of 9	9					PROJECT NUMBER: 326128.01.07	AR	BORI	NG NUMBER: OW-1		
						SOIL BORING L	DG		•		
ROJECT NAM	E:	c Invectio	nation	DC&E Topo	ock	HOLE DEPTH (ft):		ACTOR:	Mantalain CA		
SURFACE ELEN	ATIO	N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	ation & wells	DATE COMPLETED:		
547.8 ft. DRILLING MET	MSL		2,1	.03,030.90		7,613,420.85	09/09/2004 DRILLING EQUIPI	MENT:	09/22/2004		
Rotos	sonic	Parcel	No 650	151-06			LOGGED BY:	Sonic	: SS-15K		
		a, Parcer	NO. 050	-131-00	1			J. Weige	J. Weigel		
	9	SAMPLE				SOIL DESCRIPTION			COMMENTS		
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COI MPOSITION, GRADING, GRAIN SH SITY/CONSISTENCY, STRUCTURE,	.OR, APE, MINERALOGY, MOISTURE.	DRILLIN DAILY S REFUSA	G OBSERVATIONS AND OPERATIONS, TART AND END TIMES , DRILL RATE, LS, SAMPLING AND TESTING NOTES.		
-				SM	SAND AND 50% f-c sand grain edge co	SILT WITH GRAVEL (SM) - dai d, 40% silt/clay, 10% gravel, ang- ontact, grain supported, dry.	k grayish brn (2.5Y 4/2), subang, med plasticity,				
-	·\ /				-sand wit 10YR7/1	th silt and gravel, It yellowish brn 3 , 60% f-c sand, 40% silt/clay, 5%	gravel				
145					SAND AND gray (2.5Y 7,	SILT WITH GRAVEL (ML/SM) /2) 40% f-c sand, 40% silt, 20% g	- It gray (10YR 7/1) to It gravel.	-			
-		Box 36 Box 37 Box 38	10	ML/SM	- 2.5Y7/2	2 lt gray, 55% silt, 35% f-c sand, :	10% gravel				
 150				SM/ML	SAND AND fines, 45% f- - gravish	SILT WITH GRAVEL (SM/ML) -c sand, 5% gravel, not cemented brn 10YR5/2 45% f-c sand, 40%	- brn (10YR 5/3), 50% , wet. silt. 15% gravel.	-			
-					ang-suba	ang, dry					
_ 					SAND WITH sand, 30% s -silt contr	H GRAVEL AND SILT (SM) - brr ilt, 15% gravel. ent increasing with depth, gravel o	o (10YR 5/3), 55% f-c				
- - 160 -		Box 39 Box 40 Box 41	10		- brn 101	YR5/3,C208 50% silt, 48% f-c san	d, 2% gravel	ground from 1	dwater grab sample collected 160-180 ft bgs		
- - 165				SM	- brn 10 ang-suba - gray 2.! med plas	YR5/3, 65% f-c sand, 20% silt, 15 ang, moist 5Y5/1, 60% silt, 30% sand, 10%g sticity	% gravel, ravel, ang-subang,				
-		Box 41 Box 42	8		- wet						
170				ļ	- metamo	orphic clasts					
-					- It olive gravel, Ic - It yellov	brn 2.5Y5/3, 75% well grade f-c s pose wish brn 2.5YR6/3, 50% sand, 45°	and, 20% silt, 5% % silt, 5% gravel,	casing	at 160', borehole to 180'		
_ 					- It olive gravel, Ic - It yellov moist, ti <u>c</u>	brn 2.5Y5/3, 75% well grade f-c s pose wish brn 2.5YR6/3, 50% sand, 45° ght	and, 20% % silt, 5%	o silt, 5% o gravel,	o silt, 5%		

SHEET 6 of 9 PROJECT NUMBER: 326128.01.07.4R							2	BORIN	IG NUMBER: OW-1	
						SOIL BORING		G		··· -
PROJECT NAM	IE:	c Investic	ation		nck.	HOLE DEPTH (ft):	-	DRILLING CONTRAC		Montolair CA
SURFACE ELEV		N: N	IORTH	ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z	5):	DATE STARTED:	JI & Wells,	DATE COMPLETED:
547.8 ft. DRILLING ME	. MSL Thod:		2,1	03,030.90		7,613,420.85		09/09/2004 DRILLING EQUIPME	NT:	09/22/2004
Roto:	sonic st Mesi	a. Parcel I	No. 650	-151-06				LOGGED BY:	Sonic	SS-15K
									J. Weigel	
		SAMPLE	~	USCS		SOIL DESCRIPTIO	N			COMMENTS
(feet) VIII BGS V VIII BGS V						SOIL NAME, USCS SYMBOL, 4 MPOSITION, GRADING, GRAIN SITY/CONSISTENCY, STRUCTUF	COLOR SHAPE RE, MO	, , MINERALOGY, ISTURE.	DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, I'ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
 180		Box 43 Box 44	8	SM	SAND WITH sand, 30% s - compac - It olive clasts, sa	H GRAVEL AND SILT (SM) - ilt, 15% gravel. tted brn 2.5Y5/3, 55% sand, 30% s imple broken and dry	brn (1 silt, 15'	0YR 5/3), 55% f-c % gravel, ang mm		
	-			SW/SM	SAND WITH 5/4), 70% su SILT AND S 50% silt/clay	H SILT AND GRAVEL (SW/S Jbang to ang sand, 20% silt, 10 SAND WITH GRAVEL (ML/S) 45% sand 5% gravel ang tr	M) - y <u>0% sul</u> M) - ye	ellowish brn (10YR brnd gravel up to 3" ellowish brn (10YR 5/4),		
 		Box 45 Box 46	6.5		- last san - It yellov gravel, si	vish brn 2.5Y6/3, 60% silt/clay ubang-subrnd, med plasticity, r	, 30% natrix	f-c sand, 10% supported		
				ML/SM	- dry and - moist a	l loose, oscillating silt and clay nd tight				
 195 		Box 47 Box 48 Box 49	10		- moist n	nm clasts				
200	-				WELL GRAI (10YR 6/3),	DED SAND AND SILT WITH 50% sand, 40% fines, 10% co	GRAV arse gi	EL (SM) - pale brn ravel up to 1.5",		
 				SM	ang, stiff, gra - It olive silt/clay, - 65% f-	ain edge supported, moist to w brn 2.5Y5/3, 50% sand ang, cl 5% gravel -c sand, 20% silt, 15% gravel a ose wet	vet. ast sup ang-sul	oported, 45% bang, metamorphic		
	-	Box 50 Box 51 Box 53	0	ML/CL	(2.5Y 5/3), 6 med plasticit	CLAY WITH SAND AND GRA 50% silt/clay, 35% f-c sand, 5% y, alternates between clast and	VEL (I 6 grave 1 matri	ML/CL) - It olive brn el, matrix supported, x supported.	8:00, ti	ripping in
		1	<u> </u>	L	<u> </u>				•	CH2MHILL

SHEET 7 of 9 PROJECT NUMBER: 326128.01.07.AR							AR	BORING NUMBER: OW-1		
						SOIL BORING LO)G			
PROJECT NAM	eologia	Investic	ation F	PG&F Topo	ck	HOLE DEPTH (ft):	DRILLING CONTRAC	CTOR:		
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	DATE COMPLETED:		
DRILLING MET	HOD:		2,1	03,030.90		7,613,420.85	DRILLING EQUIPME	09/22/2004		
Rotos	onic t Mesa	, Parcel I	No. 650	-151-06			LOGGED BY:	Sonic SS-15K		
								J. Weigel		
	S	SAMPLE	~	liece		SOIL DESCRIPTION		COMMENTS		
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVER) (ft)	CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COL MPOSITION, GRADING, GRAIN SHA SITY/CONSISTENCY, STRUCTURE, N	DR, PE, MINERALOGY, IOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.		
 - 215 					NO RECOVI	ERY		sample fell out of core barrel and was redrilled drilling is hard		
 		Box 54	6		SAND AND 5/3), 55% f- 1.75", moist, depth. - gravel u - 3" sand	SILTY CLAY WITH GRAVEL (SI c sand, 40% silt/clay, 5% ang to s cohesive, soft, mm clasts, increas up to 3" I zone, 65% sand, 30% silt, 5% gr	1/ML) - It olive brn (2.5Y ubang gravel up to ing sand and clay with avel up to 3", stiff	groundwater grab sample collected from 220-236 ft bgs sample went from hard to soft		
				SM/ML	- It yellov subrnd-su - 80% sil plasticity	vish brn 2.5Y6/3, 80% f-c sand sul ubang, 5% silt, soft, loose and mo t/clay, 10% gravel to cobble, 10%	oang-ang, 15% gravel st f-m sand, m-h			
 		Box 55 Box 56 Box 57	12		- It yellov	vish brn 2.5Y6/3, 85% f-c sand, 10	% silt, 5% gravel			
 					- grayish subrnd-a	brn 2.5Y5/2, 45% f-c sand, 40% s ng, mm	ilt/clay, 15% gravel,			
 240 245		Box 53	0					drilling is hard, broke casing at drill head at depth, casing at 180 ft bgs, had to shake core barrel to get out of hole, lost sample		

SHEET 8 of 9 PROJECT NUMBER:							5	BORING NUMBER:
							<u> </u>	
PROJECT NAM	E:					HOLE DEPTH (ft):	DRILLING CONTRAC	CTOR:
IM-3 Hydrog	eologi	c Investig	jation, l	PG&E Topo	ck NAD 27 7 5)·	291.0	WDC Exploratio	on & Wells, Montclair, CA
547.8 ft.	MSL		2,1	03,030.90	140 27 2 3).	7,613,420.85	09/09/2004	09/22/2004
DRILLING MET Rotos	HOD:					WATER LEVEL (ft):	DRILLING EQUIPME	NT: Sonic SS-15K
LOCATION: Eas	t Mesa	a, Parcel I	No. 650	-151-06		1	LOGGED BY:	J. Weigel
	9	SAMPLE				SOIL DESCRIPTION		COMMENTS
DEPTH BGS (feet)	TERVAL	'YPE/ JMBER	COVERY (ft)	USCS CODE	PERCENT CO	SOIL NAME, USCS SYMBOL, COLOR, MPOSITION, GRADING, GRAIN SHAPE	, MINERALOGY,	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, DEFLICAL S CANDING AND TESTING NOTES
	IN	Γž	RE		NO RECOVE	ERY		
 250				SW/GP	SAND AND 55% m-c sut silt. - gravely sand, 200	GRAVEL WITH FINES (SW/GP) - bang to subrnd sand, 40% f-m suband well graded sand with silt, It olive brr % f gravel ang-subang grain supporte	grayish brn (2.5Y 5/2), g to rnd gravel, 5% n 2.5Y5/3, 65% f-c sd	246 ft bgs - formation tight, water flows out of casing while tripping in core barrel drilling is hard
ML/CL SILT AND						CLAY WITH SAND (ML/CL) - It olive	e brn (2.5Y 5/3), 70%	
 - 255 260		Box 59 Box 60 Box 61	11		<u>m. plasticity</u> SAND WITH fines, 48% f- alternating zo - silty we 10% f-m	fines, 35% f-c sand, 5% gravel, ang f I SILT AND CLAY (SM/ML) - It oliv -c sand, 2% gravel, ang to subang, m ones of matrix and grain supported. Il graded sand with gravel, 55% f-c sa gravel, 2.5" max gravel size	to subang. re brn (2.5Y 5/3), 50% red plasticity, and, 35% silt/clay,	
 - 265 270		no sample return	0	SM/ML	- sandy s	ilty clay with gravel, grayish brn, 60%	6 fines, 30% f-c	drilling is hard, tried to wash down with casing from 246 to 266 ft bgs, cement casing broke on washdown, core barrel stuck had to vibrate to get it out, lost sample
2/0	\setminus			•	sand, 10 ^o	% ang-subang gravel	5 miles, 50 /01 c	
	\bigwedge	Box 62	3	GM	GRAVEL WI 10% fines, b	ITH SILT (GM) - grayish brn (2.5Y 5 imodal distribution.	/2), 90% f-c gravel,	
 275				ML/CL	SANDY SIL 4/2), 60% sil supported, m	TY CLAY WITH GRAVEL (ML/CL) It, 35% f-c sand, 5% gravel, subrnd t netamorphic, stiff, moist.	- dark grayish brn (2.5Y o subang, matrix	
L _	X	Box 63	5	CL	SILT AND C 	CLAY WITH SAND (CL) - It olive brn 6 sand, 5% gravel.	1 (2.5Y 5/3), 80%	hard and tight
	/			SW	WELL GRAD 75% f-c sand	DED SAND WITH GRAVEL (SW) - d, 20% gravel, 5% fines, bimodal dist	grayish brn (2.5Y 5/2), ribution.	
 				SM/ML	SILTY SANI 40% fines, 5	D WITH GRAVEL (SM/ML) - It olive % f-gravel, edge supported, increasir	e brn, 55% f-c sand, ng silt with depth.	

SHEET 9 of 9)					PROJECT NUMBER: 326128.01.07.AR BORING NUMBER: OW-1				
						SOIL BORING LO	<u>uk</u>)G		011-1	
PROJECT NAM	E:	- Investic	nation. [PG&F Topc		HOLE DEPTH (ft):	DRILLING CONTRA	CTOR:	Montolair CA	
SURFACE ELEV		N: N	IORTH	ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	JUIT & WEIIS,	DATE COMPLETED:	
DRILLING MET	HOD:		۷,1	03,030.90		۲,613,420.85 WATER LEVEL (ft):	DRILLING EQUIPM	ENT:	09/22/2004	
Rotos	ionic st Mesa	a, Parcel I	No. 650)-151-06			LOGGED BY:	Sonic	SS-15K	
					l	COT DESCRIPTION				
	: ب	AMPLE	2	USCS		SOIL DESCRIPTION				
(feet)	INTERVA	TYPE/ NUMBEF	RECOVER (ft)	CODE	PERCENT CON DENS	SOIL NAME, USCS SYMBOL, COLOR, r COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE. SAND WITH GRAVEL (SM/ML) - It olive brn, 55% f-c sand,				
(feet) No recent control Image Product Image Product Image Product PERCENT Control Image Product PERCENT Control Image Product Box 65 Image Product SM/ML Image Product Image Product Image Product SM/ML Image Product Image Product Image Product						D WITH GRAVEL (SM/ML) - It oli i% f-gravel, edge supported. carbonate cement silt/clayey sand, 40% f-c sand, 35% subang-subrnd, grain supported, l-r ERY Boring Terminated at 291	ve brn, 55% f-c sand, 6 silt/clay, 25% n dense, wet ft	ran cas stuck, c	ing after core barrel became casing broke, lost sample	
					ABBREV cc = cont brn = brc It = light dk = darl vf = very f = fine-g m = med c = coars vc = very ang = an subang = subrnd = rnd = rou br = bed ss = sanc conglom comptd = qtz = qui	/IATIONS tinuous core run own k / fine-grained grained dium-grained se-grained y coarse-grained ngular = subangular = subangular = subounded unded lrock formation dstone = conglomerate = compacted artz				
								•	CH2MHILL	







SHEET 1 of 1	.1					PROJECT NUM 326128.	BER:	2	BORIN	IG NUMBER: OW-2	
						SOIL BORIN	IG LOC	3			
PROJECT NAMI	E: eologic	Investio	ation. F	PG&F Topo		HOLE DEPTH (ft):			CTOR:	Montclair CA	
SURFACE ELEV		N: N	IORTH	ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 2	7 Z 5):	DATE STARTED:	ion a wens,	DATE COMPLETED:	
546.7 ft. DRILLING MET	MSL HOD:		2,1	03,142.09		7,613,374.28		11/22/2004 DRILLING EQUIPM	ENT:	12/05/2004	
Rotos	onic t Meca	Parcel	No 650	-151-06				6" casing w/ 4" cont. core			
	i mesa	, Parceri	<u>10. 050</u>	-151-00					M. Godwir	n	
	S	AMPLE				SOIL DESCRIP	TION			COMMENTS	
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMB MPOSITION, GRADING, GR SITY/CONSISTENCY, STRU	OL, COLOR, AIN SHAPE, CTURE, MOI	, MINERALOGY, STURE.	DRILLING DAILY SI REFUSAL	GOBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, .S, SAMPLING AND TESTING NOTES.	
-				GW	sand, ang gn	SAND (GW) - dark bive leiss, qtz and k-spar fragm	ients from c	2, oo% grave, 20%	cutting conduc water u	return from setting 20 ft tor casing for core sampling, used as drilling fluid	
 25		CC01	10	GM	SILTY GRA 50% silt sup cemented wi SANDY GRJ	VEL (GM) - dk grayish br ported, caliche layer, gneis ith CaCO3, loose to hard, d AVEL (GW) - lt brn 7.5YR	n 2.5YR4/2, ss and qtz, c Jry. R6/4, to dk g	, 50% ang gravel, cobbles to 2", greenish gray			
				GW	5.6YR4/1(roo subrnd clasts chalcedony,	ck), 50% ang c sand, 40% s to 3", caliche cemented c loose to cemented, dry.	gravel, 109 lasts, gneis	% fines, ang to ss, qtz and			
30				SG	GRAVELLY fines, cemen	SAND (SG) - brn 7.5YR5, ited subang qtz, lithic c sar	1/4, 70% sar	nd,25% gravel, 5%			
				GW	SANDY GRA c sand, gnei dry.	wcL (WW) - grayish brn iss, granodiorite, qtz and v	2.31K5/2, 8	ou'% gravel, 20% m ose to cemented,			
35	<u> </u>								•	CH2MHILL	

SHEET 2 of 11						PROJECT NUMBER:	AD	BORING NUMBER:		
								011-2		
PROJECT NAM	E:					HOLE DEPTH (ft):	DRILLING CONTRA	ACTOR:		
IM-3 Hydrog	geologio	: Investig	jation, l	PG&E Topo	NAD 27 7 5)	347.0	WDC Explorat	tion & Wells, Montclair, CA		
546.7 ft.	MSL		2,1	03,142.09	NAD 27 2 3).	7,613,374.28	11/22/2004	12/05/2004		
DRILLING ME Roto:	THOD: sonic					WATER LEVEL (ft):	DRILLING EQUIPM	IENT: 6" casing w/ 4" cont. core		
LOCATION: Ea	st Mesa	, Parcel	No. 650	-151-06		1	LOGGED BY:	M. Godwin		
	s	SAMPLE				SOIL DESCRIPTION		COMMENTS		
DEPTH BGS		~	≿	USCS						
(feet)	INTERV#	TYPE/ NUMBEF	RECOVEF (ft)	CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COL MPOSITION, GRADING, GRAIN SH SITY/CONSISTENCY, STRUCTURE,	.OR, APE, MINERALOGY, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.		
	\mathbb{N}	CC02	10	SW	GRAVELLY	SAND (SW) - It yellowish brn 10	YR6/4, 80% sand, 15%			
 - 40				GW	thick with sill SANDY GRA sand, 5% fin loose to firm	AVEL (GW) - brn 7.5YR5/4, 60% es, subang to subrnd clasts to 3", , dry, upward fining.	gravel, 35% f c ang matrix supported,			
	\ /			GP	GRAVEL (G	P) - gray, 95% gravel, 5% sand,	subang, gneiss,			
 _ 45		CC03	10	GC	<u>granodiorite,</u> CLAYEY GR gravel, 30% plasticity, sol	, <u>dt</u> z, <u>clasts</u> 1/2"-1", <u>loose</u> , <u>wet</u> . AVEL (GC) - grayish brn 2.5YR5 fines, subang clasts to 2", gneiss, ft, moist.	/2, 40% m sand, 30% granodiorite, qtz, low			
				SM	SILTY SANI 2.5YR7/3), 4 medium grai thick. SANDY GRA	D (SM) - It brn 7.5YR6/4, (sand i 15% sand, 45% fines, 10% gravel, ned qtz and lithic sand, loose, dry, AVEL (GW) - gravish brn 2.5YR5				
- <u>-</u> 50 					m c sand, 10 coarsening.	0% fines, subang clasts up to 2", s	oft, moist, upward	not cored, large cobble at 50 ft, advance casing without sampling		
 		CC04	0	GW				on 12/6/04 at 7:00: At 50' with casing		
 								cuttings show sand with silt from 50-60 ft, 40% c sand? 10-15% fines?		
				GW	GRAVEL (G 10% fines, s and granodic	W) - grayish brn 2.5YR5/2, 60% ubang clasts to 4" at base, silty m orite, loose, wet, upward fining.	gravel, 30% sand, atrix at base, gneiss	groundwater grab sample collected from 60-80 ft bgs		
		CC05	10	GW	SANDY GR/ gravel, 40% moist to dry.	AVEL (GW) - brn 7.5YR5/4, 50% c sand, 10% fines, gneiss, granoc	of subang to subrnd diorite and qtz, loose,			
				SW	SAND (SW) below, upwa wet.) - grayish brn 2.5YR5/2, 90%, 10 rd fining to v f sand, subrnd, qtz,	% gradational with lithic and biotite, soft,			
70				GC	sand, 10% fi granodiorite,	EAVEL (GC) - It olive brn 2.5YR5/ ines, >clay content at base, clasts , qtz, upward fining, low plasticity	 73, 70% gravel, 20% to 3" at base, gneiss, firm, moist. 			

SHEET 3 of 11 PROJECT NUMBER: 326128.01.07.AR							2	BORING NUMBER: OW-2		
						SOIL BORING	G LOO	G		••• -
PROJECT NAM		c Invecti	nation (ck	HOLE DEPTH (ft):		DRILLING CONTRAC		Montolair CA
SURFACE ELEN		N: [ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z	Z 5):	DATE STARTED:	JI & Wells,	DATE COMPLETED:
546.7 ft. DRILLING MET	. MSL THOD:		2,1	.03,142.09		7,613,374.28 WATER LEVEL (ft):		11/22/2004 DRILLING EQUIPME	NT:	12/05/2004
Rotos	sonic	Darcel	No. 650	1-151-06		'		6'	" casing w/	4" cont. core
LUCATION: La				151 00					M. Godwir	1
	5	SAMPLE				SOIL DESCRIPTION	ON			COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL MPOSITION, GRADING, GRAI SITY/CONSISTENCY, STRUCTU	., COLOR, IN SHAPE URE, MOI	, MINERALOGY, ISTURE.	DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
 - 75 		CC06	10	GW	SANDY GR/ sand, ang to volcanics loo - cement	AVEL (GW) - brn 7.5YR5/4, subang, qtz, lithic, biotite, gr se, dry. ed at 75-76.5 ft, upward coar	60% gra neiss, gra	avel, 40% vf to c anodiorite and		
80				CL	SANDY CLA subang grave massive.	Y WITH GRAVEL (CL) - gr el up to 1" (mm clasts), med	rayish br dium plas	n 10YR5/2, ang to sticity, soft, moist,	bail and collecte	d sample borehole OW-2D-80, ed OW-2D-80 @ 14:15 for
 _ 85		CC07	8	SM	SILTY SAN fines, 10% s sand, increas	D WITH GRAVEL (SM) - dl ubang to ang gravel up to 1.5 sing clay with depth, moist to	wet at a	82-82.5 ft		
				SW	SAND WITH sand, 30% s <1/2" , dry,	I GRAVEL AND SILT (SW) ubang to subrnd gravel (mm moderately cemented.) - grayis clasts) u	sh brn 10YR5/2, 60% p to 3/4" but most	at 8:22	pull core, driller notes tough
 - <u>90</u> 				GC	CLAYEY GR 20% f to c sa clasts), medi - clay ma	AVEL WITH SAND (GC) - and, ang to subrnd gravel up um dense, moist. trix mottled with 5% red 10Y	brn 7.5Y o to 2.5" t YR4/3 aft	'R4/2, 40% fines, out most <1" (mm er 90 ft	drilling rig dow at 9:11	at 8:55 n at 9:00, tightening parts and rig running again
95		CC08	12	GM	SILTY GRA 25% c subar <10% calich moist.	VEL WITH SAND (GM) - bing sand, gravel ang to subrnd e mottling, clasts > weathere	orn 7.5YR d up to 1' ed with d	3/3, 50% f sand, " (mm clasts), epth, loose, dry to	collect	bag sample from 93-94'
				CL	SANDY CLA to subang gr with depth.	Y WITH GRAVEL (CL) - bi avel up to 1.5" (mm clasts),	rn 7.5YR , dense,	4/2, 25% c sand, ang soft, moist, less clay	difficult	to break core with putty knife
 100				SM	SILTY SAN 15% fines, s medium den	D WITH GRAVEL AND CLA ubang gravel <3/4" (mm clas se.	Y (SM) sts), high	- grayish brn 10YR5/2, Ily weathered,		
					SANDY CLA ang to subar - brn 10Y firm moi	Y WITH GRAVEL (CL) - br g gravel up to 1/4" (mm cla (R4/3, 15% f to c sand, trace st to wet	rn 10YR5 asts), sof e caliche,	i/3, 20% f to c sand, it, wet, massive. trace red mottling,	pull roc casing	ls at 9:38, core up at 9:47, push at 10:00
105				CL						
									•	CH2MHILL

SHEET 4 of 1	1					PROJECT NUMBER: 326128.01.07.AR BORING NUMBER: OW-2			NG NUMBER: OW-2			
	SOIL BORING LOG											
PROJECT NAM	eologi	r Investic	nation [PG&F Topo	ck	HOLE DEPTH (ft):		ACTOR:	Montolair CA			
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:		DATE COMPLETED:			
546.7 ft. DRILLING MET	MSL HOD:		2,1	03,142.09		7,613,374.28 WATER LEVEL (ft):	DRILLING EQUIP	MENT:	12/05/2004			
Rotos	onic t Moca	Darcel	No 650	-151-06		'	LOGGED BY:	6" casing w	/ 4" cont. core			
	t meso	, Faitei	10. 050	-131-00		M. Godwin						
	9	SAMPLE				SOIL DESCRIPTION			COMMENTS			
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT COL	SOIL NAME, USCS SYMBOL, COL MPOSITION, GRADING, GRAIN SHA IITY/CONSISTENCY, STRUCTURE, I	DR, IPE, MINERALOGY, MOISTURE.	DRILLIN DAILY S REFUSA	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.			
 <u>110</u>		CC09	20	CL	CLAY (CL)	white 10YR8/1, <5% mm gravel, white 10YR8/1, <5% mm gravel, ts up to 3", loose to moderately co	clay, and white emented, dry.	- bag sa	mple up to 3" from 110-112 ft			
	V			SM	to f sand, 20 dry.	% subang gravel up to 3" (most<:	"), 15% c sand, loose,	_				
 115	$\left \right $			SC SM	c sand, suba SILTY SANI to f sand, 20 dry.	ng to subrnd gravel up to 1", dens D WITH GRAVEL (SM) - very pa % subang gravel up to 3" (most<:						
				SC	CLAYEY SA aravel up to	ND WITH GRAVEL (SC) - grayis 1.5" (mm clasts), sand mostly fin						
				SW	clay with dep GRAVELLY sand, 30% a depth, dense	SAND WITH CLAY (SW) - graving gravel up to 1", 20% fines, inc., moist, moderately cemented.	f collect	ft				
					SANDY CLA subang grave (increasing fi	Y WITH GRAVEL (CL) - brn 10 ^v el up to 1", less c sand with depth irmness with depth), moist.	(R5/3, 20% c sand, 5% n, plastic, firm	ground from 1	dwater grab sample collected 20-140 ft bgs			
 _ <u>125</u> _								drier a	t 123			
				CL	- 6" layer clasts), lo - moist, f	r of clayey gravel, ang to subang g pose, dry ĩrm	ravel up to 1/2"(mm					
		CC10	12		- same a	s above but more gravel, color dk	grayish brn 10YR4/2	_				
				ML		GRAVEL (ML) - It gray 5YR7/1, 2", loose, dry.	10% ang to subang	-	a racovany from 122 140 ft			
 <u>135</u> 				CL	SANDY CLA m sand, moc - no grav	Y (CL) - dk grayish brn 10YR4/2, lerately plastic, wet. el observed	30% c sand, 10% f to	no cor collect produc	e recovery from 132-140 ft bgs, sample OW2D-132', driller notes tive zone			
 140												
		-	I					•	CH2MHILL			

SHEET 5 of 3	11					PROJECT NUMBER: BORING NUMBER: 326128.01.07.AR OW-2			IG NUMBER: OW-2		
						SOIL BORING LO	DG				
PROJECT NAM	E:	c Investig	nation	PG&F Tono	vck	HOLE DEPTH (ft):		ACTOR:	Montolair CA		
SURFACE ELEN	ATIO	N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:		DATE COMPLETED:		
546.7 ft. DRILLING MET	MSL HOD:		2,1	.03,142.09		7,613,374.28 WATER LEVEL (ft):	DRILLING EQUIPM	IENT:	12/05/2004		
Rotos	sonic	Parcel	No. 650	151-06		'	LOGGED BY:	6" casing w	/ 4" cont. core		
		a, raicei	NO. 050	1				M. Godwi	n		
		SAMPLE				SOIL DESCRIPTION			COMMENTS		
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COL MPOSITION, GRADING, GRAIN SHA SITY/CONSISTENCY, STRUCTURE, N	DR, IPE, MINERALOGY, MOISTURE.	DRILLIN DAILY S REFUSA	G OBSERVATIONS AND OPERATIONS, TART AND END TIMES , DRILL RATE, .S, SAMPLING AND TESTING NOTES.		
				CL	to 3/4" (mm moist.	CLAY (CL) - brn 10YR5/3, 30% a clasts), >20% fines, 10% c subro	ing to subang gravel up d sand, medium dense,				
				SP	SAND (SP) to subang gr	- pale brn 10YR7/2, 10% c sand, ravel up to 3/4", dry, silty indurated	<10% fines, trace ang I.				
 145 				CL	GRAVELLY to subrnd sa 1.5" but mos	CLAY (CL) - dk grayish brn 10YR nd, >20% fines, ang to subang gra st <1/2", dense, moist.	4/2, 20% f to c subang avel (mm clasts) up to				
				GW	SANDY GRA subrnd sand, cemented.	AVEL (GW) - It brnish gray 10YR6 , 10-20% fines, ang to subang grav	5/2, 20% c subang to vel up to 3", dry, silty				
		CC11	19.5	SC	CLAYEY SA to f subang s dense, moist	ND WITH GRAVEL (SC) - brn I sand, subang gravel up to 1.5" but t.	UYR4/ <i>3,</i> 10-20% fines, m most <1/2", medium				
 <u>155</u>				CL	SANDY CLA to subang gr cemented, ir GRAVELLY	AY (CL) - It brnish gray 10YR6/2, ravel up to 1/4", dry to damp, silty increased cementation with depth. SAND WITH CLAY (SW) - gravi	40% f sand, <10% ang to moderately sh brn 10YR5/2. 10-20%	ind, <10% ang rately grain size sample from 154-155 ft 0YR5/2, 10-20%			
				SW	fines, 10% c medium to d	subang sand, subang gravel up to lense, dry to damp.	2.5" (mm clasts),				
 160				CL	SANDY CLA <10% c sand cemented.	Y (CL) - It gray to brn 10YR7/1, 5 d, <10% subang gravel up to 3/4",	50% fines, 30% f sand, , firm, moderately				
					CLAYEY SA ang to subar to subang sa	ND (SC) - dk grayish brn 10 <u>VR4/</u> ng gravel up to 1/4" (gets up to 2 and, dense, damp, some dk green r	2, ~20% fines, ~15% " with depth), c ang nottling.				
 					- more f	gravel					
 <u>170</u>		CC12	20	SC	- It gray sand, 5% moderate	10YR7/2 to very pale brn 10YR7/3, 6 ang to subang gravel up to 1", d ely cemented	f to c ang to subang ry to moist, silty to				
					- very pa 1.5" (mm - dk gray 1", damp - very de	ale brn 10YR8/2, 10-20% fines, 10% n clasts), dry, silty cemented v 10YR4/1, 15% fines, <10% ang t o, moderately cemented ense	% ang gravel up to o subang gravel up to				
1/5			<u> </u>		<u> </u>						
								- 3	CH2MHILL		

SHEET 6 of 3	11					PROJECT NUMB	ER: 1.07.46	2	BORIN	IG NUMBER: OW-2
						SOIL BORING	G LOO	3		
PROJECT NAM	E:	- Investic	nation	PG&F Topo	nck	HOLE DEPTH (ft):			CTOR:	Montolair CA
SURFACE ELEN		N: N	IORTH	ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27	Z 5):	DATE STARTED:		DATE COMPLETED:
546.7 ft. DRILLING MET	MSL FHOD:		2,1	03,142.09		7,613,374.28 WATER LEVEL (ft):		DRILLING EQUIPM	ENT:	12/05/2004
Rotos	sonic	Parcel	No 650)-151-06				LOGGED BY:	6" casing w/	4" cont. core
LUCATION: La.		, i arcer	. 050	151 00					M. Godwir	1
	S	SAMPLE			ļ	SOIL DESCRIPTION				COMMENTS
DEPTH BGS (feet)	DEPTH BGS (feet) 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2				PERCENT CO DENS	SOIL NAME, USCS SYMBO MPOSITION, GRADING, GRAD SITY/CONSISTENCY, STRUCT	L, COLOR, IN SHAPE URE, MOI	, MINERALOGY, ISTURE.	DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
				SW	GRAVELLY <10% fines, grains, very	SAND (SW) - dk grayish b more fines with depth, ang dense, damp, moderately ce	rn 10YR4, to suban <u>c</u> mented, [,]	/2, 50% c sand, g gravel and sand weathered clasts.	difficult	: drilling
180 				SW	SAND WITH fines, 10% a subrnd sand,	H SILT AND GRAVEL (SW) ing to subang gravel up to 1. , medium dense, moist to we) - brn 7. .5" (mm et.	5YR5/3, 10-15% clasts), c subang to		
				SC	CLAYEY SA to m sand, 2 loose, moist	ND (SC) - brn 7.5YR5/3 wi 0% c sand, 20% fines, suba to dry.	th a layer ng to ang	of 5YR5/2, 30% f mm gravel to 3",	more c	emented at 183 ft
 				CL	SANDY CLA >20% fines, damp.	Y (CL) - brn 10YR4/4, 25% <10% ang to subang grave	6 c ang to l up to 2"	o subang sand, but most <1", firm,	grain s	ize sample from 188-190 ft
 190		CC13	19		SAND (SP) up to 1/2", d	- It gray 10YR7/2, <10% c Iry, silty cemented.	sand, trad	ce subang gravel	arain c	ize cample from 100-102 ft
 195				SP	- brn 10Y subang s	/R4/3, 15% gravel up to 1" (and, clast supported, loose t	mafic and to mediun	d MM clasts), c n dense, wet	grains	
 				SC	CLAYEY SA sand, 15% f clasts, dense	ND WITH GRAVEL (SC) - gravel to c sand, ang to sub , damp, moderately cemente	brn 7.5Y ang grave ed, mode	R5/3, 50% c to f el up to 3", mm rately weathered.	no reco	overy from 199-200
200				SW	SAND (SW) <10% fines,) - grayish brn 10YR5/2, 509 5% ang gravel up to 3/4",	% c ang t loose, w	o subang sand, et.	ground from 20	water grab sample collected 00-220 ft bgs
 205				SW	GRAVELLY gravel up to cemented, w	SAND (SW) - grayish brn 1 1/2", <10% fines, mafic M ret.	10YR5/2, M clasts,	40% ang to subang loose to moderately		
					- more cl	lay, 10-20% fines				
				CW	SANDY GRA gravel up to supported, n	AVEL (GW) - dk gray 10YR 1.5" (mm clasts), 35% c sa nedium dense, loose, wet.	4/1, 50% and, <10°	ang to subang % fines, clasts		
 210				GW	- gravel ι	up to 2" at 209 ft				
									•	CH2MHILL

SHEET 7 of 11						PROJECT NUMBER: BORING NUMBER: 326128.01.07.AR OW-2			NG NUMBER:
)G		011-2
PROJECT NAM	E:	.				HOLE DEPTH (ft):	DRILLING CONTRA	ACTOR:	
IM-3 Hydrog	jeologi ATIO	nvestig	iortion, I	PG&E Topo ING (CCS	NAD 27 Z 5):	347.0 EASTING (CCS NAD 27 Z 5):	WDC Explora DATE STARTED:	tion & Wells,	, Montclair, CA DATE COMPLETED:
546.7 ft.	MSL		2,1	03,142.09	- /	7,613,374.28	11/22/2004		12/05/2004
Roto	sonic					WATER LEVEL (II): 	DRILLING EQUIPP	6" casing w/	/ 4" cont. core
LOCATION: Ea	st Mesa	a, Parcel	No. 650	-151-06			LOGGED BY:	M. Godwi	n
						SOIL DESCRIPTION			COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHAI SITY/CONSISTENCY, STRUCTURE, M	PR, PE, MINERALOGY, OISTURE.	DRILLING DAILY S REFUSAI	G OBSERVATIONS AND OPERATIONS, TART AND END TIMES , DRILL RATE, .S, SAMPLING AND TESTING NOTES.
 - 215 			13	50	CLAYEY SA ang gravel u - 2" clay (weather - mottled 10YR4/1, ft(weather	ND WITH GRAVEL (SC) - brn 10 p to 1" (mm clasts), clay matrix, fi around gravel layer, ang to subang red) up to 1.5" I, 40% It yellowish brn 10YR6/4 and , intermittent gravel zones from 213 ered), ang, up to 1" -clay supported	YR5/3, 10-20% fines, rm, damp to moist. mm clasts I 15% dk gray 3-214.5 I 1/2" to 1" thick	-	
 220 					- 2 ft rec	overy - not sure where from betwee	en 220 to 230 ft		
 - 225 					GRAVELLY subang grave fines, felsic a dense, moist	SAND WITH SILT (SW/SM) - bi el, 30% c ang to subrnd sand, 20% and mafic mm clasts up to 1", wea : to wet.	rn 10YR5/3, 40% ang to f to m sand,10-20% thered clasts, medium	-	
 		CC15	2					hard d shakin	rilling, no recovery due to hard g to remove core, lost most
 235 				500/514					
240					SAND WITH subang to su	H GRAVEL AND CLAY (SW/SC)	- brn 10YR5/3, 40% c s. 5% c gravel up to	-	
 245				SW/SC	1.5" (most weathered, l - clayey s fines, les - same a	<1"), ang to subang, mm clasts (fe oose to medium dense, wet. sand with gravel (SC), same as above s sand and gravel s 240', but 30% c sand to f gravel,	lsic and mafic), ve except >20% more m sand		
								•	CH2MHILL

SHEET 8 of 11						PROJECT NUMBER: BORING NUMBER: 326128.01.07.AR OW-2		
						SOIL BORING LO)G	
PROJECT NAM	E:	- Investic	nation	PG&F Tone	nck	HOLE DEPTH (ft):		CTOR:
SURFACE ELEV 546.7 ft.	/ATIOI MSL	N: N	IORTH 2,1	ING (CCS .03,142.09	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5): 7,613,374.28	DATE STARTED: 11/22/2004	DATE COMPLETED: 12/05/2004
DRILLING MET Rotos	FHOD: sonic					WATER LEVEL (ft):	DRILLING EQUIPM	ENT: 6" casing w/ 4" cont. core
LOCATION: Eas	st Mesa	, Parcel	No. 650)-151-06			LOGGED BY:	M. Godwin
	s	SAMPLE				SOIL DESCRIPTION		COMMENTS
DEPTH BGS (feet) HE CODE (feet) HE CODE HE HE CODE HE HE H				USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHA SITY/CONSISTENCY, STRUCTURE, N	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
					SAND WITI subang to su 1.5" (most weathered, l	H GRAVEL AND CLAY (SW/SC) brnd sand to f gravel, 10-20% fine <1"), ang to subang, mm clasts (fe oose to medium dense, wet.	- brn 10YR5/3, 40% c s, 5% c gravel up to Ilsic and mafic),	
 250		CC16	20	SC	CLAYEY SA 15% c subar gravel mm cl dense, moist	ND WITH GRAVEL (SC) - brn 10 Ing to subrnd sand (rest f to m), 10 last up to 3" (mostly mafic), matr	YR5/3, >20% fines, % ang to subang x supported, medium	difficult drilling - cobble
 255					- pale ye subang g cemente	llow 2.5YR7/3, 10% c ang to subrr ravel (mm, mostly mafic) up to 1/2 d,	d sand, <10% ang to " , dry to damp, silty	lots of rig chatter
				SW/SM	SAND WITH 4/4) mottled sand, 25% c	H SILT AND GRAVEL (SW/SM) with gray 10YR5/1 with trace of re sand, ~15% f gravel, ~10% fines MM), medium dense, sitk cement		
	V 1			SW/SC	GRAVELLY	SAND WITH CLAY (SW/SC) - t	rn 10YR5/3, 15-25%	
260				sc	cLAYEY SA to subrnd sa (mafic), dense	moist. ND WITH GRAVEL (SC) - brn 10 nd, >20% fines, 15% c sand, ang se, moist.	YR5/3, 35% f to m ang gravel up to 1"	
 265				SW	GRAVELLY c ang to sub clast - felsic to wet. - 30-35%	SAND (SW) - yellowish brn 10YR rnd sand, 30% f ang to subang gra and mafic), <10% fines, loose to r o c sand	5/4, ~65% sand, 40% vel up to 1" (mm nedium dense, moist	
 				GW/GC	SANDY GR/ gravel, 30% subang grave	AVEL WITH CLAY (GW/GC) - b c ang to subrnd sand, 10-20% fine el up to 2" (mm clasts - mostly m	n 10YR5/3, ~40% f s, ~10% c ang to afic), medium dense,	
	IVI			SW/SC	SAND WITH	H CLAY AND GRAVEL (SW/SC) % f gravel up to 1", 10% c sand (m	- dk grayish brn, 10-20% ainly f to m sand).	,
270		CC17	20	SC CL	CLAYEY SA 10YR5/1 mol	se, moist. ND WITH GRAVEL (SC) - pale b ttled 50/50, 35% f to m sand, >20 JEV(for a to m band group EV()	rn 10YR6/3 and gray % fines, 20% c ang to	
						medium dense, damp. Y WITH GRAVEL (CL) - yellowis to c sand (10-15% c ang to submu g gravel up to 1.5" (mm clasts), ND WITH GRAVEL (SC) - yellow to c ang to submd sand, 15% f to 2" (mm clast), medium dense, m	h brn 10YR5/4, >50% I sand), 15% c to f medium stiff, moist. ish brn 10YR5/4, >20% c ang to subang pist.	
- – - – 280				SW/SC	SAND WITH 20% f ang to 10% c subar	H CLAY, SILT AND GRAVEL (SW o subang gravel up to 1" (mm clas og to subrnd sand, medium dense,	(/SC) - brn 10YR4/3, st), 10-20% fines, damp to moist.	

SHEET 9 of 11						PROJECT NUMBER:	D	BORING NUMBER: OW-2		
						SOIL BORING LO	G			
PROJECT NAM	IE:				-1.	HOLE DEPTH (ft):	DRILLING CONTRAC	CTOR:		
	geologi VATIO	C Investig	ortion, I	PG&E TOPO	NAD 27 Z 5):	347.0 EASTING (CCS NAD 27 Z 5):	WDC Exploration	on & Wells,	Montclair, CA DATE COMPLETED:	
546.7 ft.	. MSL		2,1	03,142.09	,	7,613,374.28	11/22/2004		12/05/2004	
DRILLING ME Roto	THOD: sonic					WATER LEVEL (ft):	DRILLING EQUIPME	:NI: 5" casing w/	4" cont. core	
LOCATION: Ea	st Mesa	a, Parcel	No. 650	-151-06		•	LOGGED BY:	M. Godwi	n	
	9	SAMPLE				SOIL DESCRIPTION			COMMENTS	
DEPTH BGS (feet)			PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLOI MPOSITION, GRADING, GRAIN SHAP SITY/CONSISTENCY, STRUCTURE, MC	R, E, MINERALOGY, DISTURE.	DRILLING DAILY S REFUSAL	G OBSERVATIONS AND OPERATIONS, TART AND END TIMES , DRILL RATE, .S, SAMPLING AND TESTING NOTES.			
	-			SW/SM	ang to subrn gravel up to moist to wet - brn 10Y	H SILT AND GRAVEL (SW/SM) - d sand (35% c sand and rest f to m) 1" (mm clast), 10-20% fines, loose , weathered. /R5/3, gravel and c sand increasing v	brn 10YR5/3, >50%), 15% ang to subang e to medium dense, with depth	boring ((280-: OW-2N 260' w	continues in hole 20 ft south 340'), move 20' south of 1(was OW-2D until but refusal at ith casing cored to 280')	
285	-			SC	CLAYEY SA ~20% fines, gravel up to - 10YR4/	ND WITH GRAVEL (SC) - dk gray 10% c sand, 10% m to f sand, 15% 3" (mm clast-felsic and mafic), mer 2 to 4/3, silty cemented, less gravel	ish brn 10YR4/2, o f to c ang to subang dium dense, moist. with depth			
 	-	CC18	20	SW	GRAVELLY subrnd sand, to 20% fines dense, moist	SAND WITH SILT (SW) - brn 7.5 , ~40% ang to subang gravel up to 3 ; with depth, ~10% fines, ~10% m t : to wet.	YR5/3, 40% c ang to 1.5" (mm clast), up to f sand, medium			
295				SC	CLAYEY SA subang grave ~20% fines, cemented, m	ND WITH GRAVEL (SC) - brn 10Y el up to 3/4" (mm clasts) increased 20% c ang to subrnd sand (rest f to redium dense, moist to wet.	(R4/3, 10-30% ang to gravel with depth, o m sand), silty			
	-			SW	SAND WITH subrnd sand, to 3/4" (mo	H GRAVEL (SW) - reddish brn 5YR , 30% m sand (rest f sand), 25% an ostly mafic mm clast), ~10% fines, lo	4/4, 30-40% c ang to g to subrnd gravel up pose to medium			
				SW/SC	SAND WITH ang to subrn 20% m sand	H CLAY AND GRAVEL (SW/SC) - d sand, 20% ang to subang gravel u , 10% f sand, 10-20% fines, mediur	brn 10YR5/3, 30% c up to 2" (mm clast), n dense, wet.			
 <u>305</u>	-			SW	SANDY GR/ subang grav sand (25% c fines, trace c	AVEL WITH SILT (SW) - brn 10YF el up to 3" mostly mafic (mm clast), : sand), ~10% fines, intermittent zor :obble, grain supported, loose, wet.	(5/3, >50% ang to 40% ang to subrnd hes with up to 20%			
	-			SW/SC	GRAVELLY 30% ang to f sand, 10-20	SAND WITH CLAY (SW/SC) - bri subang gravel up to 1.5" (mm mos 0% fines (increased fines with depth	n 10YR4/3, 40% c sand, tly mafic), 20% m to), loose, wet.			
310		CC19	18	SW/SM	SAND WITH 10YR5/3 to 4	H SILT AND GRAVEL (SW/SM) - 4/4, 10-20% fines, 15% ang to suba	brn to dk yellowish brn ng gravel up to 3/4"			
	-			sw/sc	Chill clast), T GRAVELLY subang grave to c sand, m CLAYEY SA subang grave (~10% c sar	SAND WITH CLAY (SW/SC) - bri el up to 2" (mm clast), 10-20% fine edium dense, moist to wet. ND WITH GRAVEL (SC) - brn 7.5 el up to 1.5" (mm weathered clasts nd), matrix supported, medium dense	wet. n 7.5YR4/3, 30% ang to es (increased clay), f // // // // // // // // // /			
315								-		
								-	CH2MHILL	

SHEET 10 of 11						PROJECT NUMBER: 326128.01.07.AR BORING NUMBER: OW-2			IG NUMBER: OW-2	
						SOIL BORING LO)G			_
PROJECT NAM	IE:	c Invocti	action		ock.	HOLE DEPTH (ft):	DRILLING CONTRA	CTOR:	Marshalata CA	
	VATIO	N: N		ING (CCS	NAD 27 Z 5):	347.0 EASTING (CCS NAD 27 Z 5):	DATE STARTED:	ion & weils,	DATE COMPLETED:	
546.7 ft.	. MSL		2,1	03,142.09		7,613,374.28	11/22/2004	FNT·	12/05/2004	
Roto	sonic							6" casing w	4" cont. core	
LOCATION: East	st Mesa	a, Parcel	No. 650	1-151-06			LOGGED BY:	M. Godwi	n	
	9	SAMPLE				SOIL DESCRIPTION			COMMENTS	
DEPTH BGS (feet)				USCS CODE	PERCENT COI DENS	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHAB SITY/CONSISTENCY, STRUCTURE, M	R, PE, MINERALOGY, OISTURE.	DRILLING DAILY S REFUSAI	G OBSERVATIONS AND OPERATION FART AND END TIMES , DRILL RAT LS, SAMPLING AND TESTING NOTE	S, E, S.
	-			SW/SC	GRAVELLY reddish brn 5 gravel up to 30% f ang to medium dens - less gra	SAND WITH CLAY (SW/SC) - br 5YR4/4 (from weathered clast), 40% 1" (mm clast), 25% c ang to subrr o subang gravel up to 3/4", 10-20% se, moist to wet. avel and more c sand with depth	n 7.5YR5/3 with 5-10% 6 ang to subang nd sand (rest f to m), % fines, loose to			
320				SC	CLAYEY SAI	ND WITH GRAVEL (SC) - brn 7.5 fines 10% c and to subrod sand 1	5YR4/3, 40% f to m			
 - 325	-			GW	gravel up to medium dens GRAVEL WI 50-60% ang c sand), ~10	 Initial for a second state of a second state, 11/2" (mm clast), matrix supported sec, moist. ITH SAND AND SILT (GW) - gravel to subang gravel up to 3/4", 30-51 1% fines, clast supported, loose, weiling state of the second state	yish brn 10YR5/2, 0% sand (up to 40% t.			
 	-			GC	- up to 3' felsic mm amount c - cobble l CLAYEY SIL to subang gr	" past 325', gravel size increases with n clast, coarsens with depth (sand a of fines increases layer (subang, mafic mm, >4") at 3 LTY GRAVEL (GC) - It brnish gray avel up to 2" (most <1"), 25% f to	th depth, mafic and nd gravel but 327.4 ft 10YR6/2, ~50% ang o c sand, >20% fines,			
330	-	CC20	18		loose (soft),	wet.	hrn to dk vollowich hrn			
	-			CL	10YR5/3 to 4 sand (10% c 2" most 1" or	4/4 with 10% greenish gray 5/10GY ang to subang sand), 15% ang to s r less (felsic, mafic and mm), increa	, >50% fines, 30% subang gravel up to sed sand with depth,			
 335	-			SW/SC	SAND WITH sand, 15% f mafic), 10-20	H CLAY AND GRAVEL (SW/SC) ang to subang gravel up to 3/4" (w 0% fines, medium dense, moist.	- brn 10YR5/3, 40% c veathered mm mostly			
 	-			SC	CLAYEY SAI with up to 20 5/10GY,>209 <1/2"), 10-1 medium to ti increases wit depth.	ND WITH GRAVEL (SC) - mottled 0% reddish brn 5YR4/4 and up to 20 % fines, 25% ang to subang gravel 5% f to c sand, weathered clast, ma ightly cemented, dense, dry to damp th depth up to 2", red and green col	d brn 10YR5/3 to 4/3 0% greenish gray up to 1" (most atrix supported, p, gravel size lors increase with			
340					SILTY SAN	D WITH GRAVEL (SM) - brn 10Yf	R4/3, 40% f to m sand,			
				SM	SANDY CLA	se, moist. Y (CL) - mottled greenish gray 6/2 SVR4/4 >50% fines 20% f to m sa	10GY and 15%			
 <u>345</u>		CC21	7	CL	ang to suban	ng gravel up to 1" (mm, mafic), soft	to med stiff, moist.			
						Boring Terminated at 347	ft			
					ABBREV cc = cont	TIATIONS tinuous core run				
		CC21	7	CL	SILTY SANU 25% ang to s medium dens SANDY CLA reddish brn 5 ang to suban	D WITH GRAVEL (SM) - brn 10YI subang gravel up to 1.5", 10-20% f se, moist. YY (CL) - mottled greenish gray 6/: SYR4/4, >50% fines, 20% f to m sa ng gravel up to 1" (mm, mafic), soft Boring Terminated at 347 YIATIONS tinuous core run	R4/3, 40% f to m sand, ines, 15% c sand, 10GY and 15% nd, 15% c sand, 15% to med stiff, moist. ft		CH2MHILL	

SHEET 11 of	11					PROJECT NUMBER: 326128.01.07.AR BORING NUMBER: OW-2				IG NUMBER: OW-2
						SOIL BOR		G		••• =
PROJECT NAM	E:	Investic	ation I	PG&F Topc	ock	HOLE DEPTH (ft):			ACTOR:	Montolair CA
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAL) 27 Z 5):	DATE STARTED:		DATE COMPLETED:
546.7 π. DRILLING MET	HOD:		2,1	03,142.09		7,613,374 WATER LEVEL (ft):	.28	DRILLING EQUIP	MENT:	12/05/2004
Rotos	onic st Mesa	. Parcel	No. 650)-151-06				LOGGED BY:	6" casing w/	4" cont. core
									M. Godwir	1
		SAMPLE	~	USCS		SOIL DESCR	IPTION			COMMENTS
					PERCENT CON	SOIL NAME, USCS SY MPOSITION, GRADING, SITY/CONSISTENCY, ST	MBOL, COLOR, GRAIN SHAPE RUCTURE, MO	, , MINERALOGY, ISTURE.	DRILLING DAILY ST REFUSAL	GOBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
					brn = bro It = light dk = darl vf = very f = fine- <u>c</u> m = med c = coars vc = very ang = an subang = subrnd = rnd = rou br = bed ss = sanc conglom comptd = qtz = qua	<pre>>wm k ' fine-grained yrained lium-grained ium-grained e-grained / coarse-grained gular = subangular = subrounded unded rock formation dstone = conglomerate = compacted artz</pre>				
	1				<u> </u>				•	CH2MHILL







SHEET 1 of 9						PROJECT NUMBER: BORING N 326128.01.07.AR			G NUMBER:
						SOIL BORING LC)G		011 5
PROJECT NAM	E:	Invectio	nation I	DC&E Topo	ck	HOLE DEPTH (ft):	DRILLING CONTRA		Mantalain CA
SURFACE ELEV	ATIO	N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	tion & wells,	DATE COMPLETED:
555.9 ft.	MSL		2,1	.03,286.35		7,612,161.22	09/26/2004	IFNT:	10/07/2004
Rotos	sonic						S	tandard Truc	k-Mounted Rig
LOCATION: We	st Mes	a, Parcel	No. 65	0-151-06			LOGGED BY:	T. McDona	ld
	S	AMPLE				SOIL DESCRIPTION			COMMENTS
DEPTH BGS (feet)	DEPTH BGS (feet) H H H H H H H H H H H H H H H H H H H				PERCENT COI DENS	SOIL NAME, USCS SYMBOL, COLC MPOSITION, GRADING, GRAIN SHA SITY/CONSISTENCY, STRUCTURE, M	R, PE, MINERALOGY, OISTURE.	DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
 5				SP	POORLY GF 10YR5/4, 50' gravel, 5% c	RADED SAND WITH GRAVEL (SF % m sand, 15% c sand,10% f sand gravel, ang, loose, dry.	 P) - yellowish brn 10% silt, 10% f 	each sl 2	eeve holding slightly more than
 - 10		Box 1 2 3	10	sw	GRAVELLY sand,20% f a loose, dry.	SAND (SW) - grayish brn 2.5YR5, ang gravel, 10% m to c subrnd sand very from 10-11.5 ft	2, 60% f subrnd d, 10% c ang gravel,	lost 2' d	off the bottom of core barrel
 - 15 -		Box 3 4	5		WELL GRAE 30% m to c s	DED SAND (SW) - It olive brn 2.5 sand, 5% fines, 5% gravel up to 1"	YR5/3, 60% f sand, , subang to ang.	• while c	ooling
 - 20		Box 5 6	5	SW	- increase	e in gravel % to ~10% from 18-20	ft		
		Box 6 7	3		- increase - metamo	e gravel % to 20% from 23-25 ft orphic gravel			
		Box 7 8	5						
30	$\langle \rangle$			ML	SANDY SIL sand, 20% m	T (ML) - yellowish brn 10YR5/4, 5 n subang sand, 10% subrnd gravel,	0% silt, 20% f subang qtz and mm.		
Box 9 6 40% f subradang gravel, 10 Box 9 6 35					WELL GRAE 40% f subrac ang gravel, 1	DED SAND WITH GRAVEL (SW) d to subang sand, 30% c subrnd to .0% fines (silt).	- grayish brn 2.5YR5/2, subang sand, 20%		
	<u> </u>			1				•	CH2MHILL

SHEET 2 of	9					PROJECT NUMBER: 326128.01.07.AR BORING NUMBER: OW-3				
						SOIL BORING	G LOO	3		••••
PROJECT NAM	IE:	c Invoctiv	nation I			HOLE DEPTH (ft):		DRILLING CONTRAC	TOR:	Marshalain CA
SURFACE ELE	VATIO	N: I	IORTH	ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 2	Z 5):	DATE STARTED:	on & weils,	DATE COMPLETED:
555.9 ft	. MSL		2,1	03,286.35		7,612,161.22		09/26/2004 DRILLING EQUIPME	NT:	10/07/2004
Roto	sonic							Sta	andard Truc	k-Mounted Rig
LOCATION: W	est Mes	a, Parcel	No. 65	0-151-06				LOGGED BY:	T. McDonal	d
	9	SAMPLE				SOIL DESCRIPTIO	ON			COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL MPOSITION, GRADING, GRAI JITY/CONSISTENCY, STRUCT	., COLOR, N SHAPE URE, MOI	, MINERALOGY, STURE.	DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
 - 40		Box 10 11	6	SW	WELL GRAI 40% f subm ang gravel, 1 WELL GRAI 20% f sand,	DED SAND WITH GRAVEL d to subang sand, 30% c sub 10% fines (silt). DED SAND (SW) - yellowist 10% c sand, 10% gravel, tra	(SW) - ornd to su h brn 10\ ace silt (1	grayish brn 2.5YR5/2, Ibang sand, 20% (R5/4, 60% m sand, %), subang.		
 45		Box 12	4	SW	WELL GRAI 40% f ang to to subang sa	DED SAND WITH GRAVEL o subang sand, 20% m ang to nd, 20% ang to subang grav	(SW) - o subang rel, 5% si	grayish brn 2.5YR5/2, sand, 15% c ang It.		
		Box 13	4		- qtz rich	sand, metamorphic gravel, v	weathered	d granite		
 55		Box 14	4	SW						
 60		Box 15 16 17	0		CLAYEY SA	ND (SC) - olive brn, 60% f : ravel.	sand, 30'	% fines (silt and	lost forr vibrate	nation too tight and had to out
	-			SC						
	-	Box 18 4 Box 18 4 Box 18 4 Box 18 4				DED SAND WITH GRAVEL o subang sand, 20% m ang to nd, 20% ang to subang grav	(SW) - o subang vel, 5% si	grayish brn 2.5YR5/2, sand, 15% c ang lt.	light bro	own dry loose
POORLY GR SP 5% c sand, tr - 70						RADED SAND (SP) - It olive race gravel to 2".	e brn, 85	% f sand, 10% silt,		
									•	CH2MHILL

SHEET 3 of	9					PROJECT NUMBER: 326128.01.07.4R BORING NUMBER: OW-3			IG NUMBER:
						SOIL BORING LO	G		011 5
PROJECT NAM	IE:	c Investic	nation I		ock	HOLE DEPTH (ft):			Montoloir CA
SURFACE ELE	VATIO	N: N	IORTH	ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	ion a wens,	DATE COMPLETED:
555.9 ft.	. MSL Thod:		2,1	03,286.35		7,612,161.22 WATER LEVEL (ft):	09/26/2004 DRILLING EQUIPM	ENT:	10/07/2004
Roto	sonic	a Parcel	No. 65	0-151-06		'	St	andard True	ck-Mounted Rig
LOCATION: W			110. 05	0 151 00				T. McDona	ld
	9	SAMPLE				SOIL DESCRIPTION			COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	CODE	PERCENT COL DENS	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHAB SITY/CONSISTENCY, STRUCTURE, M	R, FE, MINERALOGY, DISTURE.	DRILLING DAILY ST REFUSAL	G OBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, .S, SAMPLING AND TESTING NOTES.
	-			SW	well GRAD sand, 30% f silt. ⁻ qtz, epi	DED SAND (SW) - It olive brn 2.5' subang sand, 20% c subang sand, dote sand, metamorphic gravel			
		Box 19 20	4	SC	CLAYEY SA clay), 10% g	ND (SC) - olive brn, 60% f sand, 3 gravel.	0% fines (silt and		
	$\left(\right)$				WELL GRAD	DED SAND (SW) - grayish brn 2.5	YR5/2, 30% m subang		
		Box 20 21	5		silt caliche	subang sand, 25% C subang sand,	10% ang gravei, 5%		
					- qtz, hor	rnblende, metamorphic gravel			
		Box 22 23	5						
 _ 85								core ba	arrel wafers
		Box 23 24	6		- caliche	at 86 ft			
 					- yellowis sand, 20 ⁰	sh brn 10YR5/4, 40% f subang sand % m subang sand	, 25% c subang	moistu running	re increasing probably from g core barrel down
 - <u>-</u> 		Box 25 26	6	SW	- gneiss <u>(</u>	gravel			
 100					- It olive 15% c su	brn 2.5YR5/3, 40% f subang sand, i bang sand, <1% fines	30% m subang sand,		
		Box 26 27 28	11		- qtz, hor	rnblende			
102	<u> </u>	I	I		I			•	CH2MHILL

SHEET 4 of 9	Ð					PROJECT NUMBER: 326128.01.07.AR BORING NUMBER: OW-3			G NUMBER: OW-3			
SOIL BORING LOG												
PROJECT NAM	E:	c Invectio	ation [ck	HOLE DEPTH (ft):		DRILLING CONTRAC		Montolair CA		
SURFACE ELEV	ATIO	N: N	ORTH	ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD	27 Z 5):	DATE STARTED:	JII & Wells,	DATE COMPLETED:		
555.9 ft. DRILLING MET	MSL HOD:		2,1	03,286.35		7,612,161.2 WATER LEVEL (ft):	22	09/26/2004 DRILLING EQUIPME	NT:	10/07/2004		
Rotos	sonic	a Darcol	No 65	0 151 06		*		Sta	andard Truc	k-Mounted Rig		
LOCATION: WE	st mes	a, Parcer	10. 00	0-151-00					T. McDonal	d		
	5	SAMPLE				SOIL DESCRI	PTION			COMMENTS		
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLOR, IPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, ITY/CONSISTENCY, STRUCTURE, MOISTURE.			DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.		
 <u>110</u>					WELL GRAD sand, 30% f silt. - increase lots of se	JED SAND (SW) - grame subang sand, 25% c sul e in f sand % to 60%, 5° condary caliche cementation condary caliche cementation	yish brn 2.5Yf bang sand, 10 % m sand, 10 ation	R5/2, 30% m subang 1% ang gravel, 5% 1% c sand, 5% silt,				
 115		Box 29 30 31	8		CLAYEY SAI 10% gravel,	ND (SC) - olive brn 2.5 5% m sand, 5% c sand,	YR4/3, 65% i , silty plastic.	f sand, 15% clay,				
 		Box 31 32 33	7	SC								
 <u>125</u> 130		Box 33 34 35	8	SP	POORLY GR subrnd sand, subrnd grave	ADED SAND (SP) - It 10% c ang to subrnd sa I, igneous and metamor	olive brn 2.5 and, 5% clay, phic gravel.	YR5/3, 85% m ang to trace of c ang to				
 <u>135</u> 		Box 35 36 37	16	CL	CLAY (CL) easily), soft-f WELL GRAE 40% c sand,	- olive brn 2.5YR4/3, 5% irm. DED SAND WITH GRA 25% m sand, 15% c gr	ium plasticity (rolls It olive brn 2.5YR5/3, y, 10% f sand.					
	/+\								•	CH2MHILL		

SHEET 5 of	9					PROJECT NUMBER: 326128.01.07	7.AR	BORI	NG NUMBER: OW-3	
						SOIL BORING L	.OG			
PROJECT NAM	E:	c Invectio	action		ock	HOLE DEPTH (ft):	DRILLING CON	TRACTOR:	Mantalain CA	
SURFACE ELEN	VATIO	N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5)	: DATE STARTED		DATE COMPLETED:	
555.9 ft. DRILLING ME	. MSL THOD:		2,1	03,286.35		7,612,161.22	09/26/2004 DRILLING EQU	IPMENT:	10/07/2004	
Rotos	sonic	Deveel		0.151.00				Standard Tru	ck-Mounted Rig	
LOCATION: WE	est mes	a, Parcei	NO. 65	0-151-06			LOGGED B1:	T. McDonald		
	9	SAMPLE				SOIL DESCRIPTION			COMMENTS	
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, CO MPOSITION, GRADING, GRAIN SH SITY/CONSISTENCY, STRUCTURE,	LOR, IAPE, MINERALOGY, MOISTURE.	DRILLIN DAILY S REFUSA	G OBSERVATIONS AND OPERATIONS, TART AND END TIMES , DRILL RATE, LS, SAMPLING AND TESTING NOTES.	
	-			CL	SANDY CLA trace gravel,	IV (CL) - brn 10YR5/3, 15% m t low plasticity.	o c rnd to subrnd sand	,		
 - 145	-				WELL GRAI sand, 20% n sand, subang	DED SAND WITH GRAVEL (SW n sand, 20% f gravel, 20% c grav g to subrnd.	o C			
					- metamo	orphics volcanics				
		Box 38 39 40 41	8 10	SW	- increase	e in fines to ~15%, 15% c gravel				
					- debris f - brn 10Y	'low deposits (R5/3, 60% c subrnd sand, 20%)	m subrnd sand, 15%			
 - 160				SC	GLAYEY SA gravel, 10%	ND (SC) - brn 10YR4/3, 40% f s m sand, 5% c sand.	sand, 25% clay, 20%			
 165		Box 41	10	SW	WELL GRAD sand, 15% f subang.	JED SAND WITH GRAVEL (SW gravel, 10% fines, 10% c sand, 5	 J) - brn 10YR4/3, 60% 5% c gravel, subrnd to 	o m core b	arrel outward migration of f	
 <u>170</u>				SC SW	CLAYEY SA sand, 10% c WELL GRAI sand, 15% f	ND (SC) - brn 10YR4/3, 40% f s sand, 10% f gravel. DED SAND WITH GRAVEL (SW gravel, 10% fines, 10% c sand, !	sand, 25% clay, 15% n /) - brn 10YR4/3, 60% 5% c gravel, subrnd to	n 5 m		
		Box 41	5	CL	SANDY CLA silty plastic, v	VY (CL) - brn 10YR4/3, 75% clay wet (rolls easily when wet).	el,			
					NO RECOVE	ĒRY				
								lost co	re to 180' casing broke	
								.	CH2MHILL	

SHEET 6 of 9)					PROJECT NUMBER: 326128.01.07.4	R	BORIN	IG NUMBER: OW-3				
						SOIL BORING LO	G						
PROJECT NAM	E:	c Invoctio	nation		ck	HOLE DEPTH (ft):	DRILLING CONTRA	CTOR:	Manhalata CA				
SURFACE ELEVATION: NORTHING (CCS NAD 27 Z 5): EASTING (CCS NAD 27 Z 5): DATE STARTED:								tion & wells,	DATE COMPLETED:				
555.9 ft.	MSL		2,1	09/26/2004 DRILLING EOUIPM	10/07/2004 MENT:								
Rotos	sonic		tandard Tru	ck-Mounted Rig									
LOCATION: We	st Mes	a, Parcel	No. 65	0-151-06			LOGGED BY:	T. McDona	ld				
	9	SAMPLE				SOIL DESCRIPTION			COMMENTS				
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT COL	SOIL NAME, USCS SYMBOL, COLOF MPOSITION, GRADING, GRAIN SHAP SITY/CONSISTENCY, STRUCTURE, MC	R, E, MINERALOGY, DISTURE.	DRILLING DAILY S REFUSAL	G OBSERVATIONS AND OPERATIONS, TART AND END TIMES , DRILL RATE, .S, SAMPLING AND TESTING NOTES.				
				SC	CLAYEY SA subrnd sand, gravel.	ND (SC) - It olive brn 2.5YR5/3, 20 20% m subrnd sand, 20% c subrnd	live brn 2.5YR5/3, 20% clay, 20% f d sand, 20% c subrnd sand, 10% subang gravel 0.75" - 2.8" (19-75 m						
	. SANDY CLAY (CL) - brn 10YR5/3, 60% clay, 20% f sand, 20 GL gravel, silty plastic.							2.9 - 11.8" (75 - 300 mm)					
	180 CLAYEY SAND (SC) - It olive brn 2.5YR5/2, 40% f subrnd sand, 20% m subrnd sand, 20% clay, 10% c subrnd sand, 10% f subang gravel.												
 <u>185</u>				SC	- matrix s	supported							
 				SW	WELL GRAD 50% m sand weakly ceme	DED SAND WITH GRAVEL (SW) , 20% gravel, 10% fines, 10% c san nted.	- It olive brn 2.5YR5/3, d, 10% f sand,						
190					SANDY CLA gravel, silty p	Y (CL) - brn 10YR5/3, 60% clay, 2 plastic.	0% f sand, 20% ang						
				CL	- 192-194 - meta gr	4 ft : slough avels, qtz rich sands		ground from 1	lwater grab sample collected 92-202 ft bgs				
195					WELL GRAD 2.5YR4/2, 30 f subang san	DED SAND WITH GRAVEL (SM) - 1% m subang sand, 25% fines, 20% d, 5% f to c gravel, qtz, metamorph	dk greyish brn c subang sand, 10% ic, moist.						
 		CC29	8	SM	- same a	s above from 196-200 ft, 15% grave	l, 10% cobble to 3"						
200					SANDY SIL	T (ML) - dk greyish brn 2.5YR1/2, 6	50% silt, 30% f ang						
				GW/	sand, 10% f	ang gravel, moist. AVEL (GW) - 70% c gravel to cobb	le 1" to 3". 20% m						
 - <u>205</u>		CC30	12	SW/SM	ang sand, 10 WELLL GRA greyish brn 2 ang to subar ang to subar subang grave is qtz, metan	% clay/slit, gravel metamorphic (sch DED SAND WITH SILT AND GRA 2.5YR4/2, few mottles of brn 7.5YR4, Ig sand, 20% c ang to subang sand, g gravel, 10% f ang to subang sand el, gravel are primarily gneiss with och norphic, moist.	Arrow (SW/SM) - dk (5 (~10%), 30% m 20% clay/silt, 15% f , 5% c ang to ccasional schist, sand	stop drilling, bail 25 gallons and collect water sample					
	$\left \right + \left \right $												
					1			•	CH2MHILL				

SHEET 7 of	£					PROJECT NUMBER: 326128.01.07	: 7.AR		BORIN	G NUMBER: OW-3			
						SOIL BORING L	.OG						
PROJECT NAM	E:	o Travostiv	action			HOLE DEPTH (ft):		DRILLING CONTRAC	TOR:				
		N: N		ING (CCS	NAD 27 Z 5):	2/5.0 EASTING (CCS NAD 27 Z 5)):	DATE STARTED:	n & Wells,	DATE COMPLETED:			
555.9 ft.	MSL		2,1	.03,286.35		7,612,161.22		09/26/2004 DRILLING EQUIPME	NT:	10/07/2004			
Rotosonic										k-Mounted Rig			
LOCATION: We	st Mes	a, Parcel	No. 65	0-151-06				LOGGED BY:	T. McDonal	d			
	5	SAMPLE				SOIL DESCRIPTION				COMMENTS			
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, CO MPOSITION, GRADING, GRAIN SH SITY/CONSISTENCY, STRUCTURE,	DLOR, HAPE, , MOIS	MINERALOGY, STURE.	DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.			
 215	SANDY SILT WITH GRAVEL (ML) - dk greyish brn to brn 10YR4/2 - - - - - ML ML SANDY SILT WITH GRAVEL (ML) - dk greyish brn to brn 10YR4/2 to 4/3, 50% silt/clay, 20% f ang to subang gravel, 20% c ang to subang sand, 10% m ang to subang sand, metamorphic, predominantly gneiss, qtz/epidote metamorphic sand, moist.							brn to brn 10YR4/2 20% c ang to rphic, nd, moist.	top 2 ft	of cc appears to be slough			
 - 220 		CC31	8	SM	SILTY SAN sand, 20% s sand, 10% f - silt perc	D (SM) - brn 7.5YR4/2 to 4/3, 5 ilt, 10% m ang to subang sand, 1 ang to subang gravel, metamorp centage lowers from 219-221 ft	50% c 10% f ohic, n	ang to subang ang to subang noist to wet.					
225				GW	WELL GRAI 10YR4/2, 65 to slightly su	DED GRAVEL WITH SAND (GW % f gravel, 20% c sand, 10% c g Ibang, metamorphic, wet.	N) - α gravel,	lk greyish brn , 5% m sand, ang	sand w,	/silt (SM)			
		CC32	10	SM	SILTY SANI sand, 25% n gravel, 5% c - 5-10%	D (SM) - brn 10YR5/3 to 4/3, 50 n ang to subang sand, 15% silt, ang to subang gravel, metamor silt from 229-230ft and 234-236 t	0% c a 5% f rphic, ft	ang to subang ang to subang wet.	ground from 23	water grab sample collected 80-253 ft bgs			
235													
				ML	SANDY SIL blueish grey 20% c ang f to subang gr	T WITH GRAVEL (ML) - brn 7. 5/5B and reddish brn 5YR5/4 in t to subang sand, 10% m ang to s ravel, metamorphic, moist.	.5YR4, top or subang	/3 to 4/4 mottling of he foot, 60% silt, g sand, 10% f ang					
		CC33	6	ML	SILT (ML) slightly sticky during drillin material.	SILT (ML) - brn 7.5YR, 5% f sand, <5% c sand, slightly plastic, slightly sticky, very few clast of indurated silty sand, dry (baked during drilling) with few slightly moist block of unbaked native material.				collect sample at 1640 for geotech analysis collected into foil sleeve			
				ML	GRAVELLY 20% c ang to to 6-7 cm, 10 metamorphic	SILT WITH SAND (ML) - brn 7 o subang gravel, 10% f ang to su 0% c ang to subang sand, 5% m c, moist.	7.5YR ubang n ang t	4/3 to 4/4, 55% silt, gravel, gravel up o subang sand,					
245									-				
									-	CH2MHILL			

PROJECT NAME: IM-3 Hydroge SURFACE ELEVA 555.9 ft. M DRILLING METH Rotoso LOCATION: West	: ologic ATION 1SL 1OD: nic t Mesa	Investig I: N	jation, F	PG&F Topo		SOIL BORING LC)G				
PROJECT NAME: IM-3 Hydroge SURFACE ELEVA 555.9 ft. M DRILLING METH Rotoso LOCATION: West	iologic ATION ISL IOD: nic t Mesa	Investig I: N	jation, F	PG&F Topo							
SURFACE ELEVA 555.9 ft. M DRILLING METH Rotoso LOCATION: West	ATION ASL HOD: nic t Mesa	l: N		יוואי וואאר	ck	HOLE DEPTH (ft):	DRILLING CONTRA	NTRACTOR:			
555.9 ft. M DRILLING METH Rotoso LOCATION: West	ISL IOD: nic t Mesa			ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:		DATE COMPLETED:		
Rotoso	nic t Mesa		2,1	03,286.35		7,612,161.22 WATER LEVEL (ft):	09/26/2004 DRILLING EQUIPM	IENT:	10/07/2004		
LOCATION: West	t mesa	Deveel		0 151 00			S LOGGED BY:	Standard Truck	k-Mounted Rig		
		a, Parcel	NO. 650	0-151-06			LOGGED B1:	T. McDonald	d		
	S	AMPLE				SOIL DESCRIPTION			COMMENTS		
DEPTH BGS (feet)	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CON DENS	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHAI IITY/CONSISTENCY, STRUCTURE, M	R, PE, MINERALOGY, OISTURE.	DRILLING DAILY STA REFUSALS	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, 5, SAMPLING AND TESTING NOTES.			
 <u>250</u>				SW	WELL GRAE subang sand 5% silt/clay,	DED SAND (SW) - brn 7.5YR4/3 t , 20% m ang to subang sand, 10% 5% f ang gravel up to 7mm, metar	o 5/3, 60% c ang to f ang to subang sand, norphic, moist to wet.	top 1 ft to be sk	core from 243 to 253 appears ough		
					- top 1 fo gravels a	ot gradational from gravelly silt wit t base but no percent increase	h sand above, larger	collect z analysis	collect ziplock bag sample for grain size analysis		
\											
255		CC34	9.5	SM	SILTY SANI sand, 20% f ang to suban WELL GRAE ang to suban subang grave moist to wet.	D (SM) - brn 7.5YR4/3, 40% silt, 2 ang to subang sand, 10% c ang to ig gravel up to 5 cm, metamorphic, DED SAND WITH SILT (SW/SM) ig sand, 25% m ang to subang sand el, 10-15% silt, 10% f ang to suban	5% m ang to subang subang sand, 5% f moist to wet. - brn 7.5YR4/3, 35% c d, 15-20% f ang to g sand, metamorphic,				
		CC35	6	SW/SM	- reddish 20% m s indurated	brn 5YR5/4 to red 2.5YR5/6, 30% and, 15% c sand, 15% f gravel to : I sand with gravel at 263 ft	f sand, 25% silt/clay, L cm, large clast of	collect s water a	ample in foil sleeve for pore nalysis at 1517 OW-3D-258		
 270 275		CC36	5	ML	SANDY SIL yellowish red cm, 20% f m metamorphic - 10YR4/· loose and	 T WITH GRAVEL (ML) - brn 7.5Y I SYR4/6, 45% silt, 25% f ang to su ang to subang sand, 10% c ang to c, moderate induration. 4 color and very homogenous silty si d wet, core appears to be all worked 	R4/3, 20% mottling bang gravel up to 2-4 subang sand, sand texture, very				
					ABBREV cc = cont brn = bro It = light dk = dart	Boring Terminated at 275 TATIONS tinuous core run own	ft	•	CH2MHILL		

SHEET 9 of 9)					PROJECT NUM 326128.	IBER: .01.07.AR	2	BORIN	BORING NUMBER: OW-3		
						SOIL BORIN	IG LOO	3	1			
PROJECT NAM	E:	Trucctio	nation			HOLE DEPTH (ft):		DRILLING CONTR	ONTRACTOR:			
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 2	7 Z 5):	DATE STARTED:	ation & wells	DATE COMPLETED:		
555.9 ft.	MSL		2,1	03,286.35		7,612,161.22		09/26/2004	MENT.	10/07/2004		
Rotos	ionic							DRILLING LQUIP	Standard Tru	ck-Mounted Rig		
LOCATION: We	st Mes	a, Parcel	No. 65	0-151-06				LOGGED BY:	T. McDona	ld		
	s	SAMPLE				SOIL DESCRIPTION				COMMENTS		
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT COI DENS	SOIL NAME, USCS SYMB MPOSITION, GRADING, GR JITY/CONSISTENCY, STRU	OL, COLOR, AAIN SHAPE CTURE, MOI	, MINERALOGY, STURE.	DRILLIN DAILY S REFUSA	G OBSERVATIONS AND OPERATIONS, TART AND END TIMES , DRILL RATE, LS, SAMPLING AND TESTING NOTES.		
					vf = very f = fine- <u>c</u> m = med c = coars vc = very ang = an subang = rnd = rou br = bed ss = sanc conglom comptd = qtz = qua	r fine-grained grained ilum-grained se-grained y coarse-grained igular = subangular = subrounded unded rock formation dstone = conglomerate = compacted artz						
1			<u> </u>		<u> </u>				•	CH2MHILL		






SHEET 1 of 11 PROJECT NUMBER: 326128.01.07.AR						BORIN	IG NUMBER: OW-5		
						SOIL BORING LO	DG		
PROJECT NAM	E:	r Investia	nation (PG&F Topo	nck	HOLE DEPTH (ft):		ACTOR:	Montclair CA
SURFACE ELEV		N: M		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	tion & weils,	DATE COMPLETED:
DRILLING ME	HOD:		2,1	02,998.32		WATER LEVEL (ft):	DRILLING EQUIPM	1ENT:	11/14/2004
Roto: LOCATION: Ea	sonic st Mesa	a, Parcel	No. 650	-151-06			LOGGED BY:	Gefco S	S-15K-HL
		,						B. Sheare	r
	5	SAMPLE		USCS		SOIL DESCRIPTION			COMMENTS
DEPTH BGS (feet)	INTERVAI	TYPE/ NUMBER	RECOVER' (ft)	CODE	SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.			DRILLING DAILY ST REFUSAL	G OBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, .S, SAMPLING AND TESTING NOTES.
 		CC-1	0	- SP	GRAVELLY m sand, 25%	SAND (SP) - It brnish gray (10YR 6 gravel up to 1", 10% c sand, 5%	5/2) 30% f sand, 30% fines, subang, dry.	U-8' log	gged from conductor pipe
 <u>20</u>					- coarser	grained sand from 16' to 17'		-	dull size basened fisking had (1
		CC-2	6	SM	SILTY SAN 20% c sand, damp. POORLY GF 20% gravel t	D (SM) - dk gray (10 <u>YR4/1) 30%</u> 15% f sand, 15% gravel up to 1/ <i>i</i> RADED SAND (SP) - pale brn (10 up to 2" in layers, 10% fines, suba	m sand, 20% fines, ", subang, dense, YR 6/3) 70% f-c sand, ng, dry.	-	drill pipe tapered fishing tool (1 ntime)
 35		CC-3	0						
								•	CH2MHILL

SHEET 2 of 2	11					PROJECT NUMBER: 326128.01.07	AR	BORIN	IG NUMBER: OW-5
						SOIL BORING LO)G	I	
PROJECT NAM	E:	- Investic	nation (PG&F Topo		HOLE DEPTH (ft):	DRILLING CONTRA	ACTOR:	Montolair CA
SURFACE ELEN		N:		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	uon a wens,	DATE COMPLETED:
549.5 ft. DRILLING MET	MSL THOD:		2,1	02,998.32		7,613,185.55 WATER LEVEL (ft):	DRILLING EQUIPM	IENT:	11/14/2004
Rotos	sonic	Darcel	No. 650	-151-06		'	LOGGED BY:	Gefco S	S-15K-HL
		, Faicei	10.050	-151-00				B. Sheare	r
	s	SAMPLE				SOIL DESCRIPTION			COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHA SITY/CONSISTENCY, STRUCTURE, M	DR, PE, MINERALOGY, IOISTURE.	DRILLING DAILY ST REFUSAL	G OBSERVATIONS AND OPERATIONS, TART AND END TIMES , DRILL RATE, .S, SAMPLING AND TESTING NOTES.
 - 40	+	CC-3	10	SP	POORLY GF 20% gravel u - It brnish damp	RADED SAND (SP) - pale brn (10' up to 2" in layers, 10% fines, subar h gray (10YR 6/2) 50% sand, 40%	YR 6/3) 70% f-c sand, ng, dry. gravel, subang,		
					- layer of - decreas	f silty cemented sand sed fines to 20%) 55% subang gravel	- notenti	ial boulder
45		CC-4	9	GP	up to 2", 30%	% m c sand, 10% f sand, 5% fines	, damp.	potenti	
 				SW	WELL GRAE 20% f sand,	DED SAND (SW) - grayish brn (10 20% c sand, 20% gravel up to 1/.	YR 5/2) 30% m sand, 2", 10% fines.	-	
				SM	SILTY SAN	D (SM) - dk gray (10YR4/1) 40% f	-m sand, 30% fines,	-	
 		CC-5	10	SW	GRAVELLY	<u>I gravel up to 1/2", 10% c sand, da</u> SAND (SW) - 50% f-c sand, 40% 6 fines, gneiss, damp.	mp. 5 subang to ang gravel	- driller 1 layer o	notes hard drilling f increased times @56'
					SILTY SANI fines, 20% s	D (SM) - dk yellowish brn (10YR4/ ubrnd gravel up to 1/2", moist.	8) 50% f-c sand, 30%	-	
 		CC-6	5	SG SW	GRAVELLY subrnd grave WELL GRAE 20% fines, 2	SAND (SG) - dk gray (10YR4/1) 5 el up to 1.5", 20% fines, dense, dar DED SAND (SW) - grayish brn (10 10% subang gravel up to 1/2", mm,	0% f-c sand, 30% mp.)YR5/2) 60% f-c sand, , dry.		
70					<u> </u>				
								-	CH2MHILL

SHEET 3 of 2	11					PROJECT NUMBER: 326128.01.07	.AR	BORIN	IG NUMBER: OW-5
						SOIL BORING L	OG		
PROJECT NAM IM-3 Hydrod	E: ieologia	c Investio	aation,	PG&E Topo	ck	HOLE DEPTH (ft): 350.0	DRILLING CONTR	ACTOR:	Montclair CA
SURFACE ELEV		N: M		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:		DATE COMPLETED:
DRILLING MET	HOD:		2,1	.02,990.32		WATER LEVEL (ft):	DRILLING EQUIPM	MENT:	
LOCATION: Eas	sonic st Mesa	a, Parcel	No. 650)-151-06			LOGGED BY:	Getco S	S-15K-HL
								B. Sneare	COMMENTS
	: 	SAMPLE	≿	USCS		SOIL DESCRIPTION			COMMENTS
(feet)	INTERVA	TYPE/ NUMBER	RECOVER (ft)	CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COI MPOSITION, GRADING, GRAIN SH SITY/CONSISTENCY, STRUCTURE,	DRILLING DAILY S REFUSAL	G OBSERVATIONS AND OPERATIONS TART AND END TIMES , DRILL RATE, .S, SAMPLING AND TESTING NOTES.	
 - 75 		CC-7	15	SP	POORLY GF fines, 10% s - dry crus	RADED SAND (SP) - brn (10YR4, ubang gravel up to 1/2", silty cem	/3) 70% f-m sand, 20% ented, dry.		
 <u>80 _</u>	$\left + \right $			SW	WELL GRAI fines, 15% a	DED SAND (SW) - brn (10YR4/3 ing to subang gravel, silty cement) 70% f-c sand, 15% ed, dry .	_	
 85				SM	SILTY SANI 10% ang to : - becomin	D (SM) - grayish brn (10YR 5/2) (subang gravel, feldspar, wet.	65% f-c sand, 25% silt,	hit wat	ter @ 80'
 		CC-8	0	GW	SANDY GRA gravel, 30%	AVEL (SW) - It gray (10YR 7/2) 6 f-c sand, 10% fines, dry.	0% subrnd-subang	– potenti Driller	ial confining layer @ 86 notes hard drilling
				sw	WELL GRAI sand, 15% s moist.	DED SAND (SW) - dk yellowish b ubang gravel up to 1/2", 10% fine	orn (10YR4/4) 75% m-c es, silty cemented,	- layer o 7/2)	f silt @ 92 dry light gray (10YR
95 					SILTY SANI gravel, subar	D (SM) - brn (7.5YR5/2) 60% f-c ng to ang, wet.	sand, 30% fines, 10%	– broken 100' to	drill pipe/wash down casing to remove it lost 95-100' core
 		CC-9	10	- SM	- modera	ately cemented		ground from 1	lwater grab sample collected 00-120 ft bgs
	v Y	<u>.</u>	I	<u> </u>	I			•	CH2MHILL

SHEET 4 of 11 PROJECT NUMBER: 326128.01.07.AR						BORIN	IG NUMBER: OW-5			
						SOIL BORING L	_OG			
PROJECT NAM	E:				-1-	HOLE DEPTH (ft):	DRILLING	CONTRAC	TOR:	
	jeologi /ATIO	N:	Jation, I	ING (CCS	NAD 27 Z 5):	350.0 EASTING (CCS NAD 27 Z 5)	WD : DATE STA	C Exploratio	on & Wells,	Montclair, CA DATE COMPLETED:
549.5 ft.	MSL		2,1	.02,998.32		7,613,185.55	11/09/2004	1		11/14/2004
DRILLING ME Rotos	Genic					WATER LEVEL (ft):	DRILLING	EQUIPME	Gefco S	S-15K-HL
LOCATION: East	st Mesa	a, Parcel	No. 650)-151-06			LOGGED B	BY:	B. Sheare	r
		SAMPLE				SOIL DESCRIPTION				COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLOR, ERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.				OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
				SM	SILTY SAN	D (SM) - brn (7.5YR5/2) 60% f-0 ng to ang, wet.	c sand, 30% fines	s, 10%		
				SW	WELL GRAI sand, 15% fi moist to dam - increasi	DED SAND (SW) - dk yellowish ines, 10% subang gravel up to 1, ip.	5% m-c d,	Grain s 11/10/	ize sample collected 11:00 04	
110 					SILTY SANI ang gravel u	D (SM) - brn (7.5YR4/3) 60% c p to 1/2", dense, wet.	0% m			
		CC-10	10		- increase	e in grain size of sand				
120 				SM	- grayish	brn (10YR 5/2) 60% m-c sand, 2	20% fines, 20%	ang		
					gravel ur	o to 1/2", m dense, wet				
		CC-11	0		dk yellow	<i>i</i> ish brn (10YR4/4), wet				
				SG	GRAVELLY gravel up to	SAND (SG) - brn (7.5YR4/4) 65 6", 5% fines, damp.	% f-c sand, 30%	ang		
 140				SW	WELL GRAI fines, 10% n	DED SAND (SW) - brn (7.5YR4/ n ang loose gravel up to 1/2", we	(4) 75% m c sand et.	l, 15%		
									-	CH2MHILL

SHEET 5 of 11						PROJECT NUMBER: BC 326128.01.07.AR			ORING NUMBER: OW-5	
						SOIL BORING LC	<u></u>)G			
PROJECT NAM	IE:	c Invectiv	action		ock	HOLE DEPTH (ft):	DRILLING CONTRA	ACTOR:	Mantalain CA	
SURFACE ELE		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	tion & wells,	DATE COMPLETED:	
549.5 ft. DRILLING ME	. MSL THOD:		2,1	.02,998.32		7,613,185.55	11/09/2004 DRILLING EOUIPM	IENT:	11/14/2004	
Roto	sonic							Gefco S	S-15K-HL	
LOCATION: La	st Mesa	a, Parcel I	NO. 650)-151-06		LOGGED BY: B. Shearer			۲	
	5	SAMPLE				SOIL DESCRIPTION			COMMENTS	
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHAI SITY/CONSISTENCY, STRUCTURE, M	IR, PE, MINERALOGY, OISTURE.	DRILLING DAILY S REFUSAL	GOBSERVATIONS AND OPERATIONS, TART AND END TIMES , DRILL RATE, LS, SAMPLING AND TESTING NOTES.	
 - 145 	-			SM	SILTY SANI 5% subang o - layer of - denser	D (SM) - dk gray (10YR4/1) 65% n gravel up to 1/4", m dense, wet. f subrnd gravel	ι c sand, 30% fines,			
 150 	-	CC-12	20	SG	GRAVELLY subang grave - cobble	SAND (SG) - grayish brn (10YR5/2 el up to 3/4", 25% fines, damp. D (SM) - dk gravish brn (10YR5/2)	!) 50% f-c sand, 35%	- ground from 1.	lwater grab sample collected 50-170 ft bgs	
 				SM	fines, 15% s - lt grayi:	sh brn 10YR6/2 70% f-m sand, 20%	6 fines, 10% subang	potenti	ially a cobble pulverized drilling	
	-			-	subrnd g	ravel up to 3/4", damp to dry				
 - 165	-	CC-13	10	sw	WELL GRAI 25-30% m sa silt, subang r	DED SAND (SW) dk grayish brn (1 and, 5-10% f sand 10% gravel from mm, wet.	0YR5/2) 50% c sand, ı 1/2" to 2 1/2", 5%	-		
 - 170				SM	SILTY SANI mm gravel, 2 2 1/2", moist	D (SM) - dk grayish brn (10YR4/2) 20% f sand, 15% m sand, 15% silt, t.	25% c sand, 25% subang from 1/4" to	- grain s 11:00	ize sample collected 11/11/04	
	- \ /			GM	SILTY GRA	VEL (GM) - gray (7.5YR5/11), 65%	ang gravel up to 2	-		
	- \/	CC-14	10		. <u>1/2", 30% si</u> SILTY SAN	ilt, 15% f-m sand, v dense, damp. D (SM) - brn (10YR4/4) 70% f-m s	and, 20% fines, 10%	-		
	$ \land $		10		- <u>subang grav</u>	el up to 1/2", dense, moist.		-		
	- /\			SW	sand, 20% fi	ines, 20% subang gravel, loose, we	t.			
175	<u>/ ' \</u>	L		L	<u> </u>			_		
								- #	CH2MHILL	

SHEET 6 of 1	1					PROJECT	NUMBER:	2	BORIN	IG NUMBER: OW-5
						SOIL BO	RING LOC	G		•••••
PROJECT NAM		Tovectio	ation [ck	HOLE DEPTH (f	t):			Mantalain CA
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS	NAD 27 Z 5):	DATE STARTED:	on a wens,	DATE COMPLETED:
549.5 ft. DRILLING MET	MSL HOD:		2,1	02,998.32		7,613, WATER LEVEL	.185.55 (ft):	DRILLING EQUIPME	NT:	11/14/2004
Rotos	onic t Mesa	Parcel	No 650	-151-06				LOGGED BY:	Gefco S	S-15K-HL
LOCATION: Las	1111111		10. 050	151 00					B. Sheare	r
	S	SAMPLE	_			SOIL DES	SCRIPTION			COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	CODE	SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.				DRILLING DAILY ST REFUSAL	GOBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
 <u>180</u>		CC-14	0		WELL GRAI sand, 20% fi	DED SAND (SW) (W/GRAVEL - brn gravel, loose, wet.	(10YR5/3) 60% m-c		
 <u>185</u> 				SW	- subtie c	olor change				
 		CC-15	18		SILTY SANI subang grave - cored th	D (SM) - brn (7.5Y el up to 1/2", sand nrough ~1' of gneis	(R4/3) 60% f-m sai fining, mm, dense, ssic cobbles	nd, 30% silt, 10% , wet.		
<u> 195 </u>					brn (7.5Y trace cali	R4/3) 50% f-c san che, dense, mm, n	d, 30% silt, 20% s noist	ubang gravel,		
 - 205 210		CC-16	20	SM						
	1								•	CH2MHILL

SHEET 7 of 11 PROJECT NUMBER: 326128.01.07.AR							2	BORIN	G NUMBER: OW-5	
						SOIL BORIN	G LOO	<u> </u>	<u> </u>	
PROJECT NAM IM-3 Hydrod	E: ieologia	c Investic	ation, I	PG&E Topo	ck	HOLE DEPTH (ft): 350.0		DRILLING CONTRAC	TOR:	Montclair CA
SURFACE ELEV		N: N	IORTH	ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 7 613 185 55	Z 5):	DATE STARTED:		DATE COMPLETED:
DRILLING MET	HOD:		2,1	.02,550.52		WATER LEVEL (ft):		DRILLING EQUIPME	NT:	
LOCATION: Eas	st Mesa	a, Parcel I	No. 650)-151-06				LOGGED BY:	B Shearer	
						SOIL DESCRIPT				COMMENTS
DEPTH BGS	, ד	~	۲	USCS						
(feet)	INTERV/	TYPE/ NUMBEI	RECOVEI (ft)	CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.				OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
				ML	SILTY SAN subang grav - dk gray 15-20% : SANDY SIL silt . SILTY SAN	D (SM) - brn (7.5YR4/3) 60 el up to 1/2", sand fining, m ish brn (10YR4/2) 60% f-c <u>c</u> subang gravel, dry T WITH GRAVEL (ML) - 1 D (SM) - brn (7.5YR4/3) 50	% f-m sar m, dense, grained sa 5% grave % f-c san	nd, 30% silt, 10% wet. nd, 20% silt 1 30% f c sand 55% d. 30% silt, 20%		
 	$\left \right\rangle + \left \right\rangle$	CC-16	20	SM	subang gravi - gray SG	el, trace caliche, dense, mm 5/S2 grayish green 10R4/8 m	, moist. ed weathe	ered mms		
220					WELL GRAI	DED SAND No loggable core	e, USCS ty	pe determined from	refusal	due to cobbles
 - 225 										
				SW						
235										
 240										
	\setminus				WELL GRAI 10-15% grav	DED SAND brn 50% m san vel, 5% f sand, traces of cali	nd, 20% c iche, mm,	sand, 10-15% silt, dry.	1225: g	grab sample for grain size s at 245'
 245		CC-17	10		- brn 50% f sand, tr	% m sand, 20% c sand, 10-: aces of caliche, mm, dry	15% silt, 1	.0-15% gravel, 5%		
									•	CH2MHILL

SHEET 8 of 11 PROJECT NUMBER:							BORIN	G NUMBER:		
							1.07.AK	-		UW-5
PROJECT NAM	E:					HOLE DEPTH (ft):		DRILLING CONTRA	CTOR:	
IM-3 Hydrog		c Investig	jation, I	PG&E Topo	CK	350.0	7 5).	WDC Explorat	ion & Wells,	Montclair, CA
549.5 ft.	MSL		2,1	.02,998.32	NAD 27 2 5):	7,613,185.55	2 5):	11/09/2004		11/14/2004
DRILLING ME Roto:	THOD: sonic					WATER LEVEL (ft):		DRILLING EQUIPM	ENT: Gefco SS	S-15K-HL
LOCATION: Ea	st Mesa	, Parcel	No. 650)-151-06				LOGGED BY:	B. Shearer	
		SAMPLE				SOIL DESCRIPTI	ON			COMMENTS
DEPTH BGS		~	2	USCS						
(feet)	INTERVA	TYPE/ NUMBEF	RECOVER (ft)	CODE	PERCENT CON DENS	SOIL NAME, USCS SYMBOL MPOSITION, GRADING, GRAI SITY/CONSISTENCY, STRUCT	L, COLOR, IN SHAPE, URE, MOI	, MINERALOGY, STURE.	DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
 		CC-17	10	SW	WELL GRAE 10-15% grav	DED SAND brn 50% m sand vel, 5% f sand, traces of calic	d, 20% c che, mm,	sand, 10-15% silt, dry.		
		CC-18	6	SM SP	SILTY SANI sand, 15% g subang, mm, - brn (7.5 10-20% s POORLY GF subang sand No recovery	D (SM) WITH GRAVEL - gr gravel avg 3/4", 15% f sand, , moist. 5YR4/2) 50% m sand, 20% c silt, wet RADED SAND (SP) - brn (7 , 5% silt, mm, moist. - quartzite cobble / broken b	rayish brm 15% c sa c sand, 10 .5YR4/2) poulder.	(10YR5/2) 40% m nd, 15% silt,)-20% f sand, gradually coarsening	very ha shut do	rd drilling, cobbles or boulders wn due to lightning
260	-			SW	POORLY GF	RADED SAND (SP) - brn (7	.5YR5/2)	50% m sand, 45% c	grab sa	mple for grain size analysis @
	-			SW	sand, 5% silt WELL GRAE sand, 5% f s - metamo	t, subang to ang, mm, wet. DED SAND (SW) - brn (7.5) sand, 5% silt, 5% gravel, sub orphic cobble	YR 5/2) 6 bang, mm	5% c sand, 20% m , wet.	253 ft fining u began o core	pwards sequence 11/13/04: drilling at 0640 0712: collected
	-			GW-GM	(7.5YR5/2) 5 5% silt, 5% f WELL GRAI sand, 5% f s	50% gravel from 1/2" to 2", 2 f sand, subang to ang, wet. DED SAND (SW) - brn (7.5% and, 5% silt, 5% gravel, sub	20% m sa YR 5/2) 6 bang, mm	5% c sand, 20% m		
	-	CC-19	19	SW						
				SW-SM	WELL GRAE (7.5YR4/3) 3 10-15% silt, dry.	DED SAND WITH SILT AN 330% m sand, 25% c sand, 2 subang-ang, weathered mm	D GRAVI 20% f san I (gray 5F	EL (SW-SM) - brn Id, 10-15% gravel, 4/2, red 2.5YR4/8),		
280					- caliche	development			•	CH2MHILL

SHEET 9 of 2	1					PROJECT NUMBER: 326128.01.07.A	R	BORIN	IG NUMBER: OW-5
						SOIL BORING LO	G		
PROJECT NAM IM-3 Hydroc	E: Ieologi	c Investic	ation.	PG&F Topo	ock	HOLE DEPTH (ft):	DRILLING CONTRA	CTOR:	Montclair CA
SURFACE ELEV	ATIO	N: N	IORTH	ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	on a wens,	DATE COMPLETED:
549.5 π. DRILLING MET	HOD:		2,1	102,998.32		7,613,185.55 WATER LEVEL (ft):	DRILLING EQUIPMI	ENT:	11/14/2004
Rotos	onic	Darcel	No 650	0-151-06			LOGGED BY:	Gefco S	S-15K-HL
LUCATION: Las			10. 050	1 101 00	1			B. Sheare	r
	9	SAMPLE				SOIL DESCRIPTION			COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHAP SITY/CONSISTENCY, STRUCTURE, MC	DRILLING DAILY ST REFUSAL	G OBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, .S, SAMPLING AND TESTING NOTES.	
 - 285 					WELL GRAI sand, 20% f mm, wet .	DED SAND (SW) - brn (7.5YR4/3) 4 gravel, 10% f sand, 10% silt ang to	40% m sand, 20% c subang, weathered	collecti	ng core, drill bit melted
 		CC-20	20	SW				weath	ared red fanglomerate
 295 					- caliche	development and increasing silt			
				SC	gravel, subar	ND (SC) - brn (7.5YR 4/3) 65% f c ng to ang, wet.	sand, 30% clay, 5%		
300					- cement	ed unit burned by drilling			
 - 305 		CC-21	20	SW	WELL GRAI sand, 30% c mm, wet.	DED SAND (SW) dark reddish brn (sand, 10% gravel, 10% f sand, 5%	(2.5YR3/4) 40% m silt, subang to ang,	photo	color change to dark red-brown
315				<u> </u>				•	CH2MHILL

SHEET 10 of	11					PROJECT NUMBI 326128.01	ER: 1.07.AF	ł	BORIN	G NUMBER: OW-5		
						SOIL BORING	G LOO	<u> </u>				
PROJECT NAM IM-3 Hydrod	E: Jeologi	c Investio	aation.	PG&E Topo	ck	HOLE DEPTH (ft):		DRILLING CONTRAC	TOR:	Montclair CA		
SURFACE ELEN		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z	Z 5):	DATE STARTED:		DATE COMPLETED:		
DRILLING MET	THOD:		Z,1	.02,996.32		WATER LEVEL (ft):		DRILLING EQUIPME	NT:	11/14/2004		
Rotos LOCATION: Eas	sonic st Mesa	a, Parcel	No. 65()-151-06				LOGGED BY:	Gefco SS	S-15K-HL		
		,							B. Shearer	ſ		
		SAMPLE	~	uscs		SOIL DESCRIPTIO	ON			COMMENTS		
(feet)	INTERVA	TYPE/ NUMBER	RECOVER (ft)	CODE	PERCENT COL DENS	SOIL NAME, USCS SYMBOL MPOSITION, GRADING, GRAI JITY/CONSISTENCY, STRUCTU	., COLOR, N SHAPE URE, MOI	, MINERALOGY, ISTURE.	DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.		
 				SW	WELL GRAI sand, 30% c mm, wet.	DED SAND (SW) dark reddis sand, 10% gravel, 10% f sar	sh brn (2 nd, 5% s	5YR3/4) 40% m ilt, subang to ang,	becomin	ng SM > 315		
				SW	WELL GRAD	DED SAND (SW) - reddish b 20% f sand 10% fines 10%	orn (2.5Y	R4/4) 30% m sand,				
				SC	CLAYEY SA	ND (SC) - brn (7.5 YR 7/2)	30% m s	sand, 30% c sand,	Sand w	ith gravel		
				ML	SILT (ML) g	greenish gray (GGCY5G5/1) s	tiff.)				
<u>325</u>		CC-22	20	SC	CLAYEY SA 70% fine-coa traces of 2.5 - brn (7.5	ND (SC) -brn, (7.5 YR 414), arse sand, 326-328 as logged YR 314, dark reddish brn,32 SYR7/2) 'traces of (2.5YR3/4) ad	15% gra 1 324-326 7-328 ind	avel, 15% fines, 5, brn (7.5 YR 414), durated.				
					CLAYEY SA gravel, 15%	ND WITH GRAVEL(SC) wit clays, 60% fine to coarse sar	h gravel, nd, subar	. (7.5 YR 414), 25% ngular,				
330				SC	metamorphic	c, wet, avg grain size gravel:	2cm, stif	r.	ground from 33	water grab sample collected 30-150 ft bgs		
 <u>335</u>		CC-23	10	SW / SC	WELL GRA YR 414), 109 subangular, r metamorphic	DED SAND WITH CLAY AN % fines, 20% gravel, 70% fin metamorphic, wet, grayish gr ss.	ND GRAN ne to coar reen, wea	VEL (SW-SC) brn (7.5 rse sand, athered				
				SC	CLAYEY SA 60% m sand	ND (SC) dark reddish brn , 20% fine gravel.	(2.5 YR 3	313), 15% clay,				
				SW	WELL GRA brn (2.5 YR 3 subangular, 1	DED SAND WITH SILT AN 313), 20% gravel, 10% silt, metamorphic.	D GRAV 65-70%	FEL (SW) dark reddish fine to coarse sand,	reworke weathe	ed fanglomerate deeply red mm clasts (photo)		
				SC	CLAYEY SA 15% gravel, metamorphic	ND WITH GRAVEL (SC) of 15% clay, 70% fine to coars gravel 1-6 cm dry.	dark redd se sand, :	iish brn (7.5 YR 413), subangular,	collecte analysis	ed grab sample for grain size s @ 344 ft		
		CC-24	10		CONGLOME	RATE (BR) - dk reddish brn	1 (1.5YR3	3/3) 35% m sand,	Miocen hard dr	e conglomerate bedrock at 346', illing noted		
				BR	25% gravel, 20% f sand, 10% fines, subang, weathered metamorphic clasts, indurated, dry.							
350	1		<u> </u>		<u> </u>							
									-	CH2MHILL		

SHEET 11 of 11						PROJECT NUMBER: 326128.01.07.AR BORING NUMBER: OW-5			IG NUMBER: OW-5		
						SOIL BORI	NG LO	G	l	011-5	
PROJECT NAME	E:	Tovestic	notion			HOLE DEPTH (ft):			ACTOR:	Mandala CA	
SURFACE ELEV		N: N	IORTH	ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD	27 Z 5):	DATE STARTED:		DATE COMPLETED:	
549.5 ft. DRILLING MET	MSL HOD:		2,10	02,998.32		7,613,185.5 WATER LEVEL (ft):	55	DRILLING EQUIP	MENT:	11/14/2004	
Rotos	onic		No 650	151-06		<u> </u>			Gefco S	S-15K-HL	
	t Mesa,	, Parcer r	יטכס .0ע	-151-00					B. Sheare	r	
	s	AMPLE				SOIL DESCRI	IPTION			COMMENTS	
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO	SOIL NAME, USCS SYN MPOSITION, GRADING, (SITY/CONSISTENCY, STR	MBOL, COLOR, GRAIN SHAPE RUCTURE, MOI	, MINERALOGY, DRILLING OBSERVATIONS AND OPER JAILY START AND END TIMES , DRII ISTURE. REFUSALS, SAMPLING AND TESTING			
					ABBREV cc = cont brn = brc It = light dk = darl vf = very f = fine-g m = med c = coars vc = very ang = an subang = subrnd = rnd = rou br = bed ss = sanc conglom comptd = qtz = qua	Boring Termina 'IATIONS tinuous core run wm k ' fine-grained grained dium-grained se-grained y coarse-grained ugular = subangular = subrounded unded rock formation dstone = conglomerate = compacted artz	ated at 350 ft				
									•	CH2MHILL	







SHEET 1 of 1	SHEET 1 of 10 PROJECT NUMBER: 326128.01.07.AR						2	BORING NUMBER: MW-41
						SOIL BORING LOG	G	
PROJECT NAME	eologia	Investio	ation	PG&F Tono	rck	HOLE DEPTH (ft):	DRILLING CONTRAC	TOR:
SURFACE ELEV		N: N	IORTH	ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	DATE COMPLETED:
476.9 ft. DRILLING MET	MSL HOD:		2,1	.03,536.66		7,614,578.85 WATER LEVEL (ft):	DRILLING EQUIPME	11/05/2004
Rotos	onic	Mach Da	urcel No	650-151-	06		LOGGED BY:	Gefco SS-15K-HL
LOCATION: Dat	Cave	wasii, ra		. 050-151-				Г. McDonald
	S	SAMPLE				SOIL DESCRIPTION		COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT COL	SOIL NAME, USCS SYMBOL, COLOR, MPOSITION, GRADING, GRAIN SHAPE SITY/CONSISTENCY, STRUCTURE, MOI	, MINERALOGY, ISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
 					WELL GRAE gravel/cobble silty clay.	DED SAND WITH GRAVEL (SW) - es up to 0.75", 40% f-m sand, 10% (45% rnd to ang coarse sand, 5%	0 to 20 ft not collected in core barrel during conductor casing set. Description is from homogenized cuttings
 				SW				
20								
 <u>- 25</u>		CC1	11					
 				GW-GM	WELL GRAI gravel avg 2. sand and gra highly weath	DED GRAVEL WITH SILT AND SAN .5" up to 3", 20% c sand, 10% silt/cla avel ang to subang, metamorphic, 50° ered, moist, abrupt lower boundary.	ND (GW-GM) - 65% f-c ay, 5% f-m sand, % of gravels are	
 _ <u>35</u> _				SC	SILTY SANI sand, 25-309 sand, sand a	D WITH GRAVEL (SC) - olive brn (2 % silt, 20% m sand, 10% f gravel (0 nd gravel ang to subang, metamorph	2.5Y 4/3), 30% c 2" to 0.75"), 10% f ic, moist.	Appears to be fining upward

SHEET 2 of 10 PROJECT NUMBER: 326128.01.07.4R							2	BORING NUMBER: MW-41	
						SOIL BORING	LOC	<u> </u>	
PROJECT NAMI IM-3 Hydrog	: eoloaic	Investio	ation. I	PG&E Topo	ck	HOLE DEPTH (ft): 320.0		DRILLING CONTRAC	TOR: n & Wells, Montclair, CA
SURFACE ELEV		N: N			NAD 27 Z 5):	EASTING (CCS NAD 27 Z	5):	DATE STARTED:	DATE COMPLETED:
DRILLING MET	HOD:		2,1	03,330.00		WATER LEVEL (ft):		DRILLING EQUIPME	NT:
Rotos	Cave V	Nash, Pa	rcel No	. 650-151-	06			LOGGED BY:	Gefco SS-15K-HL
	د ب	AMPLE	≿	USCS		JOIL DESCRIPTIC			COMMENTS
(feet)	INTERVA	TYPE/ NUMBER	RECOVER (ft)	CODE	PERCENT COI DENS	SOIL NAME, USCS SYMBOL, MPOSITION, GRADING, GRAIN ITY/CONSISTENCY, STRUCTU	COLOR, I SHAPE, RE, MOI	, MINERALOGY, STURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
		CC2	8.5	SW-SC	WELL GRAE (2.5Y 4/3), 4 5-10% f grav abrupt lower	DED SAND WITH SILT AND 0% f sand, 30% m sand, 10- rel, sand and gravel ang to su boundary.			
 40				SW	WELL GRAD m sand, 20% depth, 5% si	DED SAND WITH GRAVEL (o f sand, 15% c sand, 10% f g lt, moderate caliche developm	orn (7.5YR 4/4), 50% parsening with nd and gravel ang		
					 <u>to subang, m</u> SAND WITH sand, 25% c graded, sand 	etamorphic, moist. I SILT AND GRAVEL (SW-S sand, 10-15% f gravel, 10-15 and gravel ang to subang, m	n (10YR 4/4), 40% m 10% f sand well bhic.		
 <u>45</u>		CC3	9.5	SW-SM	- It to mo	derate caliche	Appears to encounter water table at 45 to 46 ft bgs		
					WELL GRAE (10YR 4/2-4/ sand, ang to - 20% f c	DED SAND WITH GRAVEL ((3), 60% m sand, 15% f sand subang, metamorphic, wet. gravel	(SW) - c , 15% f-	lark grayish brn to brn m gravel, 10% f	
 					- 5% gra	vel, 15% silt			
 		CC4	10		- 30% f <u>c</u> 10% c sa	pravel, 25% vf sand, 15% silt, nd	. 15% f s	sand, 5% m sand,	
	$\left \right $				- brn (10 gravel, 10	YR 4/3), 40% c sand , 15% f 0% c gravel, 5% silt, ang to s	sand, 19 ubang, i	5% m sand, 15% f netamorphic, wet	
									groundwater grab sample collected from 60-70 ft bgs
	\mathbb{V}								Collect grain size sample at 62 to 64 ft, ID: MW-41D-63
	$\left \right $	CC5	10	SW	- 5% silt,	10% f sand, 10% m sand, 60	0% c sa	nd, 5-10% f gravel	Collect grain size sample at 65 to 66 ft, ID: MW-41D-66
 70	$ \rangle$				- increasi bgs	ng silt content, 10% silt at 70	ft bgs,	15% silt at 71 ft	

SHEET 3 of 10 PROJECT NUMBER:								BORING	G NUMBER: MW-41
						SOIL BORING LO	G	<u> </u>	
PROJECT NAM	E: eologia	- Investic	nation [PG&F Topo	ck	HOLE DEPTH (ft):	DRILLING CONTRAC		Aontolair CA
SURFACE ELEV		N: N	IORTH	ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:		DATE COMPLETED:
476.9 ft. DRILLING MET	MSL HOD:		2,1	03,536.66		7,614,578.85	10/22/2004 DRILLING EOUIPME	NT:	11/05/2004
Rotos	onic							Gefco SS-	15K-HL
LOCATION: Bat	Cave	Wash, Pa	arcel No	. 650-151-	06	LOGGED BY: T. McDonald			
	s	SAMPLE				SOIL DESCRIPTION			COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLOR MPOSITION, GRADING, GRAIN SHAPI SITY/CONSISTENCY, STRUCTURE, MO	, MINERALOGY, ISTURE.	DRILLING (DAILY STA REFUSALS	DBSERVATIONS AND OPERATIONS, RT AND END TIMES , DRILL RATE, , SAMPLING AND TESTING NOTES.
 		CC6	9.5		WELL GRAE (10YR 4/2-4/ sand, ang to - 10-15%	DED SAND WITH GRAVEL (SW) - /3), 60% m sand, 15% f sand, 15% f subang, metamorphic, wet.	dark grayish brn to brn [:] -m gravel, 10% f	Stop dril	ling at 80 ft bgs on 10/22/04,
 - 85		CC7	10		- 5-10%	silt		continue	drilling on 10/23/04
 	\mathbb{N}			ML SW	50% silt, 20° and gravel an not sticky, m WELL GRAE sand, 20% n gravel ang to silt < 2 cm th	With GRAVEL (ML) - greenish g % vf sand, 10% f sand, 10% m sand ng to subang, metamorphic, silty plas oist to wet. Abrupt lower boundary (DED SAND WITH GRAVEL (SW) - n sand, 20% c sand, 10% silt, 10% f o subang, metamorphic, moist, disting hick.	ray (GLET1 5/SGT), , 10% f gravel, sand tic, silty sticky to $\leq 2 \text{ cm}$. brn (7.5YR 4/4), 40% f gravel, sand and ct layers of 15-20%		
90 95 		CC8	10	SM	SILTY SANI 20% silt, 15 sand, sand a metamorphic	D WITH GRAVEL (SM) - brn (10YR % f gravel 0.2" to 1", 10% vf sand, 1 nd gravel dominantly ang to subang, c and v few conglomerate, moist.	5/3-4/3), 35% f sand, 0% m sand, 10% c v few subrnd,	Collect g MW-41D	rain size sample at 93 ft, ID: -93
 		CC9	5	SW-SM	SAND WITH sand, 20% f gravel ang to - 15% sil	H SILT AND GRAVEL (SW-SM) - b sand, 20% c sand, 20% f-m gravel, b subang, metamorphic, moist to wet t, 5% f-m gravel	Drilled 1 during re run	00 to 110 ft but dropped core etrieval and recovered on next	
105								•	CH2MHILL

SHEET 4 of 1	.0					PROJECT NUMBER: 326128.01.0	: 7.AR		BORIN	G NUMBER: MW-41
						SOIL BORING L	.OG		1	
PROJECT NAM	eologia	- Investic	ation I	G&F Topo	ick	HOLE DEPTH (ft):	1	DRILLING CONTRAC	TOR:	Montclair CA
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5)):	DATE STARTED:	n a weis,	DATE COMPLETED:
dRILLING MET	HOD:		2,1	03,530.00		7,614,578.85 WATER LEVEL (ft):		DRILLING EQUIPME	NT:	11/05/2004
Rotos	onic Cave V	Wash, Pa	rcel No	. 650-151-	06			LOGGED BY:	Gefco SS	S-15K-HL
								-	T. McDonald	
		SAMPLE				SOIL DESCRIPTION				COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVER) (ft)	CODE	PERCENT COI DENS	SOIL NAME, USCS SYMBOL, CO MPOSITION, GRADING, GRAIN SI ITY/CONSISTENCY, STRUCTURE	DLOR, HAPE, I E, MOIS	MINERALOGY, STURE.	DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
				SW	well GRAD m sand, 30%	DED SAND WITH GRAVEL (SV o c sand, 20% f sand, 15% f-m	N) - br gravel,	n (7.5YR 4/4), 30% , 5% silt, sand and		
 - 110				SW	gravel ang to development dark gray (5' WELL GRAL sand, 15% si metamorphic	subang, metamorphic, moist. N ; silty cemented throughout. Dis (4/1), 90% silt, 10% vf sand. DED SAND (SW) - brn (10YR 4/ ilt, 15% c sand, 10% f gravel, ar c, wet.				
		CC10	14		WELL GRAI 7.5YR 4/3 at 10% f sand, gravel ang to	DED SAND WITH GRAVEL (SV bottom), 30% m sand, 30% c s 5% silt, sand ang to subang and b subrnd, metamorphic, wet.	V) - br and, 2! I fining	n (10YR 4/3 at top, 5% f-c gravel, downwards,		
				SW	- 20% sil	t				
120						CDAVEL (MH) dark hrp (2 EV	(1/2 0	r 4/4) 6E0/ cilt		
					30% f-m ang metamorphic gravels, abru	GRAVEL (MH) - dark brn (2.5Y g to subang gravel up to 2.75", 5 c, med-high elasticity, sticky, plas pt lower boundary.	f 4/3 of 5% clay stic, dr	r 4/4), 65% silt, y, 5% c sand, y, caliche on	Collect	arcia ciza comple et 122 to 124
 		CC11	10	МН	- interber 20% f gr	dded sand with gravels, brn (7.5 avel, 20% m sand, 20% f gravel	YR 4/3 I, 10%), 30% c sand, silt, well graded	ft, ID: 1	YW-14D-123
 					SILTY SANI 30% f sand, metamorphic	D (SW) - dark greenish gray (Y2 20% silt, 10% m-c sand, 10% a c, moist. Moderate caliche devel	2 4/100 ing to s lopmen	G), 30% vf sand, subang gravel, it. Mottled brn	ground	water grab sample collected
 				SW	(7.5YR 4/4) (surface at bo - 80% sil	over 10% of surface, mottling in the other surface, mottling in the other sectors and the other sectors and the sectors and the sectors and the sectors and sector	crease	S LO 5U% OF	rrom 13	90-140 TC DGS
	$\left \right $	CC12	10		WELL GRAI gravel (1/5" metamorphic	DED SAND WITH GRAVEL (SV to 1"), 20% c sand, 10% f sand, c, wet.	№) - 40 , 5% si	0% m sand, 25% f-c ilt, ang to subang,	Collect 137.5 fi	grain size sample at 136.5 to t, ID: MW-14D-137
140					- 10% sil	t, slit horizontal fabric in gravels				
									•	

SHEET 5 of 10 PROJECT NUMBER:							D	BORIN	IG NUMBER: MW-41
						SOIL BORING LO	G		1111-41
PROJECT NAM	E:	- Invectio				HOLE DEPTH (ft):		CTOR:	
SURFACE ELEN	ATIO	N: N		ING (CCS	NAD 27 Z 5):	320.0 EASTING (CCS NAD 27 Z 5):	DATE STARTED:	on & wens,	DATE COMPLETED:
476.9 π. DRILLING ME	MSL HOD:		2,1	03,536.66		7,614,578.85 WATER LEVEL (ft):	10/22/2004 DRILLING EQUIPME	NT:	11/05/2004
Rotos	sonic	Wash Pa	arcel No	650-151-			LOGGED BY:	Gefco S	S-15K-HL
LUCATION: Da				. 050 151				T. McDona	ld
		SAMPLE		USCE		SOIL DESCRIPTION			COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERN (ft)	CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHAP SITY/CONSISTENCY, STRUCTURE, M(R, E, MINERALOGY, DISTURE.	DRILLING DAILY ST REFUSAL	GOBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
 - 145 		CC13	15	SW	WELL GRAI gravel (1/5" metamorphic - dark gr. up to 3", brn (7.5\ - 35% m silt, well cemental	DED SAND WITH GRAVEL (SW) - to 1"), 20% c sand, 10% f sand, 5% c, wet. "ayish brn (10YR 4/2), 40% f sand, 2 , 10% m sand, 5-10% silt, moist. M YR 4/3) I sand, 25% c sand, 25% f sand, 15° graded, caliche development througi tion with depth	40% m sand, 25% f-c o silt, ang to subang, 0% f-c gravel 1/5" lottling in blocks of % gravel, 5-10% hout and increased	Appear	s to be reworked due to drilling
 <u>160</u> 					- brn (10 sand, 35 ang to su)YR 4/3 to 7.5YR 4/3), 5% silt, 10% i% c sand, 10% f gravel, well gradec ubang - metamorphic. Gravels less t	f sand, 40% m l, sand and gravel han 2 cm	lack of gravels brown	fabric, no silt layers around s, color, and blocks of mottled
 - 165 		CC14	10						
 - 170 					WELL GRAI 35% m sand (0.2" avg, up to wet.	DED SAND WITH SILT (SW-SM) 1, 30% f sand, 15% c sand, 10-15% p to 2"), ang to subang with v few su	- brn (7.5YR 4/2 to 4/3), silt, 5-10% f-c gravel Jbang gravel, moist		
 175	\square			SW-SM				Collect 173.5 f	grain size sample at 172.5 to t, ID: MW-41D-173
								•	CH2MHILL

SHEET 6 of	10					PROJECT NUMBER: 326128.01.07	.AR	BORIN	IG NUMBER: MW-41
						SOIL BORING L	OG		
PROJECT NAM	E:	ic Investi	aation	PG&E Topc		HOLE DEPTH (ft):	DRILLING CONTRAC	CTOR:	Montoloir CA
SURFACE ELEN		N: I	NORTH	ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:		DATE COMPLETED:
476.9 tt. DRILLING ME	MSL FHOD:	L	2,1	.03,536.66		7,614,578.85	DRILLING EQUIPMI	ENT:	11/05/2004
Roto	sonic	Mach D		- 650 151-	00	<u> </u>		Gefco S	S-15K-HL
	t Cave	Wash, Pa	arcei no	. 050-151-0	J6 			T. McDonal	ld
	s	SAMPLE	ا ب را			SOIL DESCRIPTION			COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	CODE	PERCENT CO DEN!	SOIL NAME, USCS SYMBOL, COL IMPOSITION, GRADING, GRAIN SH. SITY/CONSISTENCY, STRUCTURE,	.OR, APE, MINERALOGY, MOISTURE.	DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
 - 180		CC15	10		WELL GRAI 35% m sand (0.2" avg, up to wet 5% r sand, 20	DED SAND WITH SILT (SW-SM 1, 30% f sand, 15% c sand, 10-156 p to 2"), ang to subang with v few red mottling (2.5YR 4/6), < 5% silt 1% c sand, 5% gravel			
				sw	WELL GRAI sand, 20% c subang, met	DED SAND WITH GRAVEL (SW) : sand, 20% f sand, 5% silt, 5% gr :amorphic, wet.) - brn (10YR 5/3), 50% m ravel avg 0.5", ang to		
				SP	POORLY G	RADED SAND (SP) - grayish brn	(10YR 5/2), 85% m		
				SW	well GRAI sand, 20% f subang, met	DED SAND WITH GRAVEL (SW) sand, 20% c sand, 5% silt, 5% g tamorphic, wet.) - brn (10YR 5/3), 50% m gravel avg 0.5", ang to		
 <u>190</u> 		CC16	18		SILTY SANI greenish gra m sand, 25% ang to subar development	D WITH GRAVEL (SM) - brn (7.5) IV (GLEY1 4/10Y) and 10% red (10) 6 c sand, 20% silt, 15% f sand, 15 ng with v few subrnd, metamorphi- t, faint fabric with aligned gravels.			
- <u>195</u> 				SM					
					WELL GRAI (7.5YR 4/3) 30% m sand 10% silt, sar developmen	DED SAND WITH SILT AND GR with 10% dark greenish gray (GLE J, 25% c sand, 20% f sand, 15% g nd and gravel ang to subang, meta t, abrupt lower boundary.	AVEL (SW-SM) - brn Y1 4/10Y) mottling, gravel from 0.5" - 2.5", amorphic, silt caliche		
 		V		SW-SM					
210					<u> </u>			•	CH2MHILL

SHEET 7 of 10 PROJECT NUMBER: 326128.01.07.AR							1	BORING NUMBER: MW-41	
						SOIL BORIN	IG LOO	<u> </u>	
PROJECT NAMI IM-3 Hydrog	: eoloaid	: Investio	ation.	PG&E Topo	ck	HOLE DEPTH (ft):		DRILLING CONTRAC	CTOR:
SURFACE ELEV		N: N	IORTH	ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 2 7 614 578 85	7 Z 5):	DATE STARTED:	DATE COMPLETED:
DRILLING MET	HOD:		2,1	.05,550.00		WATER LEVEL (ft):		DRILLING EQUIPME	II/05/2004
LOCATION: Bat	Cave	Wash, Pa	arcel No	. 650-151-	06			LOGGED BY:	Gerco SS-15K-HL
						SOTI DESCRIP	TION		
DEPTH BGS	۔ بر	~	≿	USCS		Sole Procial			
(feet)	INTERV/	TYPE/ NUMBEI	RECOVEI (ft)	CODE	PERCENT CO DENS	SOIL NAME, USCS SYMB MPOSITION, GRADING, GR ITY/CONSISTENCY, STRU	OL, COLOR, AIN SHAPE, CTURE, MOI	MINERALOGY, STURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
		CC17	18	GW-GM	WELL GRAI (7.5YR 4/2), silt, 5% f sar	DED GRAVEL WITH SIL 50% gravel up to 2", 20% id, sand and gravel ang to	D (GW-GM) - brn 20% c sand, 5% etamorphic.	Appears to be coarsening upward sequence 210 to 213 ft bgs	
 				SW-SM	WELL GRAI (7.5YR 4/3) 30% m sand 10% silt, and	DED SAND WITH SILT A with 10% dark greenish gr , 25% c sand, 20% f sand g to subang, metamorphic			
 220				SW	WELL GRAI 4/3), 40% m sand and gra strong calich gravels and d	DED SAND WITH SILT A sand, 30% f sand, 20% c wel ang to subang, metam e development, silt fabric w c sand.	ND GRAVE c sand, 5% s norphic, wet with horizon	EL (SW) - brn (7.5YR silt, 5% gravel, , moderate to tally aligned	Core from 220 to 233 appears to be
				SP	POORLY GF sand, 50% c	RADED SAND (SP) - dark sand, subang, metamorph	c grayish brr nic, wet.	ו (2.5Y 4/2), 50% m	washed out from drilling process
 					WELL GRAI sand, 15% f subang, met - 10% sil - reddish 5-10% g	DED SAND (SW) - brn (7 sand, 10% gravel, 5% silt amorphic, wet, silt cement t brn (5YR 4/3), 45% m sa ravel .5 to 8 cm, moderate	.5YR 5/3), 4 ; sand and g ation. nd, 5-10% s caliche dev	40% m sand, 30% c gravel ang to silt, 10% f sand, relopment	
 		CC18	17						
					- 60-70% - 45% m gravel 0.	o m sand, 20% c sand, 5% sand, 30% c sand, 5-10% 5 to 8 cm	o silt, 5% gr o silt, 10% f	ravel 0.5 - 2 cm sand, 5-10%	
					- 30% m gravel, si	sand, 30% c sand, 10-15 ome caliche, wet	% silt, 15%	f sand, 10-15%	groundwater grab sample collected from 240-250 ft bgs
245	<u>' </u>		<u> </u>						

SHEET 8 of 10 PROJECT NUMBER:								BORIN	IG NUMBER:
							<u>k</u> G		1444-4T
PROJECT NAM	E:	Investig	nation (HOLE DEPTH (ft):	DRILLING CONTRA	CTOR:	
SURFACE ELEV	ATIO	N: N	IORTH	ING (CCS	NAD 27 Z 5):	320.0 EASTING (CCS NAD 27 Z 5):	DATE STARTED:	ion & Wells,	DATE COMPLETED:
476.9 ft.	MSL		2,1	03,536.66		7,614,578.85	10/22/2004 DRILLING EOUIPM	ENT:	11/05/2004
Rotos	sonic			<u> </u>	26			Gefco S	S-15K-HL
LOCATION: Ba	Cave	Wash, Pa	Ircel No	. 650-151-	06		LOGGED BT:	T. McDona	ld
	S	AMPLE				SOIL DESCRIPTION			COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT COI DENS	SOIL NAME, USCS SYMBOL, COLOR MPOSITION, GRADING, GRAIN SHAPI SITY/CONSISTENCY, STRUCTURE, MO	, , MINERALOGY, ISTURE.	DRILLING DAILY ST REFUSAL	G OBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, .S, SAMPLING AND TESTING NOTES.
-		CC19	9	SW	 WELL GRAE sand, 15% f subang, meta reddish (GLEY1 4 sand, 5% 40% f s very few horizonta brn (10' dark gree sand, 20' thin layer reddish 10% f gr. 	 DED SAND (SW) - brn (7.5YR 5/3), sand, 10% gravel, 5% silt, sand and amorphic, wet, silt cementation. brn (5YR 4/4), 5% red (10R 4/8), 5% t/5G) mottled, 60-70% m sand, 10-1 b gravel, some caliche, silty consolida sand, 40% m sand, 10% c sand, 5% c gravel of 4 to 5 cm, silty indurated al gravel, strongest at base YR 5/3) matrix, 60% yellowish red (Senish gray GLEY2 3/5BG mottling, 30 % m sand, 15-20% silt, 5% c sand, 5% or 25-30% silt, abrupt lower bound brn (5YR 4/4), 40% f sand, 35% c savel up to 2 cm, 5% silt, gravel ang filteration. 	40% m sand, 30% c gravel ang to % grayish green 5% silt, 15% f ted silt, 5% f gravel, , slit fabric with 5YR 4/6), 20% v % f sand, 20% vf 5% c gravel, few lary and, 10% m sand, to subang, c sand		
260 - 265 		CC21	9		- red (2.5 sand, 20 weak clay - strong c - 2 to 6 c	5YR 4/4 to 4/6), 5-10% silt/clay, 30% % m sand, 15% gravel, increased inc y films around gravels caliche m gravels from 267 to 268 ft bgs	f sand, 30% c duration, v few		
 - 275 		CC22	5		- prn (5Y sand, 10 ^c - v few s sand, 20 ^c graded, s inches SILTY SANI 30% f sand, subang, little	 K 474), 30% C sand, 25% f gravel up % m sand, 5% clay/silt pots of dk greenish gray (GLEY2 4/56 % m sand, 20% c sand, 10% silt, 10 silty indurated, moderate caliche, strophy D WITH GRAVEL (SM) - dark reddi 25% silt, 20% c sand, 15% gravel, 1 metamorphic, wet, silty indurated, v 	3G) mottling, 40% f % f gravel, well ongest in top 6 sh brn (2.5YR 3/3), 10% m sand, veathered.		
200			I]		1				CH2MHILL

SHEET 9 of 10 PROJECT NUMBER: 326128 01 07 AP							•	BORIN	IG NUMBER: MW-41			
						SOTL BORT		<u> </u>				
PROJECT NAM	IE:	•				HOLE DEPTH (ft):		DRILLING CONTRA	CTOR:			
	geologi VATIO	C Investig		ING (CCS	NAD 27 Z 5):	320.0 EASTING (CCS NAC) 27 Z 5):	WDC Explorat	ion & Wells,	Montclair, CA DATE COMPLETED:		
476.9 ft.	. MSL		2,1	.03,536.66		7,614,578.	.85	10/22/2004		11/05/2004		
DRILLING ME Roto	THOD: sonic					WATER LEVEL (ft):		DRILLING EQUIPM	Gefco S	S-15K-HL		
LOCATION: Ba	t Cave	Wash, Pa	arcel No	. 650-151-	06	-		LOGGED BY:	T. McDona	ld		
	9	SAMPLE				SOIL DESCRIPTION				COMMENTS		
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SY MPOSITION, GRADING, SITY/CONSISTENCY, ST	MBOL, COLOR, GRAIN SHAPE RUCTURE, MOI	, MINERALOGY, STURE.	DRILLING DAILY S REFUSAL	G OBSERVATIONS AND OPERATIONS, TART AND END TIMES , DRILL RATE, .S, SAMPLING AND TESTING NOTES.		
		CC23	5	SM	SILTY SANI 30% f sand, subang, little	D WITH GRAVEL (SM 25% silt, 20% c sand, e metamorphic, wet, silt) - dark reddis 15% gravel, 1 y indurated, w	h brn (2.5YR 3/3), 0% m sand, eathered.				
				SW	WELL GRAI 25% c sand, gravel ang to caliche.	DED SAND (SW) - grav 15% f sand, 10% fines o subang, some metamo	yish brn (10YR 5, 10% gravel i orphic, wet, sil	5/2), 40% m sand, to 0.5", sand and ty indurated, trace				
 - 295 		CC24 15 SILTY SAND (SM) - grayish brn (10YR 5/2), 30' fines, 25% gravel, 20% c sand, 10% f sand, ang metamorphic, wet, moderately indurated. SM SM					l0YR 5/2), 30% 6 f sand, ang t ırated.	6 m sand, 25% o subang, some	Angled bedding plane seen at 301' (photo)			
 300	-			sw	SAND (SW) 30% m sand sand, weath) - dark red (2.5YR 3/6) 1, 25% gravel up to 1.5" ered bedrock, moderate	with brn (7.5) ", 20% c sand, ely indurated, v	/R4/3 clay layer, 15% fines, 10% f vet.				
				BR	CONGLOME 30% c sand, subang, dry,	ERATE (BR) - dark redo 20% f sand, 10% fines strongly indurated.	dish brn (2.5Yl s, 10% gravel (R 3/3), 30% m sand, up to 1.5", ang to				
	-			BR	CONGLOME 30% c sand,	ERATE (BR) - reddish b . 20% f sand, 10% fines	orn (2.5YR 4/4 5, 10% gravel,), 30% m sand, gravel subrnd, dry.				
	-	CC25	15	BR	CONGLOME fines, 20% c	ERATE (BR) - reddish b : sand, 20% subang gra	orn (2.5YR 4/3 vel up to 1", 1), 30% f sand, 20% 0% m sand, wet.				
<u>310</u>					CONGLOMI 30% subang silty indurate	ERATE (BR) - dark rede I gravel to 1.5", 20% f s ed, weathered.	dish brn (2.5Yl and, 10% fine	R 3/3), 30% m sand, s, 10% c sand, dry,				
315	1			L					-			
									- #	CH2MHILL		

SHEET 10 of 10 PROJECT NUMBER: 326128.01.07.AR							R	BORING NUMBER: MW-41
						SOIL BORING LO	G	
PROJECT NAM IM-3 Hydroc	E: Jeologia	Investio	nation. I	PG&F Topc		HOLE DEPTH (ft):		CTOR:
SURFACE ELEV		N: M		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	DATE COMPLETED:
476.9 ft. DRILLING MET	MSL HOD:		2,1	03,536.66		7,614,578.85 WATER LEVEL (ft):	DRILLING EQUIPM	ENT:
Rotos	onic Cave V	Wash Pa	arcel No	650-151-			LOGGED BY:	Gefco SS-15K-HL
								T. McDonald
	S	SAMPLE		UCCC		SOIL DESCRIPTION		COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVER) (ft)	CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLOF MPOSITION, GRADING, GRAIN SHAP SITY/CONSISTENCY, STRUCTURE, MC	t, E, MINERALOGY, DISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
 320		CC26	5	BR	CONGLOME 30% subang silty indurate - silty mc	:RATE (BR) - dark reddish brn (2.5' gravel to 1.5", 20% f sand, 10% fin d, weathered.	Well Completion: TD = 311.5' bgs; Screen Interval = 271 to 291 ft bgs; Filter Pack = 299 - 261 ft bgs; Stick-up Approx = 2.6 ft; Sump = 291 to 311 bgs	
						Boring Terminated at 320 f	t	
					ABBREV cc = coni brn = bro It = light dk = darl vf = very f = fine-c m = mec c = coars vc = very ang = an subang = subrnd = rnd = rou br = bed ss = sanc conglom comptd = qtz = qua	'IATIONS tinuous core run own k r fine-grained grained dium-grained se-grained y coarse-grained ngular = subangular = subangular = subrounded unded rock formation dstone = conglomerate = compacted artz		
			<u> </u>		L			







A2: Injection Well Drilling and Construction Logs

SHEET 1 of 6 PROJECT NUMBER:									BORIN	G NUMBER:	
						SOTI BORING I	00	, <u> </u>		100 1	
PROJECT NAM	E:		an a al . Tu	iantian Am		HOLE DEPTH (ft):		DRILLING CONTR	ACTOR:		
SURFACE ELEV	gation ATIO	N: N	OPOCK IF	IJECTION ARE	ea NAD 27 Z 5):	411.0 EASTING (CCS NAD 27 Z 5)	:	WDC Explora DATE STARTED:	ation & Wells,	Montclair, CA DATE COMPLETED:	
548.0 ft.	MSL		2,1	03,026.39		7,613,368.09		11/12/2004	MENT.	11/19/2004	
DRILLING MEI Mud R	otary					WATER LEVEL (ft):		DRILLING EQUIP	WD0	С 30К	
LOCATION: Eas	t Mesa	a, Parcel	No. 650	-151-06				LOGGED BY:	D. Thomas		
	s	SAMPLE				SOIL DESCRIPTION		I		COMMENTS	
DEPTH BGS	٩٢	£	2	USCS							
(feet)	INTERV	TYPE/ NUMBE	RECOVE (ft)	CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLOR, IPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, ITY/CONSISTENCY, STRUCTURE, MOISTURE.			DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.	
					-see bor	ing log for well OW-1 completed	~60	ft east of IW-1	casing to f core	to 270 ft bgs without collection or chips.	
									easier o	Irilling, some cobbles to 270'	
 									Mud Pr density c/ml, p	operties: viscosity=43 sec, =95 lbs/gal, sand=4.5% cake h=7, filter press=7.8 ml	
270 275		core 1	0		-1" angul	lar metadiorite pieces in shoe			continu ft bgs,	ous 94 mm core started at 270 drilling rate=20ft/hr	
 - 280		core 2	0		-3 rocks	in first few inches of core barrel			chatter 15ft./h	ing, slow drilling, drill rate =	
									•	CH2MHILL	

SHEET 2 of	5					PROJECT NUMBER: 326128.01.07	.DO		BORIN	G NUMBER: IW-1
						SOIL BORING L	OG			
PROJECT NAM	E: igation	PG&F To	opock II	niection Are	ea	HOLE DEPTH (ft):	DRII	LING CONTRAC	CTOR:	Montclair CA
SURFACE ELEV	ATIO	N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DAT	E STARTED:		DATE COMPLETED:
DRILLING ME	HOD:		2,1	03,026.39		WATER LEVEL (ft):	DRI	LING EQUIPME	NT:	11/19/2004
Mud F	lotary st Mesa	a, Parcel I	No. 650)-151-06			LOG	GED BY:	WDC	С 30К
		,							D. Thomas	
		SAMPLE	~	USCS		SOIL DESCRIPTION				COMMENTS
DEPTH BGS (feet)	INTERVAI	TYPE/ NUMBER	RECOVER (ft)	CODE	PERCENT CO	SOIL NAME, USCS SYMBOL, COL MPOSITION, GRADING, GRAIN SH SITY/CONSISTENCY, STRUCTURE,	.OR, APE, MINE MOISTURE	RALOGY, E.	DRILLING DAILY ST REFUSALS	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
 		core 3	0		NO FORMA	L LOG 1" cobbles in core barrel of metad	iorite rock			
		core 4	0	 	-1.5" dia	meter rock in core barrel, metadio	3, 8% gravel,	note: us	sing finger bit to core	
 		core 5	0.5	SW/GP	ang-subang. - angular	metadiorite cobbles up to 1"				
		core 6	0.08		-more gr	avely	drilling	rate=30ft/hr		
		core 7	0.25		GRAVELLY -sand w/	WELL GRADED SAND	5", suban	g	dropped	d core barrel in hole
		core 8	0.25	SW/SP	-metadio	rite cobbles cored, .5" w/loose col	obles, ang			
		core 9	0.33		WELL GRAI	DED SAND WITH SILT AND GR	AVEL -me	ed olive brn	drilling	rate=15ft/hr
 		core 10	0.5	SW/SM	5Y4/4, 15%	gravel, up to .5", ang-subang, 8%	fines.			
305 		core 11	0.67		POORLY GI 10R3/4, up t	RADED FINE SAND WITH GRA to .25" gravel ang-subang, <10%f	/EL -dk re ines.	eddish-brn	drilling	rate=10ft/hr
310					-metadio	rite cobbles			drilling	rate=10ft/hr
		core 12	0.33							
	I	1	L]		1				•	CH2MHILL

SHEET 3 of	6					PROJECT NUMBER: 326128.01.07.DO IW-1			
						SOIL BORING LO	G		
PROJECT NAM	IE: tigation	PG&F To	nock Ir	niection Ar	ea	HOLE DEPTH (ft):		RACTOR:	
SURFACE ELE	VATIO	N: N	IORTH	ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	DATE COMPLETED:	
DRILLING ME	THOD:		2,1	03,026.39		7,613,368.09 WATER LEVEL (ft):	DRILLING EQUI		
Mud I	Rotary	a Parcel I	No 650	-151-06			LOGGED BY:	WDC 30K	
LUCATION: La			10.050	151 00				D. Thomas	
		SAMPLE				SOIL DESCRIPTION		COMMENTS	
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHAR SITY/CONSISTENCY, STRUCTURE, M	R, PE, MINERALOGY, DISTURE.	DRILLING OBSERVATIONS AND OPERATIONS DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
		core 13	0.25		POORLY GF 10R3/4, up t -8-10% g	RADED FINE SAND WITH GRAVE o .25" gravel ang-subang, <10%fin gravel, fine sand	EL -dk reddish-brn es.	drilling rate=12ft/hr chattering	
<u> </u>	- \ \	core 14	0.25					chattering drilling rate-8ft/br	
325	-				-dk reddi	sh brn 10R2/4		drilling rate=15ft/hr	
		tricone cuttings	0					deilling rote_200 /br	
 335		tricone cuttings	0	SP					
	-	tricone	0		-Hard coi metamor pepper" a	nsolidated material, metadiorite qua phic bedrock, very uniform size, ang appearance	rtzite and gular, "salt &	drilling rate =15ft/hr	
	\							softer drilling	
340	-							drilling rate =20ft/hr	
 _ <u>345</u>		tricone cuttings	0						
		tricone cuttings	0					drilling rate=15ft/hr	
350									

SHEET 4 of	5					PROJECT NUMBER: 326128.01.07.D	0	BORING NUMBER: IW-1		
						SOIL BORING LO	G			
PROJECT NAM IM-3 Invest	E: igation	PG&E To	pock Ir	niection Ar	ea	HOLE DEPTH (ft):		CTOR:		
SURFACE ELEN		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5): 7 613 368 00	DATE STARTED:	DATE COMPLETED:		
DRILLING MET	HOD:		2,1	05,020.59		WATER LEVEL (ft):	DRILLING EQUIPM	ENT:		
LOCATION: East	st Mesa	a, Parcel	No. 650	-151-06			LOGGED BY:			
CAMPLE										
DEPTH BGS (feet)	, ,		≿	USCS		Sole Description				
	INTERVA	TYPE/ NUMBEF	RECOVEF (ft)	CODE	PERCENT COI DENS	SOIL NAME, USCS SYMBOL, COLOI MPOSITION, GRADING, GRAIN SHAP SITY/CONSISTENCY, STRUCTURE, MC	R, E, MINERALOGY, DISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.		
		tricone cuttings	0		POORLY GF 10R3/4, up to	RADED FINE SAND WITH GRAVE o .25" gravel ang-subang, <10%fine	:L -dk reddish-brn 25.	drilling rate=12ft/hr		
355	\leq	tricone	0							
	\vdash	cuttings						harder		
 360		core 15	0.17					drilling rate=12ft/hr		
	$\overline{}$	core 16	0.04							
 <u>365</u> -		tricone cuttings	0		BEDROCK (reddish brow metamorphic deposits. -Hard co	(BR) - mixture of metamorphic rocks on conglomerate, and silty sandstone c / felsic rock fragments, may be sor onsolidated material, "salt & pepper"	s, consolidated e, v hard ne megabreccia appearance	drilling rate=6ft/hr		
		tricone cuttings	0					drilling rate=30ft/hr		
 375		tricone cuttings	0					drilling rate=19ft/hr. cuttings coarser 375-377 cuttings coarser		
	$ \rangle$									
 <u>380</u>		tricone cuttings	0					drilling rate=19ft/hr		
 		tricone	0					drilling rate=19ft/hr		
		ı			1					

SHEET 5 of	6					PR	OJECT NUMB 326128.0	ER: 1.07.DC	,	BORIN	IG NUMBER: IW-1		
						SOI	L BORING	G LOO	G				
PROJECT NAM	IE:	PG&F To	nock Ir	niection Ar	22	HOLE D	HOLE DEPTH (ft): DRILLING CONTRA			ACTOR:	CTOR:		
SURFACE ELEVATION: NORTHING (CCS NAD 27 Z 5):						EASTIN	G (CCS NAD 27	Z 5):	DATE STARTED:	alion & weils,	DATE COMPLETED:		
548.0 ft DRILLING ME	. MSL THOD:		2,1	03,026.39		WATER	7,613,368.09		11/12/2004 DRILLING EQUIP	MENT:	11/19/2004		
Mud F	Rotary	Darcel	No. 650	-151-06			'		LOGGED BY:	WD	C 30K		
										D. Thoma	D. Thomas		
		SAMPLE				SOIL DESCRIPTION					COMMENTS		
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO	SOIL NA MPOSITIO SITY/CONS	ME, USCS SYMBO N, GRADING, GRA SISTENCY, STRUCT	L, COLOR, IN SHAPE URE, MOI	, MINERALOGY, ISTURE.	DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.		
 - 390 395 		tricone cuttings core button bit 1	0	BR	BEDROCK (reddish brow metamorphic deposits.	(BR) - mix vn conglom c / felsic rc	ture of metamorpi herate, and silty sa ick fragments, ma	nic rocks, indstone, y be some	consolidated v hard e megabreccia	drilling	rate=19ft/hr		
 - 400 - 		core button bit 2 core button	0							drilling	rate=14ft/hr, chatter		
 	-	bit 3								drillina	rate=14ft/hr		
 		core button bit 4	0		ABBREV cc = con brn = bro lt = light dk = dar vf = very f = fine- <u>c</u> m = mee c = coars vc = very	E VIATIONS tinuous co own k / fine-grain grained dium-grain se-grained y coarse-gr	Boring Terminated Fre run Hed ed	at 411 ft					
										•	CH2MHILL		

SHEET 6 of 6						I	PROJECT NUMBER: 326128.01.07.DO					BORING NUMBER: IW-1		
						SC	DIL BO	ORING	LOC	G				
PROJECT NAME: IM-3 Investigat	tion P(G&F To	nock Ir	niection Are	22	HOL	E DEPTH (ft):			NTRACT	OR:	Montolair CA	
SURFACE ELEVAT	ION:	N	ORTH	ING (CCS	NAD 27 Z 5):	EAST	TING (CCS	5 NAD 27 Z 5	;):	DATE STARTE	D:		DATE COMPLETED:	
548.0 ft. MS)D:		2,1	03,026.39		WAT	7,613 ER LEVEL	(ft):		DRILLING EQ	UIPMEN	IT:	11/19/2004	
Mud Rota	ary Aoca E	Darcel N	lo 650	-151-06						LOGGED BY:		WDC	С ЗОК	
LOCATION: Last M	iesa, r		10. 050	-151-00								D. Thomas		
	SA	MPLE				SOIL DESCRIPTION				COMMENTS				
DEPTH BGS (feet)	INIEKVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.					1	DRILLING DAILY ST REFUSALS	OBSERVATIONS AND OPERATIONS ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES		
					ang = an subang = subrnd = rnd = rou br = bed ss = sand conglom comptd = qtz = qua	ngular = suban = subrou unded lrock fo dstone = cong = comp artz	ngular unded rmation glomerate pacted							
					I							•	CH2MHILL	
SHEET 1 of 8	3					PROJECT NUMBER: 326128.01.07.A	R	BORING NUMBER: IW-2						
----------------------------	------------------	-----------------	-----------------	-----------	---------------------	--------------------------------------------------------------------------------------------------------------------------	----------------------------------	---------------------------------------------------------------------------------------------------------------------	--	--				
						SOIL BORING LO	G							
PROJECT NAM IM-3 Hydrod	E: eologia	: Investig	ation, I	G&E Topo	ck	HOLE DEPTH (ft): 412.0	DRILLING CONTRA	ACTOR: tion & Wells, Montclair, CA						
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	DATE COMPLETED:						
DRILLING MET	HOD:		2,1	05,104.94		WATER LEVEL (ft):	DRILLING EQUIPM	12/10/2004 1ENT:						
Mud R	otary st Mesa	, Parcel I	No. 650	-151-06			LOGGED BY:	WDC 30K						
	د ا ب	SAMPLE	≻	USCS		SOIL DESCRIPTION		COMMENTS						
(feet)	INTERVA	TYPE/ NUMBER	RECOVER (ft)	CODE	PERCENT COI DENS	SOIL NAME, USCS SYMBOL, COLOF MPOSITION, GRADING, GRAIN SHAP ITY/CONSISTENCY, STRUCTURE, MC	R, E, MINERALOGY, DISTURE.	DRILLING OBSERVATIONS AND OPERATION DAILY START AND END TIMES , DRILL RAT REFUSALS, SAMPLING AND TESTING NOTE						
					- began c	ng log for well OW-2 completed ~50 collecting chips at 200 ft at 10 ft inter prphic angular rock fragments, typica	rvals	chatter from 200-210 ft, slow hard drilling, penetration rate from 200-220 ft is 33 ft/hr						
210														
								÷						

SHEET 2 of 8	3					PROJECT NUMBER: 326128.01.07.AR BORING NUMBER: IW-2				
						SOIL BORING LO)G			
PROJECT NAM IM-3 Hydrog	E: eologia	c Investic	ation, I	PG&E Topo	ck	HOLE DEPTH (ft): 412.0	DRILLING CONTR	ACTOR: ation & Wells, Montclair, CA		
SURFACE ELEV		N: N	IORTH	ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5): 7 613 363 87	DATE STARTED: 12/13/2004	DATE COMPLETED:		
DRILLING MET	HOD:		2,1	05,101.51		WATER LEVEL (ft):	DRILLING EQUIPM	MENT:		
Mud R	otary st Mesa	a, Parcel I	No. 650	-151-06			WDC 30K			
	د ا بـ	SAMPLE	≿	USCS		SOIL DESCRIPTION				
(feet)	INTERVA	TYPE/ NUMBER	RECOVER (ft)	CODE	PERCENT COI DENS	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHAI SITY/CONSISTENCY, STRUCTURE, M	PR, PE, MINERALOGY, OISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.		
 - 215 					NO FORMAI	L LOG subang metamorphic rock chips, typ	oical chip size ~3 mm	slow drilling but no chatter, possible circulation problems		
 220 					- ang to s ~5 mm	subang metamorphic rock fragment	s, typical chip size	slow drilling but no chatter, penetration rate from 220-240 ft is 46 ft/hr, not running sanders, sand = 2%		
								penetration rate from 240-260' is 46 ft/hr, viscosity = 43 sec, density 9 lbs/gal, sand <0.5%, pH=8		
245										

SHEET 3 of 8 PROJECT NUMBER:									IG NUMBER: TW-2		
						SOIL BORING LO)G		111 2		
PROJECT NAM	E:	Invoctio	nation [C%E Topo	ock.	HOLE DEPTH (ft):	DRILLING CONTR	ACTOR:	Marshalata CA		
SURFACE ELEV	ATIO	N: N		ING (CCS	NAD 27 Z 5):	412.0 EASTING (CCS NAD 27 Z 5):	DATE STARTED:	ation & wells,	DATE COMPLETED:		
546.5 ft.	MSL		2,1	03,104.94		7,613,363.87	12/13/2004	MENT:	12/16/2004		
Mud R	otary							WD	С 30К		
LOCATION: Eas	st Mesa	, Parcel I	No. 650	-151-06			LOGGED BY:	S. Mellon	S. Mellon		
	s	SAMPLE		11666		SOIL DESCRIPTION			COMMENTS		
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVER) (ft)	CODE	PERCENT COI DENS	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHA SITY/CONSISTENCY, STRUCTURE, M	DR, PE, MINERALOGY, IOISTURE.	DRILLING DAILY ST REFUSAL	GOBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.		
 - 250 					- ang to s ~3 mm	L LOG subang metamorphic rock fragmen	ts, typical chip size				
 					- typical o	chip size ~5 mm		improv penetra psi); pe is 100 t	ed pump circulation and ation rate (~2100psi was 1300 enetration rate from 260-280 ft ft/hr		
 - <u>265</u> 											
 - 270 					- typical (chip size ~10 mm					
 275 											
280								•	CH2MHILL		

SHEET 4 of 8	3					PROJECT NUMBER: 326128.01.07.AR BORING NUMBER: IW-2				IG NUMBER: IW-2
						SOIL BORING	LOG	ì		
PROJECT NAM	E:	- Investic	nation [G&F Topo	ick	HOLE DEPTH (ft):			RACTOR:	Montolair CA
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5)):	DATE STARTED:		DATE COMPLETED:
DRILLING MET	HOD:		2,1	03,104.94		WATER LEVEL (ft):		DRILLING EQUIP	MENT:	12/16/2004
Mud R	totary st Mesa	, Parcel I	No. 650	-151-06			\rightarrow	LOGGED BY:	WDO	С 30К
						S. Mellon				
	S	SAMPLE				SOIL DESCRIPTION	l 			COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVER' (ft)	CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, CO MPOSITION, GRADING, GRAIN S SITY/CONSISTENCY, STRUCTURE	SOIL NAME, USCS SYMBOL, COLOR, IPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, ITY/CONSISTENCY, STRUCTURE, MOISTURE.			OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
 - 285 					NO FORMA - ang to s ~15 mm	L LOG subang metamorphic rock fragm	ients, t	ypical chip size		
 									viscosit pH=8,	y = 33 sec, density 9 lbs/gal, sand <0.5%
 - 295 										
- – - – - <u>300</u> - – –					- ang to : 5-10 mm	subang metamorphic rock fragm າ	ients, t	ypical chip size	chatter	
 <u>- 305</u> 										
 - 310 					- same a	s above, typical chip size ~3 mm	n			
315					<u> </u>				•	CH2MHILL

SHEET 5 of 3	3					PROJECT NUMBER:	PROJECT NUMBER: 326128.01.07.4R BORING NUMBER: IW-2				
							ĸ G		111-2		
PROJECT NAM	E:	Investig	nation (HOLE DEPTH (ft):	DRILLING CONTRA	ACTOR:			
SURFACE ELEV	Jeologic /ATIOI	N: N	IORTH	ING (CCS	NAD 27 Z 5):	412.0 EASTING (CCS NAD 27 Z 5):	DATE STARTED:	tion & Wells,	DATE COMPLETED:		
546.5 ft.	MSL		2,1	03,104.94		7,613,363.87	12/13/2004	IFNT:	12/16/2004		
Mud F	lotary			151.00				WDC 30K			
LOCATION: East	st Mesa	, Parcel	No. 650	-151-06			LOGGED BY: S. Mellon				
	s	SAMPLE				SOIL DESCRIPTION			COMMENTS		
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLOR MPOSITION, GRADING, GRAIN SHAPI SITY/CONSISTENCY, STRUCTURE, MO	t, E, MINERALOGY, DISTURE.	DRILLING DAILY ST REFUSAL	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.		
 - 320 					- sedime	nts felt too soft for good recovery		tripping and kri 320 ft	g out to set up split core barrel ss bit, attempting to core from		
			0.75		- typical - core bla gneiss, q veins (>:	chip size ~5 mm ack green gray metamorphic rock. Ro uartzite, some evidence of oxidation 1 mm) various orientation	ock types include at joint faces, slim	continu viscosit pH=8,	ious coring started at 330 ft bgs. ty = 36 sec, density 9 lbs/gal, sand <0.5%, 30 ft/hr		
			0.5		- black g (metadio minor fel	reen metamorphic rock, salt and pep rite?), some oxidation at joints, some sic rock fragments	per look e qtz veins (<1mm),	possibl viscosit pH=8,	e bedrock encountered cy = 36 sec, density 8.9 lbs/gal, sand <0.5%, 75 ft/hr		
			0.5		- chips aı size ~5m some joir	ng to subang metamorphic rock fragr nm, core gneiss, black white rock, oxi nts, minor felsic rock fragments	43 ft/h	r			
			0.17		- core sa	me, less felsic rock fragments	r				
								- 2	CH2MHILL		

SHEET 6 of	8					PROJECT NUMBER: 326128.01.07.AR BORING NUMBER: IW-2					
						SOIL BORING L	.OG	I			
PROJECT NAM	E:	- T			- els	HOLE DEPTH (ft):	DRILLING CONT	RACTOR:			
	Jeologic /ATIO	N:	NORTH	ING (CCS	NAD 27 Z 5):	412.0 EASTING (CCS NAD 27 Z 5):	WDC Explo	ration & Wells,			
546.5 ft	MSL		2,1	03,104.94		7,613,363.87	12/13/2004		12/16/2004		
DRILLING ME Mud F	Rotary					WATER LEVEL (ft):	DRILLING EQUIP	MENI: WD	С 30К		
LOCATION: Ea	st Mesa	a, Parcel	No. 650	-151-06		•	I				
	s	SAMPLE				SOIL DESCRIPTION			COMMENTS		
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, CO MPOSITION, GRADING, GRAIN SH SITY/CONSISTENCY, STRUCTURE,	LOR, IAPE, MINERALOGY, MOISTURE.	DRILLING DAILY ST REFUSAL	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.		
			0.67		BEDROCK (reddish brow metamorphic deposits. - chips sa metamor	(BR) - mixture of metamorphic rc vn conglomerate, and silty sandsto c / felsic rock fragments, may be ame, typical chip size 3 mm, core phic rock, oxidation on some joint	ocks, consolidated one, v hard some megabreccia is black white t surfaces	switche trying s	ed to solid core barrel slower rotation		
			0.42					viscosi	ty = 42 sec, density 8.8 lbs/gal		
			0.58	-	- metam (qtz filled	orphic rock, black green gray, 1 n 1) oblique to core axis	nm wide fractures veins	trying f	faster rotation		
			0		- chips sa	ame, typical chip size ~ 5mm					
			0		- metam	orphic rock with oxidation on som	ne joint surfaces gneiss,				
 			0.38		4 mm wi	de qtz vein					
			0.33		- metam (gneiss c core axis	orphic rock black green gray, salt or metadiorite), 1 mm wide qtz fill ;	and pepper look ed vein parallel with	viscosit	ty = 37 sec, density 8.8 lbs/gal		
 375			0					6.8 ft/ł	nr		
			0.33		- same w	vith oxidation on joint surface		5.8 ft/ł	nr		
 380			0.63	•	- same b red brn)	ut with traces of consolidated allu	uvial material (c sand,	21 ft/h	r		
			0.46	BR	- same b graded f	ut larger piece of consolidated all sand to f gravel, grain supported	21.4 ft,	/hr			
 <u>385</u>			0								
								•	CH2MHILL		

SHEET 7 of	8					PROJECT NUMBER: 326128.01.07.AR BORING NUMBER: IW-2					
						SOIL BORING LO	<u>`</u> G		111 2		
PROJECT NAM	IE:	Investig	nation			HOLE DEPTH (ft):	DRILLING CONTRA	CTOR:	TOR:		
	VATIO	N: N	IORTH	ING (CCS	NAD 27 Z 5):	412.0 EASTING (CCS NAD 27 Z 5):	DATE STARTED:	tion & Wells,	DATE COMPLETED:		
546.5 ft	. MSL		2,1	03,104.94		7,613,363.87	12/13/2004	IENT	12/16/2004		
Mud I	Rotary							WDC	С 30К		
LOCATION: Ea	st Mesa	, Parcel I	No. 650	-151-06							
	s	AMPLE				SOIL DESCRIPTION			COMMENTS		
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	CODE	PERCENT COI DENS	SOIL NAME, USCS SYMBOL, COLOR MPOSITION, GRADING, GRAIN SHAPP IITY/CONSISTENCY, STRUCTURE, MO	, MINERALOGY, ISTURE.	DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.		
	-		0.13		BEDROCK (reddish brow metamorphic deposits.	BR) - mixture of metamorphic rocks, in conglomerate, and silty sandstone, : / felsic rock fragments, may be som	consolidated v hard e megabreccia				
 390	-		0		- metamo oxidation	orphic rock, salt and pepper look (me I on joint surface	tadiorite?)	25 ft/hr			
	-		0					25 ft/hr			
 395			0					19 ft/hr			
	-		0					pH=8,	y = 39 sec, density 8.8 lbs/gal, sand <0.5%		
400			0		- mixture	of broken up rock ~0.5" to 2" combi	nation of				
 - 405			0.42		metamor supported	phic rock and consolidated alluvial ma	aterial - grains				
 - 410	-		0								
					·	Boring Terminated at 412 ft					
					ABBREV cc = conf brn = bro lt = light dk = darl vf = very f = fine- <u>c</u> m = med c = coars	TATIONS tinuous core run own k r fine-grained grained lium-grained se-grained					
								-	CH2MHILL		

SHEET 8 of 8	3					PROJECT NUMBER: 326128.01.07.AR			BORIN	IG NUMBER: IW-2	
						SOIL BO	RING LOO	G			
PROJECT NAME	E:	Invoctio	otion (DC%E Tono		HOLE DEPTH (ft)):	DRILLING CONTRAC	CTOR:	M	
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	412 EASTING (CCS N	2.0 IAD 27 Z 5):	DATE STARTED:	on & wells,	DATE COMPLETED:	
546.5 ft.	MSL		2,1	03,104.94		7,613,3 WATER EVEL (f	63.87 †):	12/13/2004 DRILLING EOUIPME	INT:	12/16/2004	
Mud R	otary					<u>.</u>			WD	С 30К	
LOCATION: Eas	t Mesa	, Parcel I	No. 650	-151-06				LOGGED BY:	S. Mellon		
-	s	AMPLE				SOIL DES	CRIPTION			COMMENTS	
DEPTH BGS (feet)	INTERVAL					SOIL NAME, USCS MPOSITION, GRADIN SITY/CONSISTENCY,	SYMBOL, COLOR, NG, GRAIN SHAPE STRUCTURE, MOI	DRILLING DAILY ST REFUSAL	G OBSERVATIONS AND OPERATIONS, TART AND END TIMES , DRILL RATE, .S, SAMPLING AND TESTING NOTES.		
					vc = very ang = an subang = subrnd = rnd = rou br = bed ss = sand conglom comptd = qtz = qua	v coarse-grained gular = subangular = subrounded unded rock formation distone = conglomerate = compacted artz					
					I				•	CH2MHILL	



SHEET 1 of	3		2	BORING NUMBER: IW-3				
						SOIL BORING LO	G	111 5
PROJECT NAM	E:	Investic	ation F	PG&F Topo	ck	HOLE DEPTH (ft):	DRILLING CONTRAC	CTOR:
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	DATE COMPLETED:
551.4 ft. DRILLING ME	. MSL THOD:		2,1	03,007.18		7,613,237.80 WATER LEVEL (ft):	12/16/2004 DRILLING EQUIPME	12/18/2004
Mud F	Rotary	Parcel I	No 650	-151-06		<u> </u>	LOGGED BY:	WDC 30K
		, i dicci i	140. 050	151 00			Gray, M. Godwin	
	S	AMPLE				SOIL DESCRIPTION		COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLOR MPOSITION, GRADING, GRAIN SHAPE ITY/CONSISTENCY, STRUCTURE, MO	, MINERALOGY, ISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
0 					NO FORMA -see bori	L LOG ng log for well OW-5 completed ~50	ft west of IW-3	large cobbles? drilling rate 12 ft/hr
355						DATE (BD) - mixture of metamorph	ic rocks	continuous coring started at 355 ft bas
	.				consolidated	reddish brown conglomerate, and sill	ty sandstone, v hard	lost circulation. bit pluaaed
	-				deposits. Br	n 7.5YR4/3 with reddish brn 5YR5/4 r	nottling, 20% f to	
	·		0.83		fragments.	o c ang to subang gravel up to 1/4", r	nostly metadlorite	
	-							
	-				- very ha	rd consolidated material, "salt and pe	pper" look	drilling rate 24 ft/hr
 <u>365</u> 								very hard
 				BR				
 - 375 	-							
					- very un	iform cuttings, all ang cuttings		
385								

SHEET 2 of 3	3					PROJECT NUMBER:	P	BORIN	G NUMBER: TW-3	
						SOIL BORING LO	G		111 5	
PROJECT NAM	E:	. T			alı	HOLE DEPTH (ft):	DRILLING CONTRAC	CTOR:		
	ATIO	N: N		ING (CCS	NAD 27 Z 5):	411.0 EASTING (CCS NAD 27 Z 5):	DATE STARTED:	on & Wells,	DATE COMPLETED:	
551.4 ft.	MSL		2,1	03,007.18		7,613,237.80	12/16/2004	ENT:	12/18/2004	
Mud R	otary							WDO	C 30K	
LOCATION: Eas	st Mesa	, Parcel I	No. 650	-151-06			EUGGED BY:	Gray, M. Go	dwin	
	S	SAMPLE				SOIL DESCRIPTION			COMMENTS	
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	CODE	PERCENT CO	SOIL NAME, USCS SYMBOL, COLOR MPOSITION, GRADING, GRAIN SHAP SITY/CONSISTENCY, STRUCTURE, MO	R, É, MINERALOGY, DISTURE.	, MINERALOGY, DAILY START AND END TIMES , DAILY START AND END TIMES , DR STURE. REFUSALS, SAMPLING AND TESTIN		
 - 390 					BEDROCK (reddish brow metamorphic deposits. Br m sand, 20% fragments.	(BR) - mixture of metamorphic rocks <i>n</i> conglomerate, and silty sandstone c / felsic rock fragments, may be som n 7.5YR4/3 with reddish brn 5YR5/4 6 c ang to subang gravel up to 1/4",	;, consolidated , v hard ne megabreccia mottling, 20% f to mostly metadiorite	drilling	rate 21 ft/hr	
				BR						
 - 410										
					ABBREV cc = com brn = bro It = light dk = dar vf = very f = fine-c m = mec c = coars vc = very	Boring Terminated at 411 fr /IATIONS tinuous core run own k / fine-grained grained dium-grained se-grained y coarse-grained	t			
								•	CH2MHILL	

SHEET 3 of 3						PROJECT NUMBER: BORING NUMBER 326128.01.07.AR IW-3				UMBER: IW-3		
						SOIL B	ORING LO	G	I			
PROJECT NAME:	ologic	Invoctio	untion [C%E Topo		HOLE DEPTH	(ft):	DRILLING CON	TRACTOR:	Velle Meet		
SURFACE ELEVA		l: N		ING (CCS	NAD 27 Z 5):	EASTING (CC	411.0 S NAD 27 Z 5):	DATE STARTED	ioration & v	DAT	re completed:	
551.4 ft. M			2,1	03,007.18		7,61 WATER I EVEI	3,237.80	12/16/2004 DRILLING EOU	IPMENT:	12	/18/2004	
Mud Rot	ary									WDC 30K		
LOCATION: East	Mesa,	Parcel N	No. 650	-151-06				LOGGED BY:	E. Gray, N	M. Godwin		
	S	AMPLE				SOIL D	ESCRIPTION				COMMENTS	
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT COI DENS	SOIL NAME, US MPOSITION, GRA ITY/CONSISTEN	SCS SYMBOL, COLOR DING, GRAIN SHAPI CY, STRUCTURE, MO	t, E, MINERALOGY, ISTURE.	DRIL DAI REF	LING OBS	ERVATIONS AND (AND END TIMES , MPLING AND TES	DPERATIONS, DRILL RATE, TING NOTES.
					ang = an subang = subrnd = rnd = rou br = bed ss = sand conglom comptd = qtz = qua	gular subangular subrounded inded rock formation dstone = conglomerate = compacted artz						
	1				·					CI	H2MHILL	



A3: Compliance Well Drilling and Construction Logs

SHEET 1 of 9 PRC							CT NUMBER: 326128.01.07	.AR		BORIN	G NUMBER: CW-1	
						SOIL B	ORING L	OG				
PROJECT NAM	E: eologia	Investio	ation [PG&F Topo	rck	HOLE DEPTH	I (ft):	DRILLIN			Montolair CA	
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (C	CS NAD 27 Z 5):	DATE ST	ARTED:		DATE COMPLETED:	
563.8 ft. DRILLING MET	MSL HOD:		2,1	02,692.93		7,6 WATER LEVE	513,263.17 EL (ft):	01/04/200 DRILLIN	05 IG EQUIPMEI	NT:	01/13/2005	
Rotos	onic t Mesa	Area Bl	Milano	1				LOGGED	BY:	Speeds	tar 15K	
LUCATION. Lus	. 11030	Alcu, D							т	. McDonal	d	
	S	SAMPLE				SOIL	DESCRIPTION				COMMENTS	
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	CODE	PERCENT COI DENS	SOIL NAME, L MPOSITION, GR ITY/CONSISTEI	JSCS SYMBOL, COL ADING, GRAIN SHA NCY, STRUCTURE, I	.OR, APE, MINERAL MOISTURE.	OGY,	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.		
				SP-SC	POORLY GF gravel m-c, 3 ang-subang, POORLY GF 5YR4/4, 40% f-sand, ang-s reddish-brn 5	RADED SAND V RO% c sand, 200 wet sand and g RADED SAND V o m-sand, 20% subang, igneous syR3/4 and grni	WITH GRAVEL (S % m sand, 5% f sa ravel, igneous / m WITH SILTY CLA c-sand, 15% f-gra / metamorphic, m sh-gry GLEY1 5/50	SP) -brn (7.5Y and, <5% silt, netamorphic, m YY (SP-SC) -rr wel, 15% clay- nottles of dk GY, massive.	(R5/4), 40% hassive. eddish brn silt, 10%	Conduct casing to of core. in unsate state state groundw from 10 possible have be bgs	tor casing set to 10 ft bgs, wash to 100 ft bgs without collection Per work-plan, drilled interval turated zone was not logged.	
102	1										<u>August</u>	
										-	GHZMHILL	

SHEET 2 of 9)					PROJECT NUMBER: 326128.01.07	AR	BORIN	NG NUMBER: CW-1
						SOIL BORING L	OG		
PROJECT NAM	E:	- Investig	nation (PG&F Tone	rck	HOLE DEPTH (ft):		CTOR:	Montolair CA
SURFACE ELEV		N:		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:		DATE COMPLETED:
563.8 ft. DRILLING MET	MSL HOD:		2,1	02,692.93		7,613,263.17 WATER LEVEL (ft):	DRILLING EQUIPME	ENT:	01/13/2005
Rotos	onic t Mesa	Δrea B	IMLand	4			LOGGED BY:	Speed	star 15K
LUCATION. Luc		Alcu, D		- 				T. McDona	ld
	5	SAMPLE				SOIL DESCRIPTION		<u> </u>	COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	CODE	PERCENT COI DENS	SOIL NAME, USCS SYMBOL, COL MPOSITION, GRADING, GRAIN SH/ ITY/CONSISTENCY, STRUCTURE,	OR, APE, MINERALOGY, MOISTURE.	DRILLING DAILY S ⁻ REFUSAI	G OBSERVATIONS AND OPERATIONS, TART AND END TIMES , DRILL RATE, .S, SAMPLING AND TESTING NOTES.
 - 110 		S1	16	SP	POORLY GF 5/4, 50% m clay/silt, ang bedding, soft	RADED SAND WITH GRAVEL (S sand, 20% c-sand, 15% f-c grave -subang, igneous/meta., faint grav -firm in intervals.	iP) -reddish brn 5YR4/4 to I, 10% f-sand, 5% <i>v</i> el-fabric and v-faint		
 <u>115</u> 					SILTY SANI f-sand, 15%	D (SM) -lt yellowish-gry 2.5Y 6/2, silt, 10% m-sand, 5% c-sand, sof	40% m-sand, 30% t, dry, massive.		
 - 120 					- brn7.5Y 15% f-gr metamor	A 4/3-5/3, 25% c-sand, 25% m-s avel, 15% f-sand, ang-subang, igr phic, massive, .5 cm-3cm, wet	and, 20% clay/silt, neous and	100-12 collect CW1-1	20ft bgs open hole, bailed and water sample, sample ID: 20 @14:15
 <u>125</u> 				SM					
 - 130 		S2	20		- brn 10Y 10% f-gr .5-1cm, r	R 4/3-5/3, 30% m-sand, 25% c-s avel, 10% f-sand, ang-subang, igr nassive	and, 25% clay/silt, neous/metamorphic,		
 <u>135</u> 				SP	POORLY GF reddish-gray c-sand, 10% development	tADED SAND WITH SILT AND (5YR4/3) to dk-gray (7.5YR4/1), 5 f-sand, 10% clay/silt, 10% f-c gra , moist to drier.	GRAVEL (SP) -dk 50% m-sand, 20% avel, hard w/caliche		
140								•	CH2MHILL

SHEET 3 of 9						PROJECT NUMBER: BORING NUMBER: 326128.01.07.AR CW-1			IG NUMBER: CW-1	
						SOIL BORING L	DG			
PROJECT NAM	E:	- T			alı	HOLE DEPTH (ft):	DRILLING CONTRAC	TOR:		
	eologic /ATIO	N:	IORTH	ING (CCS	NAD 27 Z 5):	360.0 EASTING (CCS NAD 27 Z 5):	DATE STARTED:	on & Wells,	Montclair, CA DATE COMPLETED:	
563.8 ft.	MSL		2,1	02,692.93		7,613,263.17	01/04/2005	NT·	01/13/2005	
Rotos	sonic							Speeds	star 15K	
LOCATION: East	st Mesa	a Area, B	LM Land	1			LOGGED BY:	T. McDona	ld	
	s	SAMPLE				SOIL DESCRIPTION			COMMENTS	
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COL MPOSITION, GRADING, GRAIN SH SITY/CONSISTENCY, STRUCTURE, I	OR, APE, MINERALOGY, MOISTURE.	DRILLING DAILY ST REFUSAL	G OBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.	
 - 145 				SP	POORLY GF 5/3) with mo 10% f-gravel wet.	RADED SAND WITH SILT AND (tttles of reddish-brn (5YR4/3), 65% I, <5% clay/silt, ang-subang, igne	GRAVEL (SP) - brn (7.5YR % m-sand, 20% c-sand, ous/meta., massive,	stop dr core no 1/6/05	illing at 140 ft on 1/5/05, but ot removed, continue drilling on	
 <u>150</u> 		S3	20							
 _ 155 				SM	SILTY SANI 20% silt/clay igneous/met	D WITH GRAVEL (SM) -brn (7.5 7, 20% m-sand, 15% f-c-gravel, ar a, 1-2cm., 10% mottling dk reddis	YR4/3), 30% f-sand, 1g-subang, h gry(5YR4/3).			
								160-18	Oft open hole, bailed one hour	
160						NED CAND (CW) arouthrm (10)/E	(2) 200(- arrowol - 200((130 ga	allons)	
					m-sand, 25% igneous/met	6 f-sand, 15% gravel, <5% clay/si a, color homogenized to high pern	lit, ang-subang, neability, ave-1-3cm.	from 10	60-176 ft bgs	
					-10% mc	ore clay/silt				
								very ha	ard drilling 165-170 ft	
170		S4	16		750/					
					-75% m-	sand, 10% T-sand, 5% C-sand, 5%	o gravei, 5% clay/silt			
				SW						
175										
								-	CH2MHILL	

SHEET 4 of	9					PROJECT NUMBER	: 7.AR	BORIN	IG NUMBER: CW-1
						SOIL BORING L	.OG	1	
PROJECT NAM	E:	- Investig	nation	PG&F Topo	ck	HOLE DEPTH (ft):		CTOR:	Montolair CA
SURFACE ELEN		N: M		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5)	: DATE STARTED:		DATE COMPLETED:
563.8 ft. DRILLING ME	MSL FHOD:		2,1	.02,692.93		7,613,263.17 WATER LEVEL (ft):	DRILLING EQUIPM	ENT:	01/13/2005
Rotos	sonic	Δrea B	IMIan	4			LOGGED BY:	Speeds	star 15K
				u I				T. McDona	ld
	5	SAMPLE				SOIL DESCRIPTION			COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, CO MPOSITION, GRADING, GRAIN SI SITY/CONSISTENCY, STRUCTURE	DLOR, HAPE, MINERALOGY, , MOISTURE.	DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
 - 180 					WELL GRAI m-sand, 25% igneous/met -75% c-c	DED SAND (SW) -gray-brn (10) & F-sand, 15% gravel, <5% clay/ a, color homogenized to high per gravel	(R5/2) 30% c-gravel, 30% silt, ang-subang, rmeability, ave-1-3cm.	lost cor	re from 175-180 ft
 				SM	SILTY SANI m-sand, 30% ang-subang, CLAYEY SA silt/clay, 10%	D WITH GRAVEL (SM) -reddis 6 f-sand, 20% clay/silt, 10% f-gr igneous./meta., massive, moist- ND (SC) dk grayish-brn 10YR4/ 6 f-sand, 5% f-gravel, 5% c-sand	th brn 5YR5/3, 30% avel, 10% c-sand, wet. /2, 50% m-sand, 20% d, ang-subang,		
		S3	20	SC	WELL GRA brn 5YR5/3, 10% clay/silt igneous/met	a, silty sticky/plastic, wet. DED SAND WITH SILT AND G 30% m-sand, 30% f-sand, 20% t, 5% mottles of reddish-brn 2.5% a, moist-wet.	FRAVEL (SW-SM) -reddish c-sand, 10% f-gravel, (R4/4, ang-subang,		
				SW-SM	-weak ca -sand lay	liche 196-199 ft rer, brn 7.5YR4/4, 80% m-f sand			
200				МН	SILT (MH) clay, sticky/p	-dk grayish brn 10YR4/2, 75% s blastic, moist-wet.	ilt, 15% f-sand, 10%		
 - 205 210				SP	POORLY GF f-sand, 5% c -yellowisi ,5% grav wet	RADED SAND (SP) -brn 10YR5, clay/silt, v-soft, massive, wet. h-brn 10YR5/4, 60% m-sand, 20 rel, 5% clay/silt, ang-subang, ign	/3, 50% m-sand, 45% % c-sand, 10% f-sand, eous/meta, soft-firm,	200-20 possibl	4 It sand not typical, sand end y reworked slough
210	1								
								-	CH2MHILL

SHEET 5 of 9						PROJECT NUMBER: BORING NU 326128.01.07.AR C			G NUMBER:	
						SOIL BORING LOG				
PROJECT NAM	E:	Invectio	nation (C&E Topo	ck	HOLE DEPTH (ft):			Mantalain CA	
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	on & wells,	DATE COMPLETED:	
563.8 ft. DRILLING MET	MSL HOD:		2,1	02,692.93		7,613,263.17 WATER LEVEL (ft):	01/04/2005 DRILLING EQUIPME	ENT:	01/13/2005	
Rotos	onic t Moca	Aroa Bl	Milano			<u> </u>	LOGGED BY:	Speeds	tar 15K	
	i nesa	Alea, Di				T. McDonald				
	S	AMPLE				SOIL DESCRIPTION			COMMENTS	
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CON DENS	SOIL NAME, USCS SYMBOL, COLOR MPOSITION, GRADING, GRAIN SHAPP ITY/CONSISTENCY, STRUCTURE, MO	, MINERALOGY, ISTURE.	DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.	
 215		54	20	SW-SM	WELL GRAE mottles of br 20% c-sand, igneous/meta	DED SAND WITH SILT (SW-SM) n 7.5YR4/4 weak caliche, 40% m-sar 10% f-gravel, 10% clay/silt, ang-sub amorphic, abrupt lower boundary, fir				
	$\left \left \right \right $			SP-SM	POORLY GR 7.5YR5/3-4/3 10% clay/silt <u>igneous/meta</u> WELL GRAE	ADED SAND WITH SILT AND GR 3, 35% f-sand, 20% m-sand, 15% c , 30% mottling reddish-brn 5YR4/4, amorphic, hard-v. hard. DED SAND (SW) -brn 7.5YR5/3, 60%	AVEL (SP-SM) -brn sand, 15% f-gravel, ang-subang, % m-sand, 20%	anan h	olo 220 to 240 ft bas, bail ono	
					f-sand, 15% massive, wet	c-sand, 5% clay/silt, ang-subang, igr	neous/metamorphic,	from 22	v110 gals) water grab sample collected 20-240 ft bgs	
		S5	20		-10% cla -shift in c	y/silt olor, reddish brn, 7.5YR4/4 to 5YR 4	/4			
235 										
240					-brn 7.5Y	R4/4 to 5YR4/4				
					-6" calich	e zone 10-20% clay/silt				
245	\							•	CH2MHILL	

SHEET 6 of 9)					PROJECT NUMBE	R:	2	BORIN	IG NUMBER: CW-1
						SOIL BORING	LOC	G		
PROJECT NAM	E:	- Investio	nation I	PG&F Topo	ick	HOLE DEPTH (ft):			ACTOR:	Montolair CA
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z	5):	DATE STARTED:		DATE COMPLETED:
DRILLING MET	HOD:		2,1	02,692.93		7,613,263.17 WATER LEVEL (ft):		DRILLING EQUIPM	IENT:	01/13/2005
Rotos	sonic st Mesa	Area, Bl	LM Land	1				LOGGED BY:	Speeds	star 15K
									I. McDona	
	s ا ب	SAMPLE	×	USCS		SOIL DESCRIPTIC	JN		-	COMMENTS
(feet)	INTERVA	TYPE/ NUMBER	RECOVER (ft)	CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, MPOSITION, GRADING, GRAIN SITY/CONSISTENCY, STRUCTU	COLOR, N SHAPE IRE, MOI	, MINERALOGY, ISTURE.	DRILLING DAILY ST REFUSAL	GOBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
 - 250 		56	0	SW	WELL GRAI	DED SAND (SW) -brn 7.5YR c-sand, 5% clay/silt, ang-sub t.	5/3, 60% ang, ign	% m-sand, 20% ieous/metamorphic,		
 									260-28 fully re with >	0 ft bgs core may have been covered, but same bags filled 2 ft of core
					-40-50%	gravel				
		S7	16		-20% silt	/clay				
 - 275 										
280										
									-	CH2MHILL

SHEET 7 of 9 PROJECT NUMBER: 326128.01.07.AR						R	BORIN	G NUMBER: CW-1		
						SOIL BORING LO	G		••• -	
PROJECT NAM	E:	c Invectio	nation I		ck	HOLE DEPTH (ft):	DRILLING CONTRAC		Mantalain CA	
SURFACE ELEV	ATIO	N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	on & wells,	DATE COMPLETED:	
563.8 ft. DRTI I ING MFT	MSL HOD:		2,1	02,692.93		7,613,263.17	01/04/2005 DRILLING EOUIPME	NT:	01/13/2005	
Rotos	onic	A						Speeds	star 15K	
LOCATION: Eas	t Mesa	i Area, Bl	LM Land	1			LUGGED BT:	T. McDona	. McDonald	
	5	SAMPLE				SOIL DESCRIPTION			COMMENTS	
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERN (ft)	CODE	PERCENT COL	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHAR SITY/CONSISTENCY, STRUCTURE, M	R, PE, MINERALOGY, DISTURE.	DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.	
 - 285 290		59	20	SW	WELL GRAI 5YR4/6 mott clay/silt, ang development	DED SAND (SW) -brn 7.SYR5/3, 10 ding, 60% m-sand, 20% f-sand, 15% -subang, igneous/metamorphic with t, massive, firm-hard, wet.	-15% yellowish-red % c-sand, 5% weak caliche	ground from 29	water grab sample collected 30-300 ft bgs	
 				SW-SC	WELL GRA m-sand, 20% ang-subang, massive, wet WELL GRAL c-sand, 15% igneous/met	DED SAND WITH CLAY (SW-SC) 6 f-sand, 20% c-sand, 15% f-gravel heterogeneous w/sand layers, igne- t. DED SAND (SW) -brn 7.5YR4/4, 40 f-gravel, 15% f-sand, 5% clay/silt, amorphic, massive, wet.) -brn 7.5YR4/4, 30% , 15% clay/silt, ous/metamorphic, 0% m-sand, 30% ang-subang,			
				SW				300-30 and no 300-32	9 ft appears core is washed cut t representative 0 ft only received 16ft of core	
305					-reddish	brn, 7.5 YR4/4				
 <u>310</u>		S10	15	SC-SM SW	SILTY CLAY 4/104), 40% f-c gravel, 5- subang to an gravels up to WELL GRAI c-sand, 15%	YEY SAND (SC-SM) - 40% dk gree b brown (7.5YR4/4), 20% yellowish u -10% c sand, 20% m sand, 30% f si ng, m plastic to plastic, m sticky, ma b 1 cm (one 9 cm), weak to mod. ca DED SAND (SW) -brn 7.5YR4/4, 40 f-gravel, 15% f-sand, 5% clay/silt,	enish-gray (Gley1 red (5YR4/5), 10% and, 30-35% clay/silt, ssive, ig and mm <u>liche at 306'</u> 0% m-sand, 30% ang-subang,			
				SW-SM	WELL GRAL 30-35% f san silt/clay, sub- max silt at 3	amorphic, massive, wet. DED SAND WITH SILT (SW-SM) nd, 30% m sand, 10-15% c sand, 1 ang to ang, massive, wet, igneous a 11', 313', 316',	- brn 7.5YR4/3-5/3, 0% f gravel, 10-15% nd metamorphic,			
					I			•	CH2MHILL	

SOLL BORING LOG Mol Deprint GC Mol Deprint GC Diff United Contractore: 1000 Projection: Norther Cost Name 22 2 50: 2,012,002,003 Diff Contractore: 1000,002,005 Diff Contractore: 1000,002,000 Diff Contractore: 1000,002,000,000 Diff Contractore: 1000,000,000,000,000,000,000,000,000,00	SHEET 8 of	9					PROJECT NUMBER: 326128.01.07	.AR	BORIN	G NUMBER: CW-1	
REDICT NAME: [M-3: Hydrogenet journamption, Mode Toook. Hole DepTH (ft): 300 C Parketino Meine, Monicair, CA. Mole DepTH (ft): 300 C Parketino Meine, Mole Meine, Monicair, CA. 000000000000000000000000000000000000							SOIL BORING L	OG			
SUPFACE LEVATION: OCTIVITURE (CCS NAD 27 2 5): LATTINE (CCS NAD 27 5): LATT	PROJECT NAM IM-3 Hydrod	I E: aeoloaid	c Investi	pation.	PG&E Topo	ck	HOLE DEPTH (ft):	DRILLING CONTRA	CTOR:	Montclair CA	
(A112A31.7 (A122A31.7 (A122A31.7 (D10/04/030 (A122A31.7 (D10/04/030 MATER LEVEL (C): (D10/04/030 (D0CATION: East Mesa Area BUM Land COGED BY: IDOCATION: East Mesa Area BUM Land SAMPLE SAMPLE <t< td=""><td>SURFACE ELEV</td><td></td><td>N: r</td><td></td><td>ING (CCS</td><td>NAD 27 Z 5):</td><td>EASTING (CCS NAD 27 Z 5):</td><td>DATE STARTED:</td><td>ion & weils,</td><td>DATE COMPLETED:</td></t<>	SURFACE ELEV		N: r		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	ion & weils,	DATE COMPLETED:	
Responsive Concerning Concerning <thconcerning< th=""> Concerning Concerni</thconcerning<>	DRILLING ME	THOD:		2,1	102,692.93		7,613,263.17 WATER LEVEL (ft):	DRILLING EQUIPM	ENT:	01/13/2005	
Summer Summer Summer Summer Summer COMMENTS DepTH MSS Image Image SUIL DeSCRIPTION COMMENTS DepTH MSS Image Image SUIL MARE, USCS SYNEDL, COLOR, MILERADOX, DESCRIPTION Description 320 Image Image SUIL MARE, USCS SYNEDL, COLOR, MILERADOX, DESCRIPTION Description 320 Image Image SUIL MARE, USCS SYNEDL, COLOR, MILERADOX, DESCRIPTION Description 320 Image Image Image SUIL MARE, USCS SYNEDL, COLOR, MILERADOX, DESCRIPTION Description 320 Image Image Image SUIL MARE, USCS SYNEDL, COLOR, MILERADOX, DESCRIPTION Description 320 Image Image Image Image SUIL MARE, USCS SYNEDL, COLOR, MILERADOX, SUIL MARE, MILERADOX, MILER	Roto:	sonic	Area B	Mlan	d			LOGGED BY:	Speedstar 15K		
SAMPLE SOUL DESCRIPTION COMMENTS DPP H 6GS Values Version Values Version Values			i Alea, D		u I				T. McDonal	F. McDonald	
DEPTH BGS Total State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State State Stat		5	SAMPLE				SOIL DESCRIPTION			COMMENTS	
320 WELL GRADED SAND WITH SILT (SW-SM) - Im 7.5YR4/5-5/5, 30(54% rand, 30% rand, 10-15% cash, 10-15% cash, 10-15% silt/Exy, subarg to ang, massive, vet, igneous and metamorphic, max silt at 311, 31, 316. very hard drilling conditions from 320 at a start at 311, 31, 316. 320 CLAYEY SAND WITH GRAVEL (SD) - gray (10/PK5/1), 30% grand- up to 5 cm (freshy broken), 25% f sand, 20% rand, 20% rand, 50% gravel at 321. very hard drilling conditions from 320 at 31, 315, 316. 325 SILT SAND (SN) - bm 7.5YR5/2-4/2 with reddish brown 5YR5/4 at 324, 35% f sand, 25% m sand, 15% c sand, 20% rand, 20% rand, 20% rand, 20% rand, 20% rand, 20% rand, 21% rand, 21	DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, CO MPOSITION, GRADING, GRAIN SH SITY/CONSISTENCY, STRUCTURE,	LOR, IAPE, MINERALOGY, MOISTURE.	DRILLING DAILY ST REFUSALS	OBSERVATIONS AND OPERATIONS ART AND END TIMES , DRILL RATE 5, SAMPLING AND TESTING NOTES	
320 CLAYEY SAND (WTH GRAVEL (SC) - gray (10/185/1), 30% gravel, 32-330 ft, only 10 foot run possible, or and, 5% ft, and, 2% ft, sand, 10.15% ft, sand, 10.15% ft gravel, 10.15% ft or 3% ft, sand, 10.15% ft, or 3% ft, sand, 10.15% ft, or 3% ft, sand, 10.15% f	 	-				WELL GRAI 30-35% f sa silt/clay, sub max silt at 3	DED SAND WITH SILT (SW-SM nd, 30% m sand, 10-15% c sand, ang to ang, massive, wet, igneous 11', 313', 316',	 brn 7.5YR4/3-5/3, 10% f gravel, 10-15% s and metamorphic, 			
325 S11 10 SILT SAND (SM) - Im 7.5YR5/2-4/2 with redding horses for SYR5/4 at 2324; 336% for and, 25% m sand, 15% c sand, 20% silt, 5% for sand, 5% silt, 5% for sand, 10% for sand, 20% f 345 SC CONGLOMERATE (BR) - reddish bm (5%R5/4), 40% m sand, 20% f appears to be weathered Miocene conglomerate from 348-360 ft	320				SC	CLAYEY SA up to 6 cm (c sand, 5% s gravel at 32	ND WITH GRAVEL (SC) - gray freshly broken), 25% f sand, 20% silt, massive, soft, wet, decreasing 1'.	(10YR5/1), 30% gravel o clay, 15% m sand, 5% g sand with depth. 80%	very ha 320-330 observe reddish	rd drilling conditions from) ft, only 10 foot run possible, d discharged, changed to brn/red	
330			S11	10	SM	SILTY SAN 324', 35% f weathered ir bedding, ma in-ground ig to clay / silt	D (SM) - brn 7.5YR5/2-4/2 with r sand, 25% m sand, 15% c sand, n-place gravel, subang to ang, firn ssive, igneous and metamorphic, neous / metamorphic rock, v pale size dust, whitish, few gravels	eddish brown 5YR5/4 at 20% silt, 5% f very n to hard, weak moist. At 325', brn (10YR3/2), broken			
335 SW-SM 335 SW-SM 340 SW-SM 340 Iost bottom 3 ft of core from 340-345 groundwater grab sample collected from 340-347 ft bgs very hard drilling from 340-350 ft 340 State of the same same same same same same same sam	330					WELL GRAI red to red (7 gravel, 10-1! subang to ar moist.	DED SAND WITH SILT AND GR 7.5YR5/6 to 5YR5/6), 40% m sanc 5% c sand, 5-10% clay / silt, wea ng, m hard to hard, massive, igned	RAVEL (SW-SM) yellowish d, 20% f sand, 10-15% f k caliche throughout, ous / metamorphic,			
340 Image: Sector of the s	335	-			SW-SM						
CLAYEY SAND (SC) - greenish gray (Gley1 5/10GY), 30% m sand, 30% f sand, 15% f-c gravel, 10-15% clay, 10% c sand, subang to ang, massive, igneous / metamorphic, wet. SC SC CONGLOMERATE (BR) - reddish brn (5YR5/4), 40% m sand, 20% f sand, 15% f-c gravel, 15% c sand, 5-10% clay / silt, hard, massive	340	-							lost bot ground from 34 very ha	tom 3 ft of core from 340-345 ft water grab sample collected 0-347 ft bgs rd drilling from 340-350 ft	
CONGLOMERATE (BR) - reddish brn (5YR5/4), 40% m sand, 20% f appears to be weathered Miocene sand, 15% f-c gravel, 15% c sand, 5-10% clay / silt, hard, massive conglomerate from 348-360 ft	 	-			SC	CLAYEY SA 30% f sand, ang, massive	ND (SC) - greenish gray (Gley1 5 15% f-c gravel, 10-15% clay, 10 e, igneous / metamorphic, wet.	5/10GY), 30% m sand, % c sand, subang to			
		-				CONGLOME sand, 15% f	E RATE (BR) - reddish brn (5YR5/ -c gravel, 15% c sand, 5-10% clar	'4), 40% m sand, 20% f y / silt, hard, massive	appears conglon	to be weathered Miocene nerate from 348-360 ft	
			I	1	1	ļ				A	

SHEET 9 of 9						PROJECT NUMBER: 326128.01.07.AR BORING NUMBER: CW-1			IG NUMBER: CW-1
						SOIL BORING LO	G		
PROJECT NAM	E:	Investio	nation F	G&F Topo	ck	HOLE DEPTH (ft):		CTOR:	Montclair CA
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:		DATE COMPLETED:
563.8 ft. DRILLING MET	MSL HOD:		2,1	02,692.93		7,613,263.17 WATER LEVEL (ft):	01/04/2005 DRILLING EQUIPM	ENT:	01/13/2005
Rotos	onic	Area Bl	Mland	1			LOGGED BY:	Speed	star 15K
		Alea, Di						T. McDona	ld
	s	AMPLE				SOIL DESCRIPTION			COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHAI SITY/CONSISTENCY, STRUCTURE, M	R, ÞE, MINERALOGY, OISTURE.	DRILLING DAILY ST REFUSAL	G OBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, .S, SAMPLING AND TESTING NOTES.
 			12	BR	CONGLOME sand, 15% f-	RATE (BR) - reddish brn (5YR5/4) -c gravel, 15% c sand, 5-10% clay /	, 40% m sand, 20% f silt, hard, massive	12 ft c	ore recovered from 350-360 ft, 2 core lost with previous run
360					- 8 cm ig	neous gravel cored through			
					ABBREV cc = coni brn = bro It = light dk = darl vf = very f = fine-c m = mec c = coars vc = very ang = an subang = subrnd = rnd = rou br = bed ss = sanc conglom mm = m comptd = qtz = qua	Boring Terminated at 360 TATIONS tinuous core run own k r fine-grained grained lium-grained se-grained y coarse-grained upular = subangular = subangular = suborounded unded rock formation dstone = conglomerate etamorphic = compacted artz	ft		
								•	CH2MHILL





SHEET 1 of 10 PROJECT NUMBER:								BORING NUMBER:
							G	Cw-2
PROJECT NAM						HOLE DEPTH (ft):	DRILLING CONTRAC	CTOR:
IM-3 Hydrog	eologic ATIO	nvestig	iortion, i	ING (CCS	CK NAD 27 Z 5):	385.0 EASTING (CCS NAD 27 Z 5):	Prosonic DATE STARTED:	Corp. Maretta, OH DATE COMPLETED:
546.7 ft.	MSL		2,1	03,097.47		7,613,798.05	01/18/2005	01/21/2005
Rotos	onic						S	Sonic AT (track mounted)
LOCATION: Eas	t Mesa	Area, Pa	arcel No	. 650-151-	06		LOGGED BY:	B. Moayyad
	s	AMPLE				SOIL DESCRIPTION		COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT COL DENS	SOIL NAME, USCS SYMBOL, COLOI MPOSITION, GRADING, GRAIN SHAP SITY/CONSISTENCY, STRUCTURE, MC	R, E, MINERALOGY, DISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
0 								Conductor casing set to 10 ft bgs, wash casing to 88 ft bgs without collection of core. Per work-plan, drilled interval in unsaturated zone was not logged. Drilling returns in unsaturated zone were primarily well-graded sand with silt and gravel.
 90 		CC1	10	SW	WELL GRAI 65% sand, 1 cobbles up to - more co - become	DED SAND WITH GRAVEL (SW) 5% igneous and metamorphic grave o 4.3" long, ang, medium density, dr parse 2.5-3", 60% sand, 35% suban es moist	- pale brn (10YR6/3), el, 10% silt, 10% y-silty moist. g gravel, 5% fines	continuous coring started at 88 ft bgs
 					- 4-4.5 in - brn 7.5' 10% sub	ich cobbles at 94', 96' and 97' YR4/4, 55% ang to subang sand, 30 ang cobbles, 5% fines, dense, moist	% subang gravel, : to wet	
 100				SW	WELL GRAD 7.5YR4/3, 60 density, wet.	DED SAND WITH SILT AND GRA)% sand, 30% subang gravel, 10% f DED SAND WITH SILT (SW) - bri	VEL (SW) - brn fines, medium	
		CC2	8.5	SW	10% gravel,	10% silt, medium density, wet.		
105				GW	WELL GRAD	DED GRAVEL (GW) - brn 7.5YR5/3	3, 55% mostly f gravel,	

SHEET 2 of	10					PROJECT NUMBER: 326128 01 07	۸R	BORIN	IG NUMBER: CW-2	
						SOIL BORING LO	DG			
PROJECT NAM	IE:	c Investi	nation I	PG&F Topo	ck	HOLE DEPTH (ft):	DRILLING CONTRA	CTOR:		
SURFACE ELE		N: [ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:		DATE COMPLETED:	
546.7 ft DRILLING ME	. MSL THOD:		2,1	03,097.47		7,613,798.05	DRILLING EQUIPM	ENT:	01/21/2005	
Roto	sonic	a Δrea P	arcel Nr	. 650-151-	06		LOGGED BY:	Sonic AT (tr	ack mounted)	
LOCATION. Lu				. 050 151				B. Moayyad		
	9	SAMPLE				SOIL DESCRIPTION			COMMENTS	
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COL MPOSITION, GRADING, GRAIN SHA SITY/CONSISTENCY, STRUCTURE, N	DR, PE, MINERALOGY, IOISTURE.	DRILLING DAILY ST REFUSAL	G OBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, .S, SAMPLING AND TESTING NOTES.	
	-			SW	WELL GRAI sand, 40% g grains, medi	19% fines, and metamorphic, dense, DED SAND WITH GRAVEL (SW) pravel, 3% fines, subang igneous a um density, wet.	wet. // /////////////////////////////////			
 110				SW	WELL GRAI 7.5YR5/1, 70 subang, med	DED SAND WITH SILT AND GRA 0% sand, 15% gravel, 10% fines, o dium density, wet.	ground from 10	lwater grab sample collected 08-128 ft bgs		
 	-	ССЗ	8	SW	WELL GRAI	DED SAND WITH GRAVEL (SW) nd, 27% c gravel up to 2.2" long, 3	- brn 7.5YR4/2, 70% 3% fines, hard, wet.			
	-				- 4.5" me	etamorphic cobbles, possibly larger DED SAND WITH SILT (SW) - t	, fractured by core rrn, 70% sand, 20% silt,	collect	sample CW2-118 at 13:30	
 120	-			SW	10% gravel,	medium density, wet. DED SAND WITH GRAVEL (SW)	- brn 7.5YR4/2, 70%	core se	ettles in bags and looks shorter	
 <u>125</u> 		CC4	10	sw	sand, 27% g to subrnd, ha - become sand, 32	gravel, 3% fines, occasional cobble ard, wet. es coarser below 121.5 ft, more silt % gravel, 8% silt	s up to 4" long, subrnd		J	
130	-			SW	WELL GRAI 7.5YR4/2, 65 up to 3.3" lo	DED SAND WITH SILT AND GRA 5% subrnd sand, 20% subang grav ng, medium density, wet.	AVEL (SW) - brn rel, 15% fines, cobbles	bail 30	gals at 128 ft bgs	
	-	CC5	9	SW	12% subang	gravel up to 2" long, 8% fines, ha	rd, wet.	,		
	-			SW	WELL GRAU 7.5YR4/2, 55 cobbles up to	DED SAND WITH GRAVEL AND 5% subrnd sand, 25% subang grav o 4.2" long, hard, wet.	SILT (SW) - brn rel, 15% fines, 5%			
 	-							no core similar pipe	e 138-140 ft bgs - seemed not preserved, fell into cutting	
								1	CH2MHILL	

SHEET 3 of 10 PROJECT NUMBER:								BORING	NUMBER:
									CW-2
PROJECT NAM	E:					HOLE DEPTH (ft):	DRILLING CONTR	ACTOR:	
IM-3 Hydrog	geologic VATIO	C Investig	ion, I	ING (CCS	CK NAD 27 Z 5):	385.0 EASTING (CCS NAD 27 Z 5):	Proso DATE STARTED:	nic Corp. Maretta,	OH ATE COMPLETED:
546.7 ft.	MSL		2,1	03,097.47		7,613,798.05		0 MENT:	1/21/2005
Roto	sonic						DRILLING EQUIP	Sonic AT (track i	mounted)
LOCATION: Ea	st Mesa	a Area, Pa	arcel No	. 650-151-	06	LOGGED BY: B. Moayyad			
	S	SAMPLE				SOIL DESCRIPTION	·		COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COI MPOSITION, GRADING, GRAIN SH SITY/CONSISTENCY, STRUCTURE,	LOR, APE, MINERALOGY, MOISTURE.	DRILLING OB DAILY START REFUSALS, S	SERVATIONS AND OPERATIONS, I AND END TIMES , DRILL RATE, AMPLING AND TESTING NOTES.
		666	7 0	SW	WELL GRAD 2% fines, sul wet.	DED SAND (SW) - gray 7.5YR5/ bang to ang igneous and metamo			
			7.2	- SW	WELL GRAI sand, 17% s - more gr	DED SAND WITH GRAVEL (SW ubang gravel up to 2.5" long, 8% ravel below 146 ft, 70% sand, 25	_		
	-			3	- materia well grad	I fell back into hole when pipe bre led sand with gravel and silt	eaks, appears to be	core barrel retrieve, en	breaks on 148-158 ft run, nd day 1/19/05
 _ 155	-			SW	WELL GRAI sand, 12% f	DED SAND WITH GRAVEL (SW gravel, 4% fines, subang to ang, to more and c gravel	') - brn 7.5YR5/2, 84% f medium density, wet.	logging on	1/20/05
	-	CC7	18	SW	- 157-158 fines WELL GRAI	8.5 ft: 70% sand, 25% gravel up DED SAND WITH GRAVEL AND	to 2.2 inch long, 5% CLAY (SW) - brn, 60%	<u>,</u>	
	-			SW	<u>sand, 25% g</u> WELL GRAI 7.5YR5/2, 60 subang igned	ravel, 15% clay, subang, hard, we DED SAND WITH GRAVEL AND 10% sand, 30% gravels up to 2.3" bus and metamorphic grains, med	et. SILT (SW) - brn long, 10% fines, lium hard, wet.	-	
	-			SM	SILTY SANI gravel, 23% - sand gr	D WITH GRAVEL (SM) - brn 7. silt, subang to subrnd, medium d ades to gravel	5YR4/3, 60% sand, 12% ensity, non-plastic, wet.	_	
				GM	wet.	VEL (GM) - brn, 45% gravel, 30	% silt, 25% sand, hard,	~ .	
 				SW	WELL GRAI sand, 25% g subang, meta	DED SAND WITH GRAVEL (SW ravel up to 2.5" long, 5% fines, o amorphic, medium density, wet .) - brn 7.5YR5/2, 70% ccasional cobbles,	groundwate from 168-1	er grab sample collected 88 ft bgs
 _ <u>175</u>				SW	SILTY SANI % silty and s <1" long, no - 60% sa	D WITH GRAVEL (SW) - brn 7. silty plastic fines, 15-20% gravel w cobbles, subang, hard, wet. and, 20-25% gravel, 15-20% fines	5YR5/2, 60% sand, 20-2 vhich is predominantly	5	
								e c	H2MHILL

SHEET 4 of 10 PROJECT NUMBER: 326128.01.07.AR					٨R	BORIN	IG NUMBER: CW-2		
						SOIL BORING LO	DG		
PROJECT NAM	E:	. T			-l.	HOLE DEPTH (ft):	DRILLING CONTRA	CTOR:	
	ATIO	N: N	IORTH	ING (CCS	NAD 27 Z 5):	385.0 EASTING (CCS NAD 27 Z 5):	DATE STARTED:	c Corp. Mare	DATE COMPLETED:
546.7 ft.	MSL		2,1	03,097.47		7,613,798.05	01/18/2005	ENT.	01/21/2005
Rotos	sonic					WATER LEVEL (II):		Sonic AT (tr	ack mounted)
LOCATION: Eas	st Mesa	a Area, Pa	arcel No	. 650-151-	06		LOGGED BY:	B. Moayya	d
	5	SAMPLE				SOIL DESCRIPTION			COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT COI DENS	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHA IITY/CONSISTENCY, STRUCTURE, N	DR, PE, MINERALOGY, IOISTURE.	DRILLING DAILY ST REFUSAL	G OBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
					SILTY SANI % silty and s <1" long, no WELL GRAE	D WITH GRAVEL (SW) - brn 7.5 illty plastic fines, 15-20% gravel wi cobbles, subang, hard, wet. DED GRAVEL WITH CLAY (GW) sand 15% fines no cobbles clav.			
 <u>180</u>		0.08	18	GW	hard, wet.		and site present, drig,		
					- more sa WELL GRAE	andy below 183 ft DED GRAVEL AND SAND (GW/S	W) - brn, 45% gravel,		
 <u>185</u> 				GW/SW	WELL GRAD	DED SAND WITH GRAVEL (SW)	- brn, 70% sand, 20%		
				500	_ subang f gra	vel, 10% fines, medium density, w	et. /2 60% f.c. gravel 30%		
 <u>190</u>				SW	 <u>sand, 10% fi</u> WELL GRAD 7.5YR5/2, 58 fines, hard, v 	nes, subrad, hard, wet. DED SAND WITH SILT AND GR % sand, 30% subrad gravel up to vet.	AVEL (SW) - brn 2.5" long, 12% silty		
				SW	WELL GRAD	DED SAND WITH GRAVEL (SW)	- brn, 60% sand, 35%		
				GM	SILTY GRAV	Nes, subrid, nard, wet. VEL AND COBBLES (GM and CO	BBLES) - 30% gravel,		
 <u>195</u> 		CC9	17	SW	 25% cobbles WELL GRAE 70% sand, 2 long, subang - more br 	c, 25% sand, 20% silty fines. DED SAND WITH GRAVEL (SW) 0% subrnd gravel, 5% fines, 5% c igneous and metamorphic grains, m and silty more silty from 196.5-1	- reddish brn 5YR4/4, obbles up to 3.7" medium hard, wet. .99 ft		
200									
				SM	SILTY SANI sand, 25% si medium dens	D WITH GRAVEL (SM) - reddish ilty fines, 15-20% gravel, predomir sity, wet.	brn 5YR4/4, 55-60% hantly silt to f gravel,		
					and clay				
				GW	WELL GRAE gravel, 25% hard, moist,	DED GRAVEL WITH CLAY (GW) sand, 10% fines, ang metamorphic clay lenses and coatings on gravel.	- gray 7.5YR5/1, 65% c sand and gravel,		
					- evidenc	e of clay infiltration by water			
 				SC	CLAYEY SA clay and silt,	ND WITH GRAVEL (SC) - brn 5 15% f gravel, subrnd to subang, n	(R4/3, 65% sand, 25% nedium density, wet.		
									CH2MHILL

SHEET 5 of 3	LO					PROJECT NUMBER: 326128.01.07.4	R	BORIN	G NUMBER: CW-2		
						SOIL BORING LO	G		<u> </u>		
PROJECT NAM	E:	c Invocti	action 1	C%E Topo	ck	HOLE DEPTH (ft):	DRILLING CONTRAC	TOR:	OR:		
SURFACE ELEV	ATIO	N: I		ING (CCS	NAD 27 Z 5):	385.0 EASTING (CCS NAD 27 Z 5):	DATE STARTED:	Corp. Mare	DATE COMPLETED:		
546.7 ft.	MSL		2,1	03,097.47		7,613,798.05	01/18/2005 DRILLING EOUIPME	NT:	01/21/2005		
Rotos	sonic			(50.151	00		SI LOCCED BY:	onic AT (tra	ick mounted)		
LOCATION: Eas	st Mesa	a Area, P	arcel No	. 650-151-	06		LOGGED BT:	B. Moayyad	1		
	9	SAMPLE				SOIL DESCRIPTION			COMMENTS		
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHAR SITY/CONSISTENCY, STRUCTURE, M	R, YE, MINERALOGY, DISTURE.	DRILLING DAILY ST REFUSALS	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.		
 - 215 	SILTY SAND WITH GRAVEL (SM) - brn 5YR4/3, 60-65% sand, 20-25% silty fines, 15% gravel, subrnd, medium density, wet. CC10 8.5 SM - some larger gravels										
				GW	WELL GRADED GRAVEL WITH CLAY (GW) - brn, 50% gravel, 35% sand, 15% fines, hard, wet, some clay coatings on gravel, silt and clay lenses. - 75% sand, 55% gravel, 25% cobbles, 5% fines WELL GRADED SAND WITH GRAVEL (SW) - brn 7.5YR4/3, 70% cand, 20% gravel, 10% fines gubred bard wet						
			8.5	SW SW GW	WELL GRAI sand, 35% g WELL GRAI sand, 5% fin	DED SAND WITH SILT AND GRA Iravel, 15% fines, subang, hard, wet DED GRAVEL WITH SAND (GW) nes, clay coatings, ang, hard, wet.	• VEL (SW) - brn, 50% - brn, 55% gravel, 40%				
 230 					WELL GRAI 5YR4/4, 60% igneous and	DED SAND WITH GRAVEL AND C 6 sand, 30% gravel up to 2.3" long, metamorphic grains, medium densit	CLAY (SW) - reddish brn 10% fines, subrnd ty, wet.	ground from 22	water grab sample collected 18-248 ft bgs		
 - 235 				SW	 well graded sand with gravel, as above with less fines and gravel, brn 7.5YR4/4, 75% sand, 20% gravel, 5% fines becomes gray 7.5YR5/1 			core through 6+ inches intact rock hard			
				ML	SANDY SIL	T (ML) - dk greenish gray 10BG4/1	, 30% sand, silty				
 - 240 		CC12	17	SM	WELL GRAI 5YR4/3, 67% subang, med	plastic, soft, wet. SILTY SAND WITH GRAVEL (SM) - brn 5YR5/2, 60% sand, 20% gravel, 20% fines, subrnd, medium density, wet. WELL GRADED SAND WITH GRAVEL AND SILT (SW) - reddish brn 5YR4/3, 67% sand, 30% gravel, 13% fines including some clay, subang, medium hard, wet.					
 _ 245				SW					CH2MHILL		

SHEET 6 of 10 PROJECT NUMBER: 326128 01 07 AR								BORIN	BORING NUMBER: CW-2			
						SC		RING LOC	G			
PROJECT NAME: HOLE DEPTH (ft):									DRILLING CONTRACTOR:			
		N: N		ING (CCS	NAD 27 Z 5):	EAST	ING (CCS N	5.0 NAD 27 Z 5):	Proson DATE STARTED:	c Corp. Mare	DATE COMPLETED:	
546.7 ft.	MSL		2,1	.03,097.47		WAT	7,613,7	'98.05	01/18/2005		01/21/2005	
Rotos	sonic					WAI		-		Sonic AT (tr	ack mounted)	
LOCATION: East	st Mesa	a Area, Pa	arcel No	o. 650-151-	06				LOGGED BY:	В. Моаууа	d	
	5	SAMPLE					SOIL DES	CRIPTION			COMMENTS	
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL MPOSIT SITY/CO	NAME, USCS TION, GRADII ONSISTENCY,	SYMBOL, COLOR, NG, GRAIN SHAPE STRUCTURE, MO	, MINERALOGY, ISTURE.	DRILLING DAILY ST REFUSAL	G OBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, .S, SAMPLING AND TESTING NOTES.	
				WELL GRAI 5YR4/3, 67% subang, med	DED S# % sand, dium ha	AND WITH G 30% gravel, rd, wet.	GRAVEL AND SI 13% fines includ	LT (SW) - reddish bri ing some clay,	1			
				ML	WELL GRAI 2.5YR5/2, 60 dense, damp -increasir	DED S# D% sub D. ng sand	AND WITH S rnd sand, 20 ⁰ I, decreasing	SILT AND GRAV % subang gravel, silt, gravels ang t	ELS (ML) - grayish bi 20% fines, m to 3 cm	'n		
	· \			SP	POORLY GRADED SAND WITH SILT (SP) - brn 7.5YR5/3, 85-90%							
				CW/	sand, 5-10% gravel, <5% fines, subrid, loose, damp. WELL GRADED SAND WITH GRAVEL (SW) - olive gray 5YR5/2, gravels to 7 cm, few cobbles to 10cm, subang, medium dense, damp.							
									hard, s	hard, slow and steady drilling		
 		CC13	20	SW	WELL GRAU 2.5YR5/2, 6C low density, - color ch - same a: <10% fir	DED SA D% sub modera nange to s above nes	AND WITH S rnd sand, 20- ate plasticity, o brn 10YR5/ e with fewer f	SILT AND GRAV -25% subang grav damp. '3 fines, 70-80% sar	ELS (SW) - grayish b vel, 15-20% fines, nd, 10-20% gravel,	rn		
 265 				SP	POORLY GF gravel, <5%	RADED	SAND (SP) loose, damp.	- brn 10YR5/3, 9	90% f to m sand, 5%			
 270				SW	WELL GRAE 60-70% m sa - cobble v	DED S and, 35 with fin	AND WITH C i-25% subang ues - silt/clay,	GRAVEL (SW) - g gravel to 4cm, < fragments up to	reddish brn 5YR4/3, <5% fines, damp. 9 cm			
 - 275 					- very sol MODERATE 5YR4/3, 80-9	f <u>t clay v</u> E LY GR 90% sa	with cobble fr ADED SANE nd, 5-15% su	ragments up to 1() WITH GRAVEL ubang gravel, <59	Dem . (SW/SP) - reddish l % fines, damp.	brn		
		0.14	20									
280												
										•	CH2MHILL	

SHEET 7 of 3	10					PROJECT NUMBI	ER: 1 07 AR		BORIN	G NUMBER: CW-2
						SOIL BORING		 ;		
PROJECT NAM	E:	. T			alı	HOLE DEPTH (ft):		DRILLING CONTRAC	TOR:	
SURFACE ELEV	ATIO	N: N		ING (CCS	NAD 27 Z 5):	385.0 EASTING (CCS NAD 27 2	Z 5):	DATE STARTED:	orp. Maret	ta, OH DATE COMPLETED:
546.7 ft.	MSL		2,1	03,097.47		7,613,798.05		01/18/2005	NT:	01/21/2005
Rotos	sonic							Sc Sc	onic AT (tra	ck mounted)
LOCATION: Eas	st Mesa	i Area, Pa	arcel No	o. 650-151-	06			LOGGED BY:	B. Moayyad	
	s	SAMPLE				SOIL DESCRIPTION				COMMENTS
DEPTH BGS (feet)					PERCENT CO DENS	SOIL NAME, USCS SYMBOL MPOSITION, GRADING, GRAI ITY/CONSISTENCY, STRUCT	., COLOR, N SHAPE, URE, MOI	MINERALOGY, STURE.	DRILLING DAILY STA REFUSALS	OBSERVATIONS AND OPERATIONS, RT AND END TIMES, DRILL RATE, , SAMPLING AND TESTING NOTES.
 - 285 				SW/SP	MODERATE 5YR4/3, 80-9	LY GRADED SAND WITH (00% sand, 5-15% subang gra	GRAVEL avel, <59	(SW/SP) - reddish brr 6 fines, damp.		
 290				-	- same as - cobble,	s above, damp to wet same as 270-272 ft, damp to	o wet		groundw from 28	vater grab sample collected 3-308 ft bgs
				SM	SAND WITH subrnd sand,	I SILT AND GRAVEL (SM) 20% gravel, 10% fines, loos	- grayisl se.	n brn 2.5YR5/2, 70%		
 <u>295</u>				SP	POORLY GR 2.5YR5/2, m	RADED SAND WITH GRAV sand, few gravels, wet.	EL (SP)	- grayish brn		
				SM	SAND WITH sand, 15% g	I SILT AND GRAVEL (SM) ravel, 15% fines, low plastici	- grayisl ty, loose,	n brn 2.5YR5/2, 70% wet.		
 <u>300</u> 		CC15	20		MODERATE 2.5YR5/2, gr	LY GRADED SAND WITH (avels subang to 5cm, wet.	GRAVEL	(SM/SP) - grayish brn		
 <u>305</u> 				SM/SP	- wet gra	ding to damp at 302.5 to 300	s ft dgs			
 310				SW	WELL GRAD subrnd sand, to wet.	DED SAND WITH GRAVEL 15% subang gravel up to 4	(SW) - cm, <5%	brn 10YR5/3, 80% 5 fines, loose, moist		
				SM	SILIT SAN	P WITH COBBLES (SM)	(6)41)	http://www.com/		
				SW	well GRAI subrnd m to moist to wet	c sand, 15% subang gravel u	(>W) - up to 4cm	יוויז אטיא אטאיז איז איז אטאיז איז אטאיז איז איז איז איז איז איז איז איז איז		
315	V N								-	
									-	CH2MHILL

SHEET 8 of	10					PROJECT NUMBER: 326128.01.07.AR BORING NUMBER: CW-2			
						SOIL BORING LO)G		
PROJECT NAM	E:	c Invoctio	action 1			HOLE DEPTH (ft):	DRILLING CONTRAC		
	ATIO	N: N		ING (CCS	NAD 27 Z 5):	385.0 EASTING (CCS NAD 27 Z 5):	DATE STARTED:		
546.7 ft.	MSL		2,1	03,097.47		7,613,798.05	01/18/2005	01/21/2005	
Rotos	sonic						9 1000050 PV	Sonic AT (track mounted)	
LOCATION: East	st Mesa	a Area, Pa	arcel No	b. 650-151	.06		LOGGED BY:	B. Moayyad	
	5	SAMPLE				SOIL DESCRIPTION		COMMENTS	
DEPTH BGS (feet)	INTERVAL	INTERVAL TYPE/ NUMBER		USCS CODE	PERCENT COI DENS	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHA SITY/CONSISTENCY, STRUCTURE, M	DR, PE, MINERALOGY, IOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.	
	. /				- f-m san	d, medium density			
	- \ /			SP/GP		RADED SAND WITH GRAVEL (SI	P/GP) - gley 2.5/5BG,		
	\ /	CC16	20	SW	when cleane	d gravels resemble gneissic clasts,	gravels mottled with		
 <u>320</u> 				SW/SP	Vell GRAU 60% subrnd 5-10% fines, MODERATE 5YR5/4, 85% cm, <5% fin	b, subrind to subang. DED SAND WITH GRAVEL (SW) f to m sand, 30-35% subang to an few cobbles that resemble gneiss ILY GRADED SAND WITH GRAV b subrind f to m sand, 10% subang es.	n		
					- color gr	ades to dk gray 5YR4/1			
 <u>330</u> 					WELL GRAU 70-80% subr fines, loose,	DED SAND WITH GRAVEL (SW) rnd f to m sand, 15-25% subang gr moist to wet.	- olive brn 2.5YR4/3, avel to 5 cm, <5%		
 <u>335</u> 		CC17	20	SW					
<u> </u>				GW	GRAVELLY gravels suba from 5-10%	SAND/GRAVEL WITH SAND (GI ng to ang to 6 cm, increasing fines to 20%, low plasticity, dense.	W) - reddish brn 5YR4/4, content with depth		
				CL	CLAY WITH	GRAVEL (CL) - brn 10YR4/3, fev	w f to m sand, few		
				SP	<pre>_ gravels up to _ POORLY GF</pre>	2 cm, low to medium plasticity. RADED SAND (SP) - reddish brn	5YR4/4, fine to		
345				SM	Medium, sub SILTY SANI 35-30% grav	nnd, <5% fines, damp. D WITH GRAVEL (SM) - olive brively, 15-20% fines, dense, low plastic DED SAND WITH GRAVEL (SM)	n 2.5YR4/3, 50% sand, icity, damp.		
				SW	2.5YR4/2, 70 dense, low p	% subrnd sand, 15-20% subang g lasticity, dry to damp.	ravel, 10-15% fines,		
350					MODERATE 7.5YR4/4, 80 <5% fines, v	SLY GRADED SAND WITH GRAV % m to c subrnd sand, 15% subar very low plasticity, loose, damp.	EL (SW/SP) - brn ng gravel to 5 cm,	groundwater grab sample collected from 348-368 ft bgs	

SHEET 9 of 2	10					PROJECT NUMBER: 326128 01 07 /	\R	BORING NUMBER: CW-2					
						SOIL BORING LC)G						
PROJECT NAM	E:					HOLE DEPTH (ft):	DRILLING CONTRAC	CTOR:					
	eologic ATIO	nvestig		ING (CCS	NAD 27 Z 5):	385.0 EASTING (CCS NAD 27 Z 5);	Prosonic DATE STARTED:	Corp. Maretta, OH DATE COMPLETED:					
546.7 ft.	MSL		2,1	03,097.47		7,613,798.05	01/18/2005	01/21/2005					
Rotos	sonic					WATER LEVEL (II):		Sonic AT (track mounted)					
LOCATION: Eas	t Mesa	i Area, Pa	arcel No). 650-151-	·06		LOGGED BY:	B. Moayyad					
	S	SAMPLE				SOIL DESCRIPTION	ł	COMMENTS					
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHAI SITY/CONSISTENCY, STRUCTURE, M	R, PE, MINERALOGY, OISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.					
 - 355 		CC18	20	SW/SP	MODERATE 7.5YR4/4, 80 <5% fines, v	ELY GRADED SAND WITH GRAVE D% m to c subrnd sand, 15% suban very low plasticity, loose, damp.	EL (SW/SP) - brn g gravel to 5 cm,						
			20										
				SM/ML	SANDY SIL sand, >20% damp.	.T WITH GRAVEL (SM/ML) - brn fines, remainder subang gravel, we	7.5YR4/4, 50-60% Il graded, dense,						
 				SW	WELL GRAU 25% c sand, - 60-70%	DED SAND (SW) - reddish brn 5Yl , 25% f sand, 5% gravel, 5% fine, s 6 m sand, 10-30% gravel, 10-20% f	R5/3, 40% m sand, oft, saturated. fines	groundwater grab sample collected from 368-385 ft bgs					
 <u>375</u>									SM/SP	f sand, 25% moistlarge co	ing c sand, mottling with reddish bri	n 5YR4/4	lots of chatter during drilling, drilling is
		CC19	17	SW	WELL GRAI sand, 30% n subang to su	DED SAND WITH GRAVEL (SW) n sand, 25% f sand, 10% gravel, 5% Jbrnd up to 4 cm, saturated, soft.	hard						
				SP/SM	SILTY SANI f sand, 30% sand. - mottling	D WITH GRAVEL (SP/SM) - gree silt, 20% m sand, 10% c gravel, 5% g with reddish brn 5YR4/4, decreasi	enish gray 5GY6/1, 30% % f gravel, 5% c ng gravel, increasing	distinct sweet odor noted from 378-380 ft in one sleeve when cut open on 1/21/05					
 				BR	c and m CONGLOME sand, 10% g	sand ERATE (BR) - reddish brn 5YR4/4, gravel, clasts ang to subang	35% m sand, 20% c	conglomerate. Very hard drilling from 380-385 ft					
			<u> </u>		L								

SHEET 10 of	10					PROJECT NUMBER	.: 17 AF	,	BORIN	BORING NUMBER: CW-2		
						SOIL BORING		<u> </u>	l			
PROJECT NAM	E:	c Investic	notion	DC&F Top		HOLE DEPTH (ft):				-#- 04		
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5)):	DATE STARTED:	NIC COLD. Marc			
546.7 ft. DRILLING MET	MSL (HOD:		2,1	03,097.4/		7,613,798.05		01/18/2005 DRILLING EQUIP	MENT:	01/21/2005		
Rotos	ionic	Aroa D	arcol Nr	~ 450-151	06				Sonic AT (tr	ack mounted)		
		Alea, ra		·· 020-121-	106				B. Moayya	ıd		
	S	SAMPLE				SOIL DESCRIPTION	J			COMMENTS		
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO	SOIL NAME, USCS SYMBOL, CC IMPOSITION, GRADING, GRAIN S SITY/CONSISTENCY, STRUCTURE	DLOR, HAPE, E, MOI	, MINERALOGY, ISTURE.	DRILLING DAILY S REFUSAI	G OBSERVATIONS AND OPERATIONS, TART AND END TIMES , DRILL RATE, LS, SAMPLING AND TESTING NOTES.		
	ABBREV CC = cont brn = bro It = light dk = dark vf = very f = fine-g m = med C = coars vC = very ang = any subang = subrnd = rnd = rou br = bedr ss = sand conglom comptd = qtz = qua					Boring Terminated at 3 /IATIONS tinuous core run own ' ' k / fine-grained grained dium-grained se-grained y coarse-grained y coarse-grained yular = subangular = subrounded unded frock formation dstone = conglomerate = compacted lartz	185 ft					
									-	CH2MHILL		




SHEET 1 of 1	1					PROJECT NUMBER: 326128.01.07.A	R	BORING NUMBER: CW-3
						SOIL BORING LO	G	
PROJECT NAMI IM-3 Hydrog	eologia	Investio	nation. F	PG&F Topo	ick	HOLE DEPTH (ft):	DRILLING CONTRA	CTOR:
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	DATE COMPLETED:
DRILLING MET	HOD:		2,1	03,340.44		WATER LEVEL (ft):	DRILLING EQUIPME	ENT:
Rotos	onic t Mesa	Area, Pa	arcel No). 650-151-	06		LOGGED BY:	Gefco SS-15K-HL
		,						C. Dougherty
	S	SAMPLE	~	USCS		SOIL DESCRIPTION		COMMENTS
DEPTH BGS (feet)	INTERVA	TYPE/ NUMBER	RECOVER (ft)	CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHAR SITY/CONSISTENCY, STRUCTURE, M	R, PE, MINERALOGY, DISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
 - 10								Conductor casing set to 10 ft bgs, wash casing to 70 ft bgs without collection of core. Per work-plan, drilled interval in unsaturated zone was not logged.
 _ <u>15</u> 								
<u> </u>					WELL GRAI 20% f sand, - mostly f	DED SAND (SW) - olive gray (5YR 5% gravel, ang. f sand and silt	4/2) 50% m sand,	logged from cuttings
	1		·		<u>.</u>			

SHEET 2 of 11 PROJECT NUMBER:									BORIN	G NUMBER: CW-3
						SOIL BORIN	G LOC	3	1	
PROJECT NAM	E:	Investio	ation [PG&F Tono	ck	HOLE DEPTH (ft):				Montclair CA
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 22	7 Z 5):	DATE STARTED:		DATE COMPLETED:
531.5 ft. DRILLING MET	MSL HOD:		2,1	03,348.44		7,613,849.33 WATER LEVEL (ft):		DRILLING EQUIPME	NT:	01/25/2005
Rotos	ionic st Mesa	Area, Pa	arcel No	0. 650-151-	06			LOGGED BY:	Gefco SS	-15K-HL
LUCATION. Lu		Alcu, I c		. 050 151					C. Doughert	у
	S	SAMPLE	_			SOIL DESCRIP	TION			COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	CODE	PERCENT COI DENS	SOIL NAME, USCS SYMB MPOSITION, GRADING, GR ITY/CONSISTENCY, STRUC	OL, COLOR, AIN SHAPE, CTURE, MOI	, MINERALOGY, STURE.	DRILLING DAILY STA REFUSALS	OBSERVATIONS AND OPERATIONS, RRT AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
 - 40					WELL GRAE 20% f sand,	DED SAND (SW) - olive <u>o</u> 5% gravel, ang.	gray (5YR4/	(2) 50% m sand,	cutting r	not monitored continuously
 				SW						
 					- grayish gravel	brn (10YR,5/2), 50% m sa	and, 30% f	ang sand, no		
- <u>65</u> 										
//					I				•	CH2MHILL

SHEET 3 of 11 PROJECT NUMBER: 326128.01.07.4R								BORIN	G NUMBER: CW-3	
						SOIL BORING	LOG			
PROJECT NAM	E:	- Invectio	nation (DC&E Topo	ck	HOLE DEPTH (ft):				Manhalain CA
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5	5):	DATE STARTED:	on & weils,	DATE COMPLETED:
531.5 ft. DRILLING MET	MSL HOD:		2,1	03,348.44		7,613,849.33		01/19/2005 DRILLING EOUIPME	NT:	01/25/2005
Rotos	onic	A		650 151	00				Gefco SS	G-15K-HL
LOCATION: Eas	t Mesa	i Area, Pa	arcel No	. 650-151-	06			LOGGED BT:	C. Doughert	у
	S	SAMPLE				SOIL DESCRIPTION	N			COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT COI DENS	SOIL NAME, USCS SYMBOL, C MPOSITION, GRADING, GRAIN : ITY/CONSISTENCY, STRUCTUR	COLOR, SHAPE, E, MOIS	MINERALOGY, STURE.	DRILLING DAILY ST REFUSALS	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, 5, SAMPLING AND TESTING NOTES.
 		CC1	10	SP	POORLY GR 10YR5/3, 40 gravel, gness - silty mo - gravel in	ADED SAND WITH SILT AN % f-m sand, 20% c sand, 10-1 is as large as 4 cm, firm, moist re silt and clay in thin layers ncreasing in size to 6-7 cm, silt	ID GRA 5% silt, t.	VEL (SP) - brn 10% subang clay	large gr	ous coring started at 70 ft bgs avel possibly cobble fragments?
				SW-SM	WELL GRAE 10YR5/3, 30° subang grave - some ca	DED SAND WITH SILT AND 0 % m sand, 25% f sand, 20% a el up to 6 cm size, 10% silt-clay aliche, slit imbrication of fine gr	GRAVE ng c sar (, firm n ravel at l	L (SW-SM) - brn nd, 15% ang to noist. base of core, dry		
					SILTY SANI sand, 20% si than 2 cm, m	D (SM) - brn 10YR5/3, 50% f lt, 5% subang gravel, firm, cla noist.	sand, 2 asts are	5% m and c ang gneiss-few larger		
<u> </u>		CC2	20	SM	- decreas	ing silt and increasing c sand				
 100					WELL GRAD 10YR5/3, 30° 5% subang g	DED SAND WITH SILT AND (% m sand, 30% f sand, 25% a pravel generally 2 cm or less, fi	GRAVE ng c sar rm mois	L (SW-SM) - brn Id, 10% silt-clay, t.		
					- silt and	clay increased to 20%, 15% de	ecreased	d c sand		
105	<u> </u>		<u> </u>						•	CH2MHILL

SHEET 4 of 11 PROJECT NUMBER: 326128 01 07 AP									BORIN	G NUMBER: CW-3
						SOIL BORING	LOC	G		
PROJECT NAM	E: eologia	Investig	ation I	PG&F Topo	ck	HOLE DEPTH (ft):		DRILLING CONTRAC	TOR:	Montclair CA
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z	5):	DATE STARTED:		DATE COMPLETED:
DRILLING MET	HOD:	[2,1	us,348.44		7,613,849.33		DRILLING EQUIPME	NT:	U1/25/2005
Rotos	onic it Mesa	Area, Pa	arcel No	. 650-151-	06			LOGGED BY:	Gefco SS	5-15K-HL
							N		. Dougher	
	s L	SAMPLE	7	USCS		SOIL DESCRIPTIO	'n			COMMENTS
(feet)	INTERVA	TYPE/ NUMBER	RECOVER (ft)	CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, MPOSITION, GRADING, GRAIN SITY/CONSISTENCY, STRUCTU	COLOR, SHAPE RE, MO	, , MINERALOGY, ISTURE.	DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
 - 110 		CC3	20	SW-SM	WELL GRAI 10YR5/3, 30 5% subang g - increase (7.5YR4/	DED SAND WITH SILT AND % m sand, 30% f sand, 25% a gravel generally 2 cm or less, f ed 10% gravel content, color r (4)				
 					- dry					
120										
				SW	WELL GRAI clay, <5% gr	DED SAND (SW) brn 10YR5/ ravel, saturated, clasts are ang	'3, 10% J.	o c sand, 5% silt and	ground from 12	water grab sample collected 20-136 ft bgs
				SM	SILTY SANI ang gravel u moist, grada	D WITH GRAVEL (SM) - brr p to 4cm, 20% c sand, 20% m tional contact above, abrupt be	n 7.5YR n sand, elow.	5/3, 30% f sand, 20% 15% silt, firm,		
125					SILTY SANI ang c sand, 2	D (SM) - brn 10YR4/3, 30% r 20% silt, 5% subang gravel up	m sand, to 2cn	, 25% f sand, 20% n size, firm.		
 					- increase	ed gravel content				
		CC4	16	SM	- slit incr	ease in clay				
135					- It large	2 inch gravel				
 					NO RECOVI	ERY				
170			I		I				•	CH2MHILL

SHEET 5 of 11						PROJECT NUMBER: 326128.01.07	AR	BORIN	IG NUMBER: CW-3
						SOIL BORING LO	DG		
PROJECT NAM	E:	. T			alı	HOLE DEPTH (ft):	DRILLING CONTRA	CTOR:	
	eologic ATIO	N:	Jation, F	ING (CCS	CK NAD 27 Z 5):	360.0 EASTING (CCS NAD 27 Z 5);	WDC Explorat	ion & Wells,	Montclair, CA DATE COMPLETED:
531.5 ft.	MSL		2,1	03,348.44		7,613,849.33	01/19/2005		01/25/2005
Rotos	ionic					WATER LEVEL (IL):	DRILLING LQUIPM	Gefco S	S-15K-HL
LOCATION: Eas	t Mesa	Area, Pa	arcel No	. 650-151-	06		LOGGED BY:	C. Dougher	ty
	s	SAMPLE				SOIL DESCRIPTION	L		COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT COI DENS	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHA SITY/CONSISTENCY, STRUCTURE, M	DR, PE, MINERALOGY, IOISTURE.	DRILLING DAILY ST REFUSAL	G OBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
 - 145 150		CC5	20	SM	SILTY SANI ang c sand, 2 - 9 cm cc - brn 10Y gravel - modera - increasi	D (SM) - brn 10YR4/3, 30% m sa 20% silt, 5% subang gravel up to 2 obble (R5/3, 30% f sand, 25% silt, 15% a stely firm, dry, moist ing c sand 25%	nd, 25% f sand, 20% cm size, firm. ang c sand, <5% ang	cobble hard di	possibly part of larger rock
 					- several clay at 15 - silty sar 25% silt, - caliche,	2cm to 4cm gravel, less gravel bel 52-153.5 ft, very moist nd, brn 7.5YR5/4, 5% ang gravel u 20% c sand, 20% f sand	ow 152ft, Increased p to 2 cm or less,		
				SC	CLAYEY SAI clay,<10% c - color m and f san	ND (SC) - brn 10YR5/3, 70% f to sand, <5% gravel, firm, moist to v ottled with reddish brn 2.5YR4/4, o nd, increasing 15% c sand	m sand, 20% silt and wet. decreasing 65% m	drill pip push c	e broken when just starting to ore
165 170		CC6	20	SM	SILTY SANI 15% silt, 109 - some re	D (SM) - brn 10YR5/3, 50% f and % f gravel, silty soft, moist to wet. eddish brn 2.5YR4/4 mottling, large	m sand, 25% c sand,		
 				SW	WELL GRAE sand, 35% f	DED SAND WITH GRAVEL (SW) and m sand, 15% f gravel, 5% silt	- brn 10YR4/3, 40% c , ang to subang, loose.		
								- 🏯	CHZMIHILL

SHEET 6 of 11 PROJECT NUMBER: 326128 01 07 AP								BORIN	IG NUMBER: CW-3
						SOIL BORING LO	G		
PROJECT NAM		c Invectio	nation I	DC&F Topo	ck	HOLE DEPTH (ft):		CTOR:	Montolair CA
SURFACE ELE	VATIO	N: N	IORTH	ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	ion a wens,	DATE COMPLETED:
531.5 ft. DRILLING ME	. MSL THOD:		2,1	03,348.44		7,613,849.33	01/19/2005 DRILLING EOUIPM	ENT:	01/25/2005
Roto	sonic			CE0 4 54	0.0			Gefco S	S-15K-HL
LOCATION: Ea	st Mesa	a Area, Pa	arcel No	. 650-151-	06		LOGGED BY:	ty	
	s	SAMPLE				SOIL DESCRIPTION			COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT COL	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHAR SITY/CONSISTENCY, STRUCTURE, MO	R, FE, MINERALOGY, DISTURE.	DRILLING DAILY ST REFUSAL	G OBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.
 <u>180</u> 				SW-SM	WELL GRAI sand, 35% f WELL GRAI reddish brn (10% f gravel - thin zor	DED SAND WITH GRAVEL (SW) and m sand, 15% f gravel, 5% silt, DED SAND WITH SILT (SW-SM) (2.5YR3/4) mottled, 40% c sand, 40 I, 10% silt, moderately firm. he of dark greenish gray (5GY4/1), s	- brn 10YR4/3, 40% c ang to subang, loose. - brn 10YR 4/3 and dk % f and m sand, ilt, some caliche	ground from 1	lwater grab sample collected 80-200 ft bgs
 _ 185 					- pale brr clasts are	n (10YR6/3), 35% c sand, 15% grav e angular up to 6 cm size	vel, saturated, soft,		
 _ 190		CC7	20		SILTY SANI 7.5YR4/4, 60 firm, moist.	D (SM) - mottled dk grayish brn 2. 0% f and m sand, 15% silt, 15% c s	5YR4/2 and brn and, 10% f gravel,		
 - 195 				SM	- larger g	gravel clasts (2-4 cm)			
	-				- larger g	gravel clasts (2-4 cm)			
					NO RECOVE	ERY		lost co down h	re due to broken core barrel nole
								hard di	rilling
210									
								-	CH2MHILL

SHEET 7 of 11 PROJECT NUMBER: 326128.01.07.4R							BORIN	IG NUMBER: CW-3		
						SOIL BORING LO	G			
PROJECT NAMI	eologic	Investio	nation	PG&F Topo	ck	HOLE DEPTH (ft):	DRILLING CONTRA		Montolair CA	
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	ion & weils,	DATE COMPLETED:	
DRILLING MET	HOD:		2,1	.03,348.44		7,613,849.33 WATER LEVEL (ft):	DRILLING EQUIPM	ENT:	01/25/2005	
Rotos	onic t Mesa	Area, Pa	arcel No	0. 650-151-	06		LOGGED BY:	Gefco S	S-15K-HL	
		,,						C. Dougher	ty	
	s	AMPLE	~	USCS		SOIL DESCRIPTION			COMMENTS	
DEPTH BGS (feet)	INTERVA	TYPE/ NUMBER	RECOVER' (ft)	CODE	PERCENT COL DENS	SOIL NAME, USCS SYMBOL, COLOF MPOSITION, GRADING, GRAIN SHAP SITY/CONSISTENCY, STRUCTURE, MC	R, E, MINERALOGY, DISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.		
-		ССЭ	20	SW-SM	WELL GRAD 2.5YR4/2, 40 silt, 5% f sut	DED SAND WITH SILT (SW-SM) 0% m ang sand, 25% c ang sand, 20 bang gravel up to 2 cm, moderately f	- dk grayish brn 1% f ang sand, 10% firm, moist to wet.	periodic	c nard driwing	
 					- large gr - mottling - dry SILTY SANI 20% silt, 5%	ravel 3-4 cm, also increasing c sand g with reddish brn 5YR4/4 D (SM) - brn 7.5YR4/4, 50% f to m o gravel, moderately soft, moist.	sand, 25% c sand,	dry, ma collecte CW-3-2 conduc	aybe from drilling friction heat? ed grab groundwater sample, ID: 260 at 14:40 hrs, pH=8.9/8.7, tivity = 730/850 ms, TDS =	
 				SM	- 7 cm cc	bble		4500/5 hard dr	100 ppm illing	
								•	CH2MHILL	

SHEET 8 of 11 PROJECT NUMBER: 326128 01 07 AR							\R	BORIN	G NUMBER: CW-3
						SOIL BORING LO	G		
PROJECT NAME		Toucetic	nation		ck	HOLE DEPTH (ft):	DRILLING CONTRAC	TOR:	
	ATIO	N: N		ING (CCS	NAD 27 Z 5):	360.0 EASTING (CCS NAD 27 Z 5):	DATE STARTED:	on & Wells,	Montclair, CA DATE COMPLETED:
531.5 ft.	MSL		2,1	03,348.44		7,613,849.33	01/19/2005	NT-	01/25/2005
Rotos	onic							Gefco SS	-15K-HL
LOCATION: Eas	t Mesa	a Area, Pa	arcel No	o. 650-151-	06		LOGGED BY:	2. Dougherty	
	s	SAMPLE				SOIL DESCRIPTION			COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHAR SITY/CONSISTENCY, STRUCTURE, M	R, 9E, MINERALOGY, OISTURE.	DRILLING DAILY STA REFUSALS	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, 5, SAMPLING AND TESTING NOTES.
 - 250 		CC10	6		NO RECOV	ERY		groundv from 24	vater grab sample collected 6-260 ft bgs
 				GW	WELL GRA 35% f ang to gravel, 15% <u>rock.</u> WELL GRAI	DED GRAVEL WITH SAND (GW) o subang gravel, 30% c ang sand, 2 f sand, 5% silt, soft, saturated, clas DED SAND WITH SILT (SW-SM)	- grayish brn 2.5YR5/2, 0% c ang to subang ts are metamorphic - grayish brn 2.5YR5/2,	periodic	hard drilling
				SW-SM	40% f and m saturated. WELL GRA	n sand, 30% c sand, 20% silt, 10%	f gravel, soft, - gravish brn 2.5YR5/2,		
 				SM	35% f ang to gravel, 15% rock. SILTY SAN sand, 20% f	b subang gravel, 30% c ang sand, 2 f sand, 5% silt, soft, saturated, clas D (SM) - brn 10YR5/3, 40% m san sand, very soft, saturated.	0% c ang to subang its are metamorphic		
 275		CC11	16	SW-SM	WELL GRAI sand, 25% c - some f - coarse - increasi - caliche	DED SAND WITH SILT (SW-SM) sand, 10% silt, 5% f gravel, soft, s gravel (<5%), less silt, grades into gravel present (3cm in size- rock fra ing silt, less c sand and mottling with reddish br (5YR4/	- brn 10YR5/3, 30% f aturated. SW below agments) (4)		
 280					NO RECOV	ERY		very har	rd drilling
								•	CH2MHILL

SHEET 9 of 11 PROJECT NUME							AR	BORIN	NG NUMBER: CW-3
						SOIL BORING LO	DG		
PROJECT NAM	E:	c Invectio	nation	DC&E Topo	ock	HOLE DEPTH (ft):			Mantalain CA
SURFACE ELEN	ATIO	N: N	IORTH	ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:		DATE COMPLETED:
531.5 ft. DRILLING MET	MSL THOD:		2,1	.03,348.44		7,613,849.33 WATER LEVEL (ft):	01/19/2005 DRILLING EQUIP	MENT:	01/25/2005
Rotos	sonic	Area Pa	arcel No	0 650-151-	.06		LOGGED BY:	Gefco S	S-15K-HL
LOCATION. La		.,						C. Doughe	rty
		SAMPLE		LIECE		SOIL DESCRIPTION			COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVER) (ft)	CODE	PERCENT CO	SOIL NAME, USCS SYMBOL, COL MPOSITION, GRADING, GRAIN SHA SITY/CONSISTENCY, STRUCTURE, I	OR, APE, MINERALOGY, MOISTURE.	DRILLING DAILY S REFUSAI	G OBSERVATIONS AND OPERATIONS, TART AND END TIMES , DRILL RATE, .S, SAMPLING AND TESTING NOTES.
				SW	40% c sand,	DED SAND (SW) - brn 7.5YR5/4, 10% subang to subrnd gravel, 5%	. 45% f and m sand, 6 silt, soft, wet.	rig cha	tter
				SC	CLAYEY SA and clay, 10 ^o - increase	ND (SC) - brn 10YR4/3, 65% f ar % c sand, 5% f gravel, firm, moist ed gravel 10%	nd m sand, 20% silt		
					- caliche WELL GRAI sand, 20% f	DED SAND (SW) - brn 7.5YR5/3, f sand, 10% fine ang to subang gri	, 40% m sand, 25% c avel, 5% silt,	_	
		CC12	20		moderately f	îrm, moist to wet.	,		
295 				SW	- increasi	ing 15% gravel and c sand			
				-	- 6 inch t gravel	thick zone of silt and gravel, brn 10)YR5/3, 3-5cm ang	no rec casing ground from 3 core re materia	overy due to over drilling with to remove broken drill pipe dwater grab sample collected 00-322 ft bgs ecovered, appears to be slough al
<u> </u>				SM	SILTY SANI silt and clay,	D (SM) - brn 10YR5/3, 40% m sa 5% c sand, <5% gravel, modera	nd, 35% f sand, 20% tely soft, moist.	_	
 		CC13	20	SW-SM	WELL GRAI sand, 30% f soft, wet.	DED SAND WITH SILT (SW-SM sand, 25% c sand, 25% m sand, 3) - brn 7.5YR5/3, 40% 10% silt, 10% gravel,		
315									
								-	CH2MHILL

SHEET 10 of	11		BORING NUMBER: CW-3					
						SOIL BORING LOO	G	
PROJECT NAM IM-3 Hydrog	E: eologic	: Investic	ation, I	PG&E Topo	ck	HOLE DEPTH (ft): 360.0	DRILLING CONTRAC	CTOR: on & Wells, Montclair, CA
SURFACE ELEV		N: N	IORTH	ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5): 7 613 849 33	DATE STARTED: 01/19/2005	DATE COMPLETED: 01/25/2005
DRILLING MET	HOD:		2,1	00,010.11		WATER LEVEL (ft):	DRILLING EQUIPME	ENT:
LOCATION: Eas	t Mesa	Area, Pa	arcel No	. 650-151-	06		LOGGED BY:	
	s					SOIL DESCRIPTION		COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT COI DENS	SOIL NAME, USCS SYMBOL, COLOR MPOSITION, GRADING, GRAIN SHAPE ITY/CONSISTENCY, STRUCTURE, MO	, MINERALOGY, ISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
 - 320 	I		E		WELL GRAE to ang sand, 10% subang - few clas - slit colo sand, inc	DED SAND (SW) - reddish brn 5YR 25% c subang to ang sand, 20% f su to subrnd gravel, 5% silt, soft, wet. sts of lithified matrix r change to 5YR4/3, 25-30% increasi reasing gravels to 15%, c sand, 5% s	5/3, 40% m subang Jbang to ang sand, ng sand, 20% f silt	collected grab groundwater sample, ID: CW-3-320 at 9:32 hrs, from 300-320 ft interval
330 - 335 				SW	- few clas	avel up to 9 cm, multiple lithologies		groundwater grab sample collected from 340-360 ft bgs

SHEET 11 of 11 PROJECT NUMBER:								BORIN	G NUMBER:	
						SOTL BORING LO	<u>.</u> G			
PROJECT NAM	E:	Tovactic	action 1			HOLE DEPTH (ft):		CTOR:		
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	10n & vvens,	DATE COMPLETED:	
531.5 ft.	MSL THOD:		2,1	03,348.44		7,613,849.33 WATER LEVEL (ft):	01/19/2005 DRILLING EQUIPM	ENT:	01/25/2005	
Rotos	ionic st Mesa	Area, Pa	arcel No		-06		LOGGED BY:	Gefco SS	S-15K-HL	
					T			C. Dougher	C. Dougherty	
	S	AMPLE	_	liscs		SOIL DESCRIPTION				
DEPTH BGS (feet)	INTERVA	TYPE/ NUMBER	RECOVER (ft)	CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLOR MPOSITION, GRADING, GRAIN SHAPE SITY/CONSISTENCY, STRUCTURE, MO	, MINERALOGY, ISTURE.	DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.	
-					WELL GRAT to ang sand, 10% subang - color to - brn (7.! gravel, ABBREV cc = con brn = brn It = light dk = dar vf = very f = fine-! m = mec c = coar: vc = ver ang = ar subang = subrnd = rnd = ro br = bec	DED SAND (SW) - reddish brn 5YR5 25% c subang to ang sand, 20% f suit to subrnd gravel, 5% silt, soft, wet. > 5YR4/3 SYR5/2), 45% m sand, 30% c sand, 1 :5% silt Boring Terminated at 360 ft /IATIONS itinuous core run 'own : rk y fine-grained grained dium-grained 'se-grained y coarse-grained ngular = subangular = subrounded brounded	3/3, 40% m subang Jbang to ang sand, L0% f sand, 10%	total dr	illed depth	
					conglom comptd = qtz = qua	= conglomerate = compacted artz			CH2M HILL	





SHEET 1 of 10 PROJECT NUMBER: 326128.01.07.AR							R	BORING NUMBER: CW-4
						SOIL BORING LO	G	
PROJECT NAM	E: eologia	: Investio	ation, I	PG&E Topo	ck	HOLE DEPTH (ft):	DRILLING CONTRAC	CTOR:
SURFACE ELEV		N: r		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	DATE COMPLETED:
DRILLING MET	HOD:		2,1	03,203.03		WATER LEVEL (ft):	DRILLING EQUIPME	01/14/2005
Rotos	sh Bet	ween Ea	st & We	st Mesas, I	Parcel No. 650-1	 151-06	LOGGED BY:	
							B. Mo	bayyad, B. Trebble
	s L	SAMPLE	7	uscs		SOIL DESCRIPTION		COMMENTS
(feet)	INTERVA	TYPE/ NUMBER	RECOVER (ft)	CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHAP SITY/CONSISTENCY, STRUCTURE, M	R, PE, MINERALOGY, DISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
0 								Conductor casing set to 10 ft bgs, wash casing to 48 ft bgs without collection of core. Per work-plan, drilled interval in unsaturated zone was not logged.
						DED SAND WITH GRAVEL AND S	II T (SW) - brn	cuttings well graded sand with gravel, brn 10YR5/3, medium hard, dry
 		CC1	10	SW	10YR3/2, 50 clay (predom - become - sand be gravel, 1	% sand, 35% gravel up to 2.2" long ninantly f sand), subang Igneous and es moist ecomes more coarse. Pale brn 10YR 0% fines	, 15% fines (silt), no d metamorphic. 6/3, 60% sand, 30%	
 60				-	WELL GRAI	DED SAND WITH GRAVEL (SW)	- brn 10YR5/3, 70-75%	saturated (water table) groundwater grab sample collected from 58-78 ft bgs some decomposing MM gravels
 		CC2	10	SW	- become fines	es subang with more clay, 65% sand	l, 20% gravel, 5%	drilling becomes difficult
 70				SW	WELL GRAI 10YR4/3, 55 long, metam	DED SAND WITH CLAY AND GRA % f sand, 25% fines, 20% gravel, s iorphic, hard, wet.	VEL (SW) - brn ubang, one cobble 4"	collect CW-4-68 @ 10:40 on 1/11/05

SHEET 2 of 2	LO					PROJECT NUMBER:		BORING NUMBER: CW-4		
						SOIL BORING L	OG			
PROJECT NAM	E:	c Invecti	nation I	PG&F Topo	ck	HOLE DEPTH (ft):	DRILLING CONTRA	CTOR:		
SURFACE ELEV		N: [ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	DATE COMPLETED:		
DRILLING MET	HOD:		2,1	03,263.03		7,612,928.74 WATER LEVEL (ft):	DRILLING EQUIPME	01/14/2005		
Rotos	sh Betv	ween Ea	st & We	st Mesas, F	Parcel No. 650-1	 151-06	LOGGED BY:	onic AT (track mounted)		
							B. Me	ayyad, B. Trebble		
	s ا ب	SAMPLE	7	USCS		SOIL DESCRIPTION		COMMENTS		
(feet)	INTERVA	TYPE/ NUMBER	RECOVER (ft)	CODE	PERCENT COI DENS	SOIL NAME, USCS SYMBOL, COL MPOSITION, GRADING, GRAIN SH SITY/CONSISTENCY, STRUCTURE,	LOR, APE, MINERALOGY, MOISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.		
 		CC3	9.5	SW	WELL GRAE 10YR4/3, 70 long, metam	DED SAND WITH CLAY AND GF % sand, 20% gravel, 10% fines, s orphic, hard, wet.	RAVEL (SW) - brn subang, one cobble 4"			
 - 80 					WELL GRAE brn 10YR4/2, fines, 10% co	DED SAND WITH GRAVEL AND , 45% ang sand with med c grains obbles up to 4.5", igneous and me	CLAY (SW) - dk grayish s, 25% gravel, 20% etamorphic, hard, wet.	stop drilling at 78ft to bail from 58-78 ft very difficult drilling		
 - 85 		CC4	9.5	SW	- no cobb	oles, 60% sand, 25% gravel, 15%	fines			
 90 		CC5	9	SW	WELL GRAE 10YR4/5, 72 fines, m dens	DED SAND WITH GRAVEL (SW % subrnd sand, 25% subang to su se, wet.) - dk grayish brn ubrnd gravel, < 3%	cleaner, grayer zone		
 				SW-GW	WELL GRAE 50% sand, 4 hard, wet.	DED SAND AND GRAVEL (SW) 10% gravel, 10% fines, subang to	- dk grayish brn 10YR4/3, ang metamorphic,	decomposing MM cobbles		
 				SW	WELL GRAE 7.5YR3/3, 65	DED SAND WITH GRAVEL AND 5% sand, 20% gravel, 15% fines,	CLAY (SW) - dk brn hard, wet.			
 105		CC6	9		WELL GRAD subang to su density.	DED SAND WITH GRAVEL (SW Ibrnd sand, 20% subang gravel, 5) - brn 7.5YR4/3, 75% % fines, medium			

SHEET 3 of 3	10					PROJECT NUMBER: 326128.01.07.AR BORING NUMBER: CW-4					
						SOIL BORING LOC	G				
PROJECT NAM	E:	- Investi	nation I	PG&F Topo	ck	HOLE DEPTH (ft):	DRILLING CONTRAC	CTOR:			
SURFACE ELEV		N: [ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:	DATE COMPLETED:			
DRILLING ME	MSL FHOD:		2,1	03,263.03		7,612,928.74 WATER LEVEL (ft):	DRILLING EQUIPME	01/14/2005			
Rotos	sonic sh Bety	ween Fa	st & We	st Mesas I	Parcel No. 650-1		S LOGGED BY:	onic AT (track mounted)			
							B. Mo	bayyad, B. Trebble			
	S	SAMPLE		11000		SOIL DESCRIPTION		COMMENTS			
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVER) (ft)	CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLOR, MPOSITION, GRADING, GRAIN SHAPE ITY/CONSISTENCY, STRUCTURE, MOI	, MINERALOGY, STURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.			
	$\left \right $			SW	WELL GRAI subang to su density.	DED SAND WITH GRAVEL (SW) - brnd sand, 20% subang gravel, 5% fi	brn 7.5YR4/3, 75% ines, medium				
				GW	WELL GRAD	DED GRAVEL AND COBBLES (GW)	- 40% gravel, 10%				
				SW	WELL GRAI	nes, subra. DED SAND WITH GRAVEL (SW) -	75% sand, 20%				
 110				ML	SANDY SIL	nes. T (ML) - brn 7.5YR4/3, 35% sand, 5	% gravel, non				
					plastic, firm, WELL GRAI	wet. DED SAND WITH GRAVEL (SW) -	brn 7.5YR4/3, 60%				
					sand, 30% g	ravel, 10% fines, subang, medium de	nsity, wet.				
		CC7	9.5								
115											
					- 65% sa	nd 5% fines gravel is predominantly	aneiss				
					- 58% C	subrnd sand, 10% gravel, 5% fines	griciss	groundwater grab sample collected			
	A A				5070 0	Sabria Salla, 1076 gravel, 576 miles		from 118-138 ft bgs			
120	\ /				- silty lay	er, 60% sand, 25% gravel, 5% fines					
	$ \setminus $										
				C/M	- well gra	ided sand with gravel (SW), grayish b	rn 10YR 5/2, 75%				
	ÌŇ	CC8	10	300	subrnd sa metamor	and, 20% subang gravel, 5% fines, ig phic, medium density, wet	neous and				
 125											
					- cobbles						
]/ \										
	Λ							collect sample CW-4-128 on 1/11/05. End of 1/11/05 drilling day			
130	\ /										
					- color ch	anges to hrn 7 5YR4/3					
		CC9	10								
					- 75% s	and, 15% gravel, 10% fines					
135	$\left \right \left \right $				WELL GRAD	DED SAND WITH GRAVEL AND SI	LT (SW) - brn	at 15:45 stop drilling to bail for sample			
					7.5YR4/3, 65 metamorphic	i% sand, 20% gravel, 15% fines, sub c, hard, wet.	ang, igneous and				
				SW	cobble	7020					
	$ \land $			-							
 140											
	<u>v 1</u>				<u>I.</u>						

SHEET 4 of 3	10					PROJECT NUMBER:	2	BORING NUMBER: CW-4			
						SOIL BORING LOC	G				
PROJECT NAM	E:	Investig	uation [C&F Topo	ck	HOLE DEPTH (ft):	DRILLING CONTRAC	CTOR:			
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	337.0 EASTING (CCS NAD 27 Z 5):	DATE STARTED:	DATE COMPLETED:			
515.9 ft. DRILLING MET	MSL HOD:		2,1	03,263.03		7,612,928.74	01/10/2005 DRILLING EOUIPME	01/14/2005 NT:			
Rotos	onic		+ 0 \//-	-+ Massa -			S	onic AT (track mounted)			
LOCATION: Wa	sn Betv	ween Eas	st & we	st Mesas, H	Parcel No. 650-1	.51-06	B. Moayyad, B. Trebble				
	s	AMPLE				SOIL DESCRIPTION		COMMENTS			
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT COI	SOIL NAME, USCS SYMBOL, COLOR, MPOSITION, GRADING, GRAIN SHAPE IITY/CONSISTENCY, STRUCTURE, MOI	, MINERALOGY, ISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.			
 		CC10	10	SW	WELL GRAL and c sand, 2 and metamo	DED SAND WITH GRAVEL (SW) - 20% predominantly f gravel, 5% fines rphic, medium density, wet, occasion:	brn 7.5YR4/3, 75% f s, subang, igneous al cobble 3".				
 <u>150</u>				GW	WELL GRAD 55% gravel, and metamor	DED GRAVEL WITH COBBLES (GW 35% subang cobbles up to 5.7" long, rphic, hard, dry.	/) - gray 10YR6/1, 5% sand, igneous	fines wash into cobbles and gravel?			
 <u>155</u>		CC11	9.5	SW	WELL GRAD 25% gravel, WELL GRAD gravel, stron 5% fines, sul	DED SAND WITH GRAVEL AND CL 20% fines. DED SAND WITH GRAVEL (SW) - g brn 7.5YR4/6 fines, 65% sand, 30% bang to ang, igneous and metamorph					
 					- gray sa	nd DED SAND (SW) - dk grav 7 5YR4/3	2 85% sand 10%				
				SW	fines, 5% gra WELL GRAE 7.5YR4/4, 55 wet.	avel, subang, medium. DED SAND WITH GRAVEL AND CL 5% sand, 30% gravel, 15% fines, sub	AY (SW) - brn ang, medium hard,				
	$\left \right $	CC12	10		- gravel is	s mostly coarse, cobbles present up to	o 5.5 inch				
					sand, 30% g metamorphic	ravel which is mostly fine, 5% fines, s c, medium density, wet.	subang, igneous and				
		CC13	9.5		- 60% sa	nd, 10% fines					
	\setminus				- color ch	nange to gray and brn 7.5YR5/1 and 5	5/2				
1/5	1		I		<u> </u>						

SHEET 5 of 10 PROJECT NUMBER: 326128.01.07.4R									BORIN	G NUMBER: CW-4	
						SOIL BORING	LOC	3		••••	
PROJECT NAM	IE:	c Investic	nation (PG&F Tonc	rck	HOLE DEPTH (ft):		DRILLING CONTRAC	COR:	#2 04	
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5)):	DATE STARTED:		DATE COMPLETED:	
515.9 ft. DRILLING ME	. MSL THOD:		2,1	.03,263.03		7,612,928.74 WATER LEVEL (ft):		01/10/2005 DRILLING EQUIPME	NT:	01/14/2005	
Roto:	sonic	woon For	ct 9. W/c	et Mocac I	Darcal No. 6E0.1	´	onic AT (tra	ack mounted)			
						.51-00		B. Mc	bayyad, B. Trebble		
	9	SAMPLE				SOIL DESCRIPTION				COMMENTS	
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, CO MPOSITION, GRADING, GRAIN S SITY/CONSISTENCY, STRUCTURE	OLOR, SHAPE E, MOI	, MINERALOGY, STURE.	DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.	
 <u>180</u> 	-			SW	WELL GRAT sand, 30% g metamorphic - less gra - gray 7.1 to 3.3 inc - less gra	DED SAND WITH GRAVEL (SV ravel which is mostly fine, 5% fi ;, medium density, wet. wel, 75% sand, 20% gravel, 5% 5YR5/1, 55% sand, 35% gravels ch wel, 75% sand, 20% gravel, 5%	W) -t ines, s o fines s, 10%	orn 7.5YR4/4, 65% subang, igneous and 6 fines, cobbles up	ground from 17	water grab sample collected 78-198 ft bgs	
 - 185 	-	CC14	9.5		- brn 7.5 inch, 80	YR4/4, better grading below 185 % sand, 10% gravel, 5% cobble					
 190	-			SP	POORLY GR	RADED SAND (SP) - gray, f sa 1, clean, wet. RADED GRAVEL (GP) - gray 7	hing upwards, <3%				
				GP	- grades - fine gra	to subrnd c sand vel					
 <u>195</u> 	-	CC15	9	SW	WELL GRAI subang to su - become 70% san	DED SAND WITH GRAVEL (SV Ibrnd c gravel, 5% fines, wet. es brn with more gravel and cobl d, 20% gravel, 5-10% fines	W) - bles u	gray, 80% sand, 15%			
 - 200	-			SC	CLAYEY SA f to c gravel, density, wet.	ND WITH GRAVEL (SC) - brn 30% fines, ang, igneous and m	n 7.5Y ietami	R4/4, 40% sand, 30% orphic, medium			
	-			SW	WELL GRAI 7.5YR4/4, 50	DED SAND WITH GRAVEL AN 1% subang sand, 30% ang grave	ID CL el, 20	AY (SW) - brn % fines, hard, wet.			
 	-	CC16	18		WELL GRAI 60% sand, 3 hard, wet.	DED SAND WITH GRAVEL (SV 5% gravel, 5% fines, subrnd igr	W) - neous	strong brn 7.5YR4/6, and metamorphic,			
210	1			<u> </u>						Ö 110121	
									-	GHZMHILL	

SHEET 6 of	10					PROJECT NUMBER: 326128.01.07.AR BORING NUMBER: CW-4				
						SOTI BORINGIO	n NG			
PROJECT NAM	E:	. T			alı	HOLE DEPTH (ft):	DRILLING CONTRAC	CTOR:		
	eologic /ATIOI	N: N	IORTH	ING (CCS	NAD 27 Z 5):	337.0 EASTING (CCS NAD 27 Z 5):	Prosonic DATE STARTED:	C Corp. Maretta, OH DATE COMPLETED:		
515.9 ft.	MSL		2,1	.03,263.03		7,612,928.74	01/10/2005	01/14/2005		
Rotos	sonic							Sonic AT (track mounted)		
LOCATION: Wa	ish Beti	ween Eas	st & We	st Mesas, I	Parcel No. 650-1	151-06	LOGGED BY: B. Mo	oayyad, B. Trebble		
	s	SAMPLE				SOIL DESCRIPTION		COMMENTS		
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT CO DENS	SOIL NAME, USCS SYMBOL, COLO MPOSITION, GRADING, GRAIN SHAB SITY/CONSISTENCY, STRUCTURE, M	R, YE, MINERALOGY, DISTURE.	DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES , DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.		
 - 215				SW	WELL GRAI 60% sand, 3 hard, wet. - gravels WELL GRAI	DED SAND WITH GRAVEL (SW) 5% gravel, 5% fines, subrnd igneou up to 1.5 inch DED SAND WITH GRAVEL AND C	- strong brn 7.5YR4/6, is and metamorphic,			
				SW	7.5YR4/6, 55	5% sand, 30% gravel, 15% fines, su	ibang, hard, wet.			
 					WELL GRAI sand, 30% g wet.	DED SAND WITH GRAVEL (SW) gravel, 10% fines, subang to subrnd,	- brn 7.5YR4/4, 60% medium density,			
		0017		SW	- cobble : - brn 7.5	zone, 35% sand, 30% cobbles, 20% YR4/3	ó gravel, 15% fines	refusal in metamorphic bedrock		
			19		- become 25% grav	es strong brn 7.5YR4/6 with more c vel, 10% fines	sand, 65% sand,			
 				sw	WELL GRAI 7.5YR4/3, 45 metamorphic	DED SAND WITH GRAVEL AND C 5% sand, 35% gravel, 20% fines, su c, medium hard, wet.	LAY (SW) - brn Ibang, igneous and	groundwater grab sample collected from 238-258 ft bgs		
				SW	WELL GRAI subrnd sand, density, wet.	DED SAND WITH GRAVEL (SW) , 15% subang gravel up to 2" long,	- brn 7.5YR4/3, 78% 7% fines, medium			
245										
								CH2MHILL		

SHEET 7 of	10					PROJECT NUMBER: 326128.01.07.AR BORING NUMBER: CW-4					
						SOIL BORING LOG					
PROJECT NAM	E:	. T				HOLE DEPTH (ft):	DRILLING CONTRA	CTOR:			
	jeologi /ATIO	N:	IORTH	ING (CCS	NAD 27 Z 5):	337.0 EASTING (CCS NAD 27 Z 5):	Prosonie DATE STARTED:	c Corp. Mare	DATE COMPLETED:		
515.9 ft.	MSL		2,1	.03,263.03	- /	7,612,928.74	01/10/2005	ENT.	01/14/2005		
Roto:	sonic					WATER LEVEL (ft):	DRILLING EQUIPM	Sonic AT (tra	ack mounted)		
LOCATION: Wa	ash Bet	ween Eas	st & We	est Mesas, I	Parcel No. 650-1	.51-06 LOGGED BY: B. Moayyad, B. Trebble					
		SAMPLE				SOIL DESCRIPTION			COMMENTS		
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	CODE	PERCENT CO	SOIL NAME, USCS SYMBOL, COL MPOSITION, GRADING, GRAIN SHA SITY/CONSISTENCY, STRUCTURE, I	OR, IPE, MINERALOGY, MOISTURE.	DRILLING DAILY ST REFUSAL	OBSERVATIONS AND OPERATIONS, ART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.		
				GW	WELL GRAD	DED GRAVEL WITH COBBLES A D% gravel, 30% sand, 20% cobble	ND SAND (GW) - brn s, 10% fines, ang,				
 250		CC18	18	SW	wet. WELL GRAI gravel. - cobble - 50% sa WELL GRAI	DED SAND WITH GRAVEL (SW) zone, 45% sand, 25% gravel, 20% and, 40% gravel, 10% fines DED SAND WITH GRAVEL AND	- 75% sand, 20% b cobbles, 10% fines CLAY (SW) - brn				
 				SW	7.5YR4/2, 50 subang, harc	0% sand, 30% gravel, 10% fines, 1, wet.	10% cobbles, ang to				
 				SW	WELL GRAI sand, 30% g	DED SAND WITH GRAVEL (SW) pravel, 5% fines, subang to ang, ha) - brn 7.5YR4/2, 65% ird, wet.				
				GW	WELL GRAI subang to ar	DED GRAVEL WITH SILT AND S ng gravel, 20-25% sand, 15-20% f	AND (GW) - brn, 60% ines (silt), hard, wet.				
	\cdot	CC19	9	CW/	WELL GRAD	DED SAND WITH GRAVEL AND	SILT (SW) - 45% sand,				
265				GW	40% gravel, WELL GRAI gravel, 20-25	15% fines. DED GRAVEL WITH SAND AND 5% sand, 15-20% fines, hard.	SILT (GW) - brn, 60%				
				GW	WELL GRAI	DED GRAVEL (GW) - bluish gray sand, 3% fines, hard, wet.	10YR36/1, 65% ang				
270					sand, 20% fi density, wet.	ine gravel, subrnd igneous and me	tamorphic, medium				
 - 275				SW	- gravel t	becomes more coarse and subang	below 273 ft				
		CC20	18	GW	COBBLES V	VITH SAND - bluish gray, 25% sa	and, 5% fines, ang				
					55% subang hard, wet.	sand, 40% c gravel, 5% reddish t	orn silt, ang, medium				
								•	CH2MHILL		

SHEET 8 of 3	10					PROJECT NUMBER: 326128.01.07	۵R	BORING NUMBER: CW-4		
						SOIL BORING LC)G	1	···· ·	
PROJECT NAM	E:	- Investig	nation	PG&F Topo	ck	HOLE DEPTH (ft):	DRILLING CONTRAC	TOR:	to 0H	
SURFACE ELEN		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:		DATE COMPLETED:	
DRILLING ME	MSL THOD:		2,1	103,263.03		7,612,928.74 WATER LEVEL (ft):	01/10/2005 DRILLING EQUIPME	NT:	01/14/2005	
Rotos	Sonic	ween Fa	ct & W/	act Macac I	Parcel No. 650-1		LOGGED BY:	onic AT (track mounted)		
LUCATION: W						151-00	ayyad, B. Trebble			
	5	SAMPLE				SOIL DESCRIPTION			COMMENTS	
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	USCS CODE	PERCENT COL DENS	SOIL NAME, USCS SYMBOL, COLC MPOSITION, GRADING, GRAIN SHA SITY/CONSISTENCY, STRUCTURE, M	DR, PE, MINERALOGY, IOISTURE.	DRILLING DAILY STA REFUSALS	OBSERVATIONS AND OPERATIONS, RRT AND END TIMES , DRILL RATE, S SAMPLING AND TESTING NOTES.	
				SW	WELL GRAI 55% subang hard, wet.	DED SAND WITH GRAVEL (SW) sand, 40% c gravel, 5% reddish b	- reddish brn 7.5YR4/4, rn silt, ang, medium			
 - <u>285</u>				sw	WELL GRAI gray 10B6/1, wet.	DED SAND WITH GRAVEL AND (, 55% sand, 25% cobbles, 15% gra	COBBLES (SW) - bluish avel, 5% fines, hard,			
					45-50% grav	vel, 45-50% sand, 3-5% fines, hard	GW) - Drn 7.5YR5/4, ang I, wet.			
 				SW / GW		no, 50 % grater, 55 % saila, 15 % in				
 _ 295 		CC21	9.5	sw	WELL GRAI 5YR4/4 and 3 subang, med	DED SAND WITH GRAVEL AND S 2.5YR4/4, 50% sand, 25% gravel, i lium density, wet.	SILT (SW) - reddish brn 25% silty fines,	red fang	Jomerate (reworked)	
					- metamo	orphic, boulder? cobbles? weathere	d			
					CLAYEY SA 35-40% ang	ND AND GRAVEL (GC / SC) - re gravel, 35-40% subang sand, 25%	ddish brn 5YR4/4, fines, hard, wet.	groundw from 298 red fang	vater grab sample collected 8-318 ft bgs Ilomerate (reworked)	
 		CC22	9	GC / SC						
					- weathe	red MM bedrock, bolder? cobbles?				
				-	- cobbles	5				
310					WELLODA		hrp 7 EVD4/4 (00)		lluvium?	
		((23	9.5	SW	sand, 25% f	gravel, 5% fines, subang to ang, m	avel, 15% fines	oldest al	iuvium?	
		2025								
315										
								-	CH2MHILL	

SHEET 9 of	10					PROJECT NUMBER: 326128.01.07.AR BORING NUMBER: CW-4					
SOIL BORING LOG											
PROJECT NAM	I E:	Invectiv	nation I	PG&F Topo	ck	HOLE DEPTH (ft):	DRILLING CONTRA	CTOR:	otta OH		
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS NAD 27 Z 5):	DATE STARTED:		DATE COMPLETED:		
DRILLING ME	. MSL THOD:		2,1	03,263.03		7,612,928.74 WATER LEVEL (ft):	01/10/2005 DRILLING EQUIPMI	ENT:	01/14/2005		
Roto:	sonic ash Bet	ween Fa	st & We	st Mesas I	Parcel No. 650-1	51-06	LOGGED BY:	Sonic AT (tra	ack mounted)		
LOCATION. W						51 00	B. Me	bayyad, B. 1	Trebble		
	S	SAMPLE				SOIL DESCRIPTION			COMMENTS		
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERY (ft)	CODE	PERCENT COI DENS	SOIL NAME, USCS SYMBOL, COLOR, MPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, ISITY/CONSISTENCY, STRUCTURE, MOISTURE.			OBSERVATIONS AND OPERATIONS, FART AND END TIMES , DRILL RATE, S, SAMPLING AND TESTING NOTES.		
 	-			BR	CONGLOME 15% sand, 1	tATE (BR) - brn 7.5YR4/4, 55% fines, 20% cobbles, top Miocene conglomerate estimated at % gravel, subang, non plastic, hard. 315 ft bgs					
 - 325	-			BR	CONGLOME subang, 30%	RATE (BR) - reddish brn (5YR4/14) o rnd, 45% fines.), hard, 25% gravel,	encoun	itered rocks at 323'		
	-	CC24	17.1	BR	CONGLOME 15% cobbles	RATE (BR) - brn 7.5YR4/4, hard, 2 , 25% sand, 40% fines					
 <u>335</u>	-				- cobbles	and ang rock fragments are metamo					
	_			BR	BEDROCK	(BR) - weathered, fractured metamo	orphic rock with fill				
_						Boring Terminated at 337 ft					
					ABBREV cc = cont brn = brc It = light dk = darl vf = very f = fine-c m = med c = coars vc = very ang = an subang = subrnd = rnd = rou br = bed ss = sanc	TATIONS tinuous core run own k fine-grained grained lium-grained se-grained v coarse-grained gular = subangular subrounded unded rock formation dstone					
								•	CH2MHILL		

SHEET 10 of	10					PROJECT N	IUMBER: 128 01 07 AR	BORING NUMBER: CW-4		
						SOIL BOR	RING LOC	G		
PROJECT NAM	E:	Investio	ation I	PG&F Tone	nck	HOLE DEPTH (ft):		DRILLING CONTRA	CTOR:	
SURFACE ELEV		N: N		ING (CCS	NAD 27 Z 5):	EASTING (CCS N	.0 AD 27 Z 5):	DATE STARTED:		DATE COMPLETED:
515.9 ft. DRILLING MET	MSL HOD:		2,1	03,263.03		7,612,92 WATER LEVEL (ft	28.74):	DRILLING EQUIPM	ENT:	01/14/2005
Rotos	ionic sh Betv	ween Fas	:t & We	st Mesas. I	Parcel No. 650-1			LOGGED BY:	Sonic AT (tr	ack mounted)
EUCATION. M						51 00		B. M	oayyad, B. ⁻	Trebble
	S	AMPLE	~	USCE		SOIL DESC	RIPTION		_	COMMENTS
DEPTH BGS (feet)	INTERVAL	TYPE/ NUMBER	RECOVERN (ft)	CODE	PERCENT COI DENS	SOIL NAME, USCS S MPOSITION, GRADING ITY/CONSISTENCY, S	SYMBOL, COLOR, G, GRAIN SHAPE STRUCTURE, MOI	, MINERALOGY, ISTURE.	DRILLING DAILY ST REFUSAL	G OBSERVATIONS AND OPERATIONS, IART AND END TIMES , DRILL RATE, .S, SAMPLING AND TESTING NOTES.
					comptd = qtz = qua	= conglomerate = compacted artz				
	I				·				•	CH2MHILL





A4: Well Development Records

	PR	OJECT NUI	ABER 8.0(WELL ID	DW-15 Sheet_of_	
CH2MH		<u>()</u> ()		W	ELL DI	EVELC	OPMENT LOG	
: Topock	PGII	E IM	3		LOCATION	: Topo	ck, CA	
MENT CONTRACT		VDC		Icil I	Davis	· · · · · · · · · · · · · · · · · · ·		
MENT METHOD A	ND EQUIPM	MENT USED	: B	wler, su	ige blo	d 2" Prop		
ATER LEVELS :		START	95.0	8	END: CPS	.18	LOGGER :	
DRAWDOWN DU	IRING PUM		0.1	<u> </u>		2:20	. Total Depth 113.79	
IANTITY OF WAT	ER DISCHA		02	propias.				
ION OF DISCHAR	GE WATER	t:	5-2-95 Case	106 1/0	JUME	3.04	9.0	
ING EQUIPMENT	USED:	HDAC	<u>ل دیمی</u> ٭ ے	HACH	Turbid	it's met	er	
Water Volume Discharged (gal)	Water Level (ft BTOC)	Temp. (°C)	pН	Conductivity (µmhos/cm)	Turbidity (NTU)	Sand (ml/L)	Remarks (color, odor, sheen, sadiment, etc.)	
2 ggl	95.08	5_77.2	8.57	12.97			Turbant brownish	
4 991		74.1	8.75	11-69				
6 591		74.2	8.64	12.33			Slightly turbant	
							Surge screen 15m.2	
8 gal		71.4_	8.62	12.84			Very turbant	
13gal	··_	-71.2	855	11.52	5999		Slightly turbant	
· · · · · · · · · · · · · · · · · · ·						~	Sieve yell	
_01354	95.14						TD 113.89	
15 34		68.b	7.94	12.89	<u> </u>		slightly turbant	
17391	95.18	68.1	834	12.17	<999		{ c []	
		-665	7.98	10.92	107		Pumping 1.2 gpm	
26gal	~	665	7.98	10.92	107		cloudy	
350 34		684	8.26	11.35	20.3		clear	
50 sil		66.9	8.31	10.46	5.62		clear	
62991		71.4	8.30	10.77	3.39		Clear	
74 gal		705	8.3	10-36	2.65		jr ^x)	
82 gal						-	TUTO DUMP OFF	
							4	
		-						
							5. X	
	CH2MIN TOPOCK MENT CONTRAC MENT CONTRAC MENT METHOD A ATER LEVELS: DRAWDOWN DU ND AVERAGE DIS JANTITY OF WATT TON OF DISCHAR UNG EQUIPMENT Water Volume Discharged (gal) 2 gal 4 gal 4 gal 4 gal 4 gal 4 gal 5 gal	CH2MHILL TOPOCK PG2 MENT CONTRACTOR: M MENT METHOD AND EQUIPM ATER LEVELS: IDRAWDOWN DURING PUM ND AVERAGE DISCHARGE WATER JANTITY OF WATER DISCHAR ION OF DISCHARGE WATER UNG EQUIPMENT USED: Weter Volume Discharged (gal) (ft BTOC 2 gg1 95.02 4 gg1 6 gg1 1 gg1 1 gg1 1 gg1 1 gg1 1 gg1 2 gg1 1 gg1 1 gg1 2 gg1 2 gg1 1 gg1 2 g	CH2MINILL CH2MINILL TOpock PG2E INV MENT CONTRACTOR: WDC MENT METHOD AND EQUIPMENT USED ATER LEVELS: START: IDRAWDOWN DURING PUMPING: ND AVERAGE DISCHARGE RATE: JANTITY OF WATER DISCHARGED: ION OF DISCHARGE WATER: ING EQUIPMENT USED: H DAC Water Volume Uscharged Level (# BTOC) (C) 2 gc, 1 95.08 77.2 4 gal 74.1 6 gal 74.1 6 gal 74.2 9 gal 74.1 15 gal 684 17 gal 684 17 gal 684 17 gal 665 26 gal 71.4 50 gal 71.4 50 gal 71.4 50 gal 71.4 70 5 8 2 gal 70 5	PROJECT NUMBER 326128.01. CH2RMHILL START Solution TOPOCK PG2E TAV3 MENT CONTRACTOR: WDC. 0 MENT CONTRACTOR: WDC. 0 MENT CONTRACTOR: WDC. 0 MENT CONTRACTOR: WDC. 0 MINE TOD AND EQUIPMENT USED: 0.1 MENT METHOD AND EQUIPMENT USED: 0.1 NDAVERAGE DISCHARGE RATE: 1.2 JANTITY OF WATER DISCHARGED: 82.90 DAC Water Volume OBSCHARGE WATER: Case UNG EQUIPMENT USED: MDAC Water Volume OBSCHARGE WATER: Case UNG EQUIPMENT USED: MDAC Water Volume OBSCHARGE WATER: Case Water Volume OBSCHARGE WATER: Case OBSCHARGE WATER: Case OBSCHARGE MATER: Case OBSCHARGE MATER: Case OBSCHARGE RATE: 1.2 OBSCHARGE MATER: Case OBSCHARGE MATER: Case OBSCHARGE MATER: Case	PROJECT NUMBER 326128.01.07.AR START: 326128.01.07.AR WI 326128.01.07.AR WI 326128.01.07.AR START: 32.01.07.AR WI START: 75.08. MENT CONTRACTOR: WDC. No.1 I MENT METHOD AND EQUIPMENT USED: Baule, T., SU ATER LEVELS: START: 95.08. ATER LEVELS: START: 95.08. IDRAWDOWN DURING PUMPING: 0.1 Generation of DISCHARGE RATE: I.2 Prop.as; JANTITY OF WATER	PROJECT NUMBER 326128.01.0T. AR WELL DI START: 92.0.0T. AR WELL DI MENT METHOD AND EQUIPMENT USED: Daule.T., Surge, blog ANTITY OF WATER DISCHARGE RATE: 1.2 Propers DANTITY OF WATER DISCHARGED: 82 gal ION OF DISCHARGE RATE: 1.2 Propers ING EQUIPMENT USED: H DAC NACH Turbud Water Case rag. Volume Volume <td colspa="</td"><td>PROJECT NUMBER WELL ID 326128.01.07: AR WELL DEVEL(MELT CONTRACTOR: WDC NEATOR: WDC NEDUPMENT USED: Baule: T, Surger blocks on ATER LEVELS: START: 95.08 END: $cys: 18 IDRAMDOWN DURING PUMPING: 0.1' God ON OF DISCHARGE WATER: Cosciag Cosciag: Volume: 3:04 Water Discharge WATER: Cosciag: Volume: 3:04 ON OF DISCHARGE WATER: Cosciag: Volume: 3:04 Water Discharge WATER: Cosciag: Volume: 3:04 Volume: Water Discharge Volume: 7:05 Volume: Water Discharge Volume: 7:18$</td></td>	<td>PROJECT NUMBER WELL ID 326128.01.07: AR WELL DEVEL(MELT CONTRACTOR: WDC NEATOR: WDC NEDUPMENT USED: Baule: T, Surger blocks on ATER LEVELS: START: 95.08 END: $cys: 18 IDRAMDOWN DURING PUMPING: 0.1' God ON OF DISCHARGE WATER: Cosciag Cosciag: Volume: 3:04 Water Discharge WATER: Cosciag: Volume: 3:04 ON OF DISCHARGE WATER: Cosciag: Volume: 3:04 Water Discharge WATER: Cosciag: Volume: 3:04 Volume: Water Discharge Volume: 7:05 Volume: Water Discharge Volume: 7:18$</td>	PROJECT NUMBER WELL ID 326128.01.07: AR WELL DEVEL(MELT CONTRACTOR: WDC NEATOR: WDC NEDUPMENT USED: Baule: T, Surger blocks on ATER LEVELS: START: 95.08 END: $cys: 18 IDRAMDOWN DURING PUMPING: 0.1' God ON OF DISCHARGE WATER: Cosciag Cosciag: Volume: 3:04 Water Discharge WATER: Cosciag: Volume: 3:04 ON OF DISCHARGE WATER: Cosciag: Volume: 3:04 Water Discharge WATER: Cosciag: Volume: 3:04 Volume: Water Discharge Volume: 7:05 Volume: Water Discharge Volume: 7:18$

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			PROJ	ECT NUI	MBER			WELLID				
	WDC		32	6128	3.01.	07.AR		OW IMSheetof				
We	lls & Exploration					W	ELL D	EVEL	OPMENT LOG			
PROJECT	: Topock	26	2E	IM.	3		LOCATION	: 1000	xk.CA			
DEVELOP	MENT CONTRAC	TOR :	WD)(Jed D	au.5					
DEVELOP	MENT METHOD A	ND EQU	IPME	NT USED): Ba	il Su	NE BI	ock	Purup.			
START W	ATER LEVELS :			START :	95.0	22	ÉND: 9	5.28	LOGGER :			
CASING V	OLUME:			CASING	DIAMET	ER: 2"		SCREEN II	NTERVAL: 165.5 - 18	22		
MAXIMUM	DRAWDOWN DL	JRING PL	JMPIN	ig: C). 06	`						
RANGE A	ND AVERAGE DIS	CHARGE	ERAT	E: ·								
TOTAL QL	JANTITY OF WAT	ER DISC	HARG	ED: L	1 gal							
DISPOSIT	ON OF DISCHAR	GE WAT	ER:	Slight	atty_	cloud	<u>.</u>					
MONITOR		USED:		0			V	,				
Date/ Time	Vvaler Volume Discharged (gal)	Wate Leve (ft BTC	er el DC)	Temp. (°C)	рН	Conductivity (µmhos/cm)	Turbidity (NTU)	Sand (mi/L)	Remar (color, odor, shean,	ks sediment, etc.)		
4:39		95.2	2_						Initial Total Depth	189.02		
10:06	4 Gal	95.2	.8	70.5	10.37	2.46			slightly cloudy TI	0 189.26		
				~								
	\											
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			PRÓJ	ECT NUN	IBER			WELL ID			
	WDC		Ś	2612	0.8	1.07.F	HR I	C	JW-1	ה	Sheet of
We	lls & Exploration					WE	ELL DI	EVELO	OPME	NT LOG	
PROJECT	: Topock	PG	ΣĒ	ZM	3		LOCATION	: ೧	edles	CA	
DEVELOP	MENT CONTRAC	TOR :	L	DC		Neil D	avis			,	
DEVELOPI	MENT METHOD A		JIPME	NT USED	: Ba	il Su	nge B	local	Point	>	
START WA	TER LEVELS :			START :	95.	26	END: 9	5.35	LOGGER	:	
CASING V	OLUME:			CASING	DIAMET	ER: 2		SCREEN IN	TERVAL:	257-277	
MAXIMUM	DRAWDOWN DU	RING P	UMPIN	1G: 0	.{['						
RANGE AN	D AVERAGE DIS	CHARG	E RAT	E:							
TOTAL QU	ANTITY OF WAT	ER DISC	HARG	ED: 5	gal						
DISPOSITI	ON OF DISCHAR	GE WAT	FER:								
MONITOR	NG EQUIPMENT	USED:									
Date/ Time	Water Volume Discharged (gal)	(ft BT	ter /el 'OC)	Temp. (°C)	рН	Remarks (color, odor, sheen, sec	timent, etc.)				
11-20-04		95.	26		7.90				Total	Depth TOC	280.72
<u>1105</u>	<u><u><u></u><u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u></u></u>		_	695	7,9	4.40				The second Table 1000 and	
1112	<u> 5 </u>	95.	35						ID	280.3	Toc
			6						_		
									_		
							·				
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					-				- 10.0		11000 <u>15 0</u> 0
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		PRO.		MBER		0.0	WELL ID					
	WDC		う20128·01·01·AK じい-25 Sheet_of_									
We	Ils & Exploration				WE	ELL DI	EVEL					
PROJECT	IM-3 TOP	bock, f	ጋኇኟ	E		LOCATION	: Top	ock (A (East Mesa)				
DEVELOP	MENT CONTRAC	<u>TOR: ~</u>	DC -	Deil.	Davis							
DEVELOPI	DEVELOPMENT METHOD AND EQUIPMENT USED: Ball, SURGE FLOCK, TUREP											
START WA	CASING VOLUME: 1.3 CASING DIAMETER: 2 SOBEEN INTERVAL: 71-101											
MAXIMUM DRAWDOWN DURING PUMPING: 0.8												
RANGE AND AVERAGE DISCHARGE RATE:												
TOTAL QUANTITY OF WATER DISCHARGED: 104 gal												
DISPOSITI	DISPOSITION OF DISCHARGE WATER: Cleas											
MONITORI	NG EQUIPMENT	USED:	DAC									
Date/ Time	Discharged (gal)	(ft BTOC)	Temp. (°C)	рH	Conductivity (µmhos/cm)	Turbidity (NTU)	Sand (ml/L)	Remarks (color, odor, sheen, sediment, etc.)				
12-16-04		(14.1)						Total Depth 102				
			Į					Stort balling				
230	Deal		70.7	8.01	1.72			cloudy/ Turbant				
232	5				·+.73-		·	Surge well 15 min				
2:57	6 gal		68:7	8.53	1-73			Balwell				
318	10 gal		139.7	8.52	1.77							
320								Enstell pump				
245								Startpumping 250m				
348	16	44.91	71.7_	3.45	1.94			cloudy				
357	34	44 85	70.4	8.43	1.93			clear				
410	60	94.9	639	8.70	1.69			Glear				
420	80		70.2	854	1.66			Clear				
430	100		69.7	8.49	1.58			Cleur				
432	104_							Turnpu 2FF				
	r			 								
			-	· · · · ·								
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		ł	PROJECT NUM	BER			WELL ID		7				
	СНОМН	CHORAHIII	, L	32612	8.¢	$p_{1.} q_{7}$. AR		OW-2M Sheet_o	f			
	Ghzivini	(C _ L	WELL DEVELOPMENT LOG										
PROJECT :	TOPOCK	PG	+ = I	M-3		LOCATION :	TOPO	CK. (A (EAST MEDA)					
DEVELOPM	IENT CONTRACTOR	1: W	Dc / 1	SONAT	AN STE	ART			_				
DEVELOPM	IENT METHOD AND	EQUIPM	ENT USED :	Bail (s	tallese sty	i), Su	ge Block	(constructed on the) pump (GRUNFOS RED.	-FLO 2)				
START WA	TER LEVELS :		START:	5	2	END: N	rR	LOGGER: EVANI GRAY (CHIM MULL)	·				
махімим	DRAWDOWN DURI		ING: NOT	ABLÉ	TO ME	NSURC_							
RANGE AN	D AVERAGE DISCH	ARGE RA	TE: ~ 4	GPM			I well	whene ~ 72.8, 73 gellows					
TOTAL QU/	ANTITY OF WATER	DISCHAR	GED: 26	8 ga	<u> </u>								
DISPOSITIO	ON OF DISCHARGE	WATER:	clear	verc	<u>11111</u>	le od	٥٢,						
MONITORI	NG EQUIPMENT US	ED: H	ORIBA U-	22	HAC	<u>n Zis</u> o	P THB	1 DIMETER (10+ (C-101644)					
Date/ Time	Water Volums Discharged (gal)	Wate Leve (# BTC	er el Temp. OC) (°C)	ρН	(S/m) Conductivity (µ mhos/cm)	Turbidity (NTU)	Do(114/L) Saria (ml/L)	OFP / Remarks (mV) / (color, odor, sheen, sediment, etc.)					
12/11/04								Brach Pumpin Q 4 GPM					
1006	~20	NF	28.55	8,44	0,690	8.54 (Hire) 35 (u-2) 04.49	-188 / clear - very little abor, if on					
1011	~ 40.	NK	28.72	8.62	0.874	6,25 (HAG 20.1 (U-21	4.81	-225/ 11, no odor	<u></u>				
1016	~ 60	NR	28.74	8.67	0.711	36.0 (U-2 2-59/HAL	<u>} 4.98</u>	-257/ " , twilding on U	1-22 midel				
1031	~120	NR	28.84	8,70	0,601	40.0/4-2	5,04	-304/"					
1091	~ 160	NR	28.86	8,70	0.584	2,24 (440	5.00	-310/11 11	_				
1051	~ 200	NR	28,87	<u> </u>	0.581	27.5 (u-2	15.01	~3=7/ "	_				
1056	~ 220	_NR	28.58	8,70	0.579	30. (4.2	1) 5.01	-3~4/"	_				
1101	~ 240	N۴	28.58	8,70	0,500	1.35(NACH) 16.4(u-21)	5,01	-3-2/"					
1106	~ 260	NA 	28.92	8.70	0,578	17.6(u.22	5,00	-299/					
				¥	·	V (M4			_				
1108	~ 268							Stop Kumping	_				
									~				
									_				
									_				
									_				
									-				
													
					[
							J						
Stabili	Botim Critevi			±0.1	+ 3%	+ 10 NTL	+ 10%	±10 mV					

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		PROJ	ECT NUM	BER			WELL ID					
			52612	18.0	1.07.A	९	OW-2D Sheet_					
	≠¤¬¤∡£¥₽Г"		WELL DEVELOPMENT LOG									
PROJECT :	Topo	C PG1	E I	MB		LOCATIO	N: Eas	+ Mesa Topoch CA				
DEVELOPMENT CONTRACTOR: W.DC Acid Davis												
DEVELOPMENT METHOD AND EQUIPMENT USED: Bail, Surge Slock, Pump.												
START WATER LEVEL (Date / Time): LOGGER : ++, Davis												
CASING DIAMETER: 1, SCREEN INTERVAL: 310 - 330° FILTER INTERVAL: NA HEIGHT OF WATER COLUMN: NA												
MAXIMUM DRAWDOWN DURING PUMPING: 1973 RANGE AND AVERAGE DISCHARGE RATE:												
DISPOSITION OF DISCHARGE WATER: $\mathcal{O}(PO)$ () MONITORING EQUIPMENT USED: \mathcal{H} D4C												
Dale/	Water Volume	Water	Temp		Conductivity	Tuchidity	Send	Remarks				
Time	(gal)	(ft BTOC)	(°C)	ρH	(µmhos/cm)	(NTU)	(m/L)	(color, odor, sheen, sediment, etc.)				
7:10		93.73						wtal anth 342.5%				
745	5.1		72.7	8.61	1546			cloudy / slightly				
815	40541		69.6	8.19	6.13			_ cloudy				
825	<u>55</u> 01							-Sungerfsmal - 4011 15-	<u>.</u>			
8:45								Leve bailing				
9:58	110 cm		71.3	807	11.34							
10:00								Sct pump				
1021								Start punpins 2.250	~ ```			
1028	124		73-7	7.61	1246			cloudy				
1045	161		73.0	8.12	12-72		·	slightly clearly				
1100	198		75.1	7.58	12.41			clear / slight + cont				
+1-0-	270							Stop pumping				
1220								Resume pumping				
1230	262		.758	8.04	१७.५४			Cloudy				
1245	3300		75.1	8.09	13.02			clear				
100	337_		<u>َذ 75</u>	8.06	:306			clear				
115	374		73.0	8.09	12.13			clear				
								Pump set at 175 FIL	- z.p			
								tubing not mailable	to			
								set into screened	<u> </u>			
								interval, (TimeDanald	~~~~)			
CASING VC 2" 0.163	LUMES (gal / 4"	ft) 0.65	6"	1.469		FILTER V 6" 0.441	/OL (gal/ft 8" 0.783	*0.3) >Subtract casing vol for correct gal/ft 10" 1.224 12" 1.763 16" 3.132				

		PR	PROJECT NUMBER					WELL ID				
WDC			32612	28 <u>.01</u>	·07.AR	`	OW-55 Sheet L of 1					
Wells & Exploration			WELL DEVELOPMENT LOG									
PROJECT	: <u>Topo</u>	ck PC	I 32F	M3		LOCATION	: Eosl	mese our-55	ispork, CA			
DEVELOP	MENT CONTRAC	TOR: U	DC:	N.I	avis_							
DEVELOP	MENT METHOD A	ND EQUIP	MENT USED): ba	ler, g	rund Fi	as br	np				
START WA	ATER LEVELS :		START	: 9.6.	.98	END: 96	2.99	LOGGER: N. Davis				
CASING V	OLUME: NA		CASING		<u>ER: 2''</u>		SCREEN I	NTERVAL: 10~110'				
MAXIMUM	DRAWDOWN DL	JRING PUM	PING:	0.02	-							
RANGE AN	ND AVERAGE DIS	CHARGE R	ATE:	1-55	300							
TOTAL QU	ANTITY OF WAT	ER DISCHA	RGED:		1301							
DISPOSITI	ION OF DISCHAR	GE WATER		$\frac{r}{\sqrt{r}}$								
MONTOR	Water Volume	Water		<u> </u>				·				
Date/ Time	Discharged (gal)	Level (ft BTOC)	Temp. (°C)	рH	Canductivity (µmhos/cm)	Turbidity (NTU)	Sand (mVL)	Rema (colar, odor, sheen	rks , sediment, etc.)			
9.55	~	96.98	3 -	-	-		_	Total depth	113.5			
	1501		77.2	7.94	2.07	-	_					
1100	85-1	96.9	7 80.0	8.39	2.09			Total depth.	113.36_			
11:03	-			-	~			Install pump				
1125					for	~	_	Start pumping	1.33 gpm			
1145	35501	-	79.6	8.32	1.90	~		55 clear				
1155	48		79.8	829	1.91_		~	Ciear				
1205	61	-	77.6	8.11	1.86			Clear				
1215	74		78.0	8.13	1.86			cirat				
1225	87		78.3	8.23	1.87	-		Cleur				
1245	114		_77.i	8.19	17,56	-		Clear				
1255	127		- 783	82	17.83	-	-	Clear				
108	144		78.4	8.24	18.03			Clear .				
118	157	76.99	78.5	821	13.09			clear				
								Dumpings 20	t-at-approx.			
								III FE bys,	about 2 Feel			
		<u> </u>						above botto	m. (T. mcDonald to			
				\geq								
				-								

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PROJECT NUMB							WELLID	(
WDC		~	32612	28.0	A-10-10	r <u>r</u>		0W-5D Sheet 1	of <u>2</u>
Wells & Exploration					W	ELL D	EVEL	OPMENT LOG	
PROJECT	: Topoc	K PGS	LE I	I.M3		LOCATION	: TOF	ock, CA	
DEVELOP	MENT CONTRAC	TOR :	wac		el Dau	u <u>s</u>			
DEVELOP	MENT METHOD		ENT USE	D: Ba	il, Su	<u>rge B</u>	Lock,	himp.	
START W	ATER LEVELS:	9654	START	: 96.	54	END: 1	<u> </u>		
		25al IRING RIMP		6 DIAMET	ER: &		SCREEN	NTERVAL: 300-320	
RANGE A	ND AVERAGE DIS	CHARGE RA	τε: Λ	JA.					
TOTAL QL	JANTITY OF WAT	ER DISCHAR	GED: 3	38	gal.				
DISPOSIT	ION OF DISCHAR	GE WATER:	Clear		0]
MONITOR	ING EQUIPMENT	USED:	<u>н</u>	DAC	<u>+ нА</u>	CH furb	1.1+1-ma	etcr	
Date/ Time	Discharged (gal)	Leval (ft BTOC)	Ťemp, (°C)	pН	Conductivity (µmhos/cm)	Turbidity (NTU)	Sand _(ml/L)	Remarks (color, odor, sheeri, sediment, etc.)	
12:27		9654						TD 345.51 TOC	
1235					-			7 of bentowite on bottom (Try re.	-00
202	5 391	81.3	81.3	7.9	6.91	<999		Turbant beige color	
240	17 541	 						Surge Sereen	
221	21gel		79.5	8.47	4.48	2999		Turbant	
356								Start pumping 2927	
406	High		77.8	7.94	5.25	2999		-slightly trobant	
414_	57.		78.1	7.98	5.42	5999		slowpusp down -29-gen	
422	69							shut pump off	
11-21-04									
659		97.02						Problems with pump pullit out	
715	62		-	 .				start punping 1:55pm	
728	69	70.5	8.1	6.14	53.1			cloudy slightly	
738	84	72.7	7.85	8.2	15.4			Clear	
7:48	_95	71.2	7.92	17.71	12.4			<u> </u>	
758	110	-73.i	7.83	7.66	3.58			Clear	
808	125	74.2	7.88	7.69	3.58			<u>clear</u>	
8:18	140	74.9	7.94	7.36	3.22			clear	
8:28	155_	73.5	8.03	7.37	5.12		.	<u>Llegr</u>	
8:38	170	743	8.01	7.63	8.75			Clear	
9:08	185	71.0	8.06	7.07	15.9			clear	

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		PRO	ECT NUM	BER			WELL ID					
			3261	28.0	01.07.	AR	$OW - 5M$ Sheel \underline{I} of \underline{I}					
-	CHZIVIH		WELL DEVELOPMENT LOG									
PROJECT :	TOPOGY	P6 +E	IM	 }		LOCATION :	70 00	CK, CA (EAST MESA)				
DEVELOP	AENT CONTRACTOR	1: WD	c / :	JONATI	HAN 5	TENART	i					
DEVELOPA	ANT METHOD AND	EQUIPMENT	USED :	Bail (stailers !	teel, S	wife (Cor	sometal minte), pumps (GRANF	TOS REDJI-FLD 2			
START WA	TER LEVELS : 90	0.64	START :	1004	12.10.0	HEND: 142	52	LOGGER: ENAN GRAY /C	KZM HILL			
MAXIMUM	DRAWDOWN DURI	NG PUMPING:	Nor	ABLZ	TO ME	SURE						
RANGE AN	DAVERAGE DISCH	ARGE RATE:	5 6	ήρm								
TOTAL QU	ANTITY OF WATER	DISCHARGED	AP	KOX.	230	GAL						
DISPOSITI	ON OF DISCHARGE	WATER: D	evelopin	ent	trailer	then	roll-off	tank (10# DB)			
MONITORI		ED: Honib	4 U-2	2.	HACH	213012	Turbid	imeter				
Dale/ Time	Discharged (gal)	Level (ft BTOC)	Ťemp.	pН	Conductivity (umbot/cm)	Turbidity (NTU)	00 (mg/c 8000 (ml/L)	Remarks ORP (WV) (color, odor, sheen, sediment,	elc.)			
12/10/04								Begin Pumping @ ~ 5	GPM			
1353	~ 60	NR	29,54	7,89	0,724	2.1	NR	NR / Clear no notechle	sed mana			
1415	~ 145	NR	29,51	8,39	0.852	2,54 (HACH 2.6 (4.22	NR	2 mV / "	ļi			
1420	~ 170	NR	29,52	8,43	0.867	2.6	5.21	-4 mV / "	h			
1425	~ 195	NR	29.49	8,45	0.877	0.6	5,22	-7 mV / "	h			
1430	~ 220	NR	29,49	8,47	0.881	1.75 (HACH)	5,23	-11 mV/ "	<u>ب</u>			
1432	~ 230		ļ					Stop pumping				
					/ 							
			<u> </u>									
	3											
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WellDevLog	NR	÷	Not	Recorded
wainnavroð	NR	-	Not	Recorded

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			PROJE	CT NUN	IBER			WELL ID	1	
	WDC			32¢	128	01.07.	AR		OW-5D	Sheet 2 of 2
We	lls & Exploration					W		EVELO	OPMENT LOG	
PROJECT	: Topos	<u>k</u> P	GRE	EI	MЗ		LOCATION	: Tope	ock, CA.	
DEVELOP	MENT CONTRAC	TOR :		/	neil	Davis				
DEVELOP	MENT METHOD A	ND EQU	JIPMEN	NT USED	Bari	1, Sw	ye BL	ock,	Pomp.	
START W	ATER LEVELS :			START :	916.	54	ÈND: 'TI		LOGGER:	
CASING V	OLUME: NA		(DIAMET	ER: 2'		SCREEN IN	TERVAL: 300-320'	
MAXIMUM	DRAWDOWN DU	ORING P		<u>G: </u>	A	7				
	ANTITY OF WAT				<u> </u>	00 L .				
DISPOSIT	ION OF DISCHAR	GE WAT	TER:	Cleo		gay.				
MONITOR	ING EQUIPMENT	USED:	HD	AC	4	HACH				
Date/ Tima	Water Volume Discharged (gal)	Wat Lev _(ft BT	ter vel OC)	Тетр. (°С)	ρH	Conductivity (µmhos/cm)	Turbidity (NTU)	Sand (ml/L)	Remarks (color, odor, sheen, sediment,	etc.)
11-20	185									
9.78	305			74.7	8.42	7.21	18.9		Clear	
948	335			<u>75.3</u>	<u>\$:</u> 77	7-34	8.54		clear	
10-13	290			70.1	<u>z.zz</u>	7.04	534		clear	
1028	305			73.2	8.12	7.48	4.56		Clear	
1038	_ 320			75.6	<u>8.08</u>	7.44	287		Clear	
1048				74.8	8.05	7.32	3.97		:lear	
1150	338								turn punp of =	
				•						
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 MW41D Initial Purge

 11/09/2004

 Pump Depth: 74.5

 Well Depth: 312 ft.

 Initial Depth to Water: 23.76 ft.

 Total Water Column: 288.24 ft.

 Well Volume = .16 x (312-23.76) = 46.08 gal.

 Purge Rate: 2 gpm

Time	pН		Cond(S/m)	Turb (ntu)	DO (g/l)	Temp (C)	TDS (g/l)	ORP (mV)	WL (BTOC)	Gal. Purged (approx.)	TDS by Orlon pen	Well Volumes (approx.)
9:5	8	6.88	0.173	80	7.73	30.4	1.1	21	23.72			
10:0	5									14		0.30 pump stopped; under voltage
10:3	3	7.90	0.174	13.3	7.27	30.8	1.1	44	24.01	44		0.96
10:4	8	8.00	0.193	85.6	6.65	31.1	1.3	-178	25.18	74		1.61
11:0	3	7.80	1,56	318	6.05	31.3	10	-300	25.42	104		2.26
11:1	8	7.85	1.56	999	5.91	31.3	10	-303	25.42	134		2.91
11:3	3	7.88	1.55	68.1	5.80	31,4	10	-307	25.39	164		3.57
11:4	8	7.89	1.55	13.7	5.77	31,4	10	-311	25.38	194		4.22
12:0	3	7.91	1,57	0.9	5.74	31.4	10	-313	25.37	224		4.87
12:1	8	7.91	1.54	34.1	5.75	31.4	10	-314	25.35	254		5.52
												pump stopped to get TDS pen
12:3	6	8.58	1.59	34,4	6.46	31,3	6	-283	25,35	254	6.20	5.52 pump restarted
12;5	1	8.15	1.56	98	6.05	31.4	10	-298	25.34	284	8.50	6.17
13:0	6	8.04	1.56	11.2	5,69	31.3	10	-308	25.32	314	9.30	6.83
13:2	1	8.01	1.56	23.0	5.60	31.3	10	-312	25.31	344	9.40	7.48
13:3	6	8.00	1.52	10.3	5.56	31.4	9	-314	25.29	374	9.50	8.13

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# TABLE B-1Summary of Grain-Size AnalysesGroundwater and Hydrogeologic InvestigationInterim Measures No. 3 Injection Area, PG&E Topock Compressor Station

	Samplo	Particle-Size Distribution (percentage)						
Boring ID	Depth (feet bgs)	Gravel	Sand	Total Fines	Silt	Clay	Description	USCS Designation
OW-1D	105	22.0	50.1	27.9	17.1	10.8	silty sand with clay and gravel	SC/SM
	125	34.0	41.3	24.7	11.6	13.1	clayey sand with silt and gravel	SC/SM
	173	20.0	65.8	14.2			silty sand with gravel	SM/SC
	200	35.0	49.5	15.5			silty sand with gravel	SM
	219	14.0	56.6	29.4	15.4	14.0	silty sand with clay and gravel	SM/SC
	224	11.0	59.1	29.9	14.0	15.9	clayey sand with silt and gravel	SC/SM
	235	11.0	57.0	32.0	16.1	15.9	silty sand with clay and gravel	SM/SC
	249	76.0	18.3	5.7			sandy gravel	GP
	278	34.0	59.7	6.3			sandy gravel	GP
OW-2D	94	23.0	46.8	30.2	16.2	14.0	silty sand with clay and gravel	SM/SC
	155	22.0	41.6	36.4	18.9	17.5	silty sand with clay and gravel	SM/SC
	190	14.0	44.4	41.6	20.2	21.4	clayey sand with silt and gravel	SC/SM
	192	24.0	65.6	10.4			silty sand with gravel	SM/SC
	230	22.0	52.8	25.2	15.1	10.1	silty sand with clay and gravel	SM/SC
OW-3D	141	8.0	54.3	37.7	16.6	21.1	clayey sand with silt and gravel	SC/SM
	157	17.0	77.1	5.9			gravelly sand with clay	SP/SC
	163	26.0	47.0	27.0	10.9	16.1	clayey sand with silt and gravel	SC/SM
	253	27.0	62.7	10.3			gravelly sand with clay	SC/SP
	238	26.0	47.0	27.0	13.7	13.3	silty sand with clay and gravel	SM/SC
OW-5D	107	23.0	45.0	32.0			silty sand with gravel and clay	SM/SC
	165	35.0	54.7	10.3			silty sand with gravel	SM/SC
	179	29.0	58.4	12.6			silty sand with gravel and clay	SM/SC
	245	49.0	33.3	17.7			silty sand with gravel and clay	SM/SC

Notes:

1. Results of grain-size sieve and hydrometer analyses, IM-3 hydrogeologic investigations, Oct. 2004 - Jan. 2005

2. All core samples from saturated Alluvial Aquifer, Tertiary Oldest Alluvium (Toa) stratigraphic unit.

Sample depths in feet below ground surface (bgs); (--) denotes particle size not analyzed

3. Refer to Appendix A for boring locations, boring logs, and Unified Soil Classification System (USCS) descriptions

# TABLE B-2Water Level Measurements and Groundwater ElevationsGroundwater and Hydrogeologic InvestigationInterim Measures No 3. Injection Area, PG&E Topock Compressor Station

	Measuring Point			Depth to	Raw Water	Salinity	Adjusted Groundwater Elevation
Location ID	(ft MSL)	Date	Time	(ft btoc)	(ft MSL)	(%)	(ft MSL)
CW-01M	566.07	08-Feb-05	12:50 PM	111.59	454.48	0.2	454.31
CW-01M	566.07	22-Feb-05	10:51 AM	111.73	454.34	0.2	454.18
CW-01M	566.07	22-Mar-05	9:17 AM	112.02	454.05	0.2	453.89
CW-01M	566.07	18-May-05	6:36 AM	110.35	455.72	0.2	455.56
CW-01D	566.46	07-Feb-05	10:09 AM	112.07	454.39	0.7	454.71
CW-01D	566.46	22-Feb-05	11:45 AM	112.22	454.24	0.7	454.52
CW-01D	566.46	22-Mar-05	9:18 AM	112.40	454.06	0.7	454.34
CW-01D	566.46	18-May-05	6:37 AM	110.86	455.60	0.7	455.88
CW-02M	549.45	09-Feb-05	8:53 AM	95.12	454.33	0.4	454.24
CW-02M	549.45	23-Feb-05	9:25 AM	95.43	454.02	0.4	453.97
CW-02M	549.45	22-Mar-05	9:32 AM	95.58	453.87	0.4	453.82
CW-02M	549.45	18-May-05	6:35 AM	93.60	455.85	0.4	455.79
CW-02D	549.43	08-Feb-05	10:35 AM	95.38	454.05	0.9	454.72
CW-02D	549.43	23-Feb-05	10:23 AM	95.53	453.90	0.9	454.62
CW-02D	549.43	22-Mar-05	9:30 AM	95.65	453.78	0.9	454.50
CW-02D	549.43	18-May-05	6:33 AM	93.89	455.54	0.9	456.27
CW-03M	534.10	10-Feb-05	9:08 AM	79.95	454.15	0.6	454.18
CW-03M	534.10	22-Feb-05	1:43 PM	80.06	454.04	0.6	454.08
CW-03M	534.10	22-Mar-05	9:35 AM	80.30	453.80	0.6	453.84
CW-03M	534.10	18-May-05	6:42 AM	78.31	455.79	0.6	455.83
CW-03D	534.14	08-Feb-05	9:15 AM	80.40	453.74	1.2	454.96
CW-03D	534.14	22-Feb-05	2:30 PM	80.38	453.76	1.2	454.95
CW-03D	534.14	22-Mar-05	9:36 AM	80.64	453.49	1.2	454.69
CW-03D	534.14	18-May-05	6:40 AM	78.84	455.30	1.2	456.50
CW-04M	518.55	07-Feb-05	2:40 PM	63.92	454.63	0.4	454.52
CW-04M	518.55	23-Feb-05	12:32 PM	64.25	454.30	0.4	454.21
CW-04M	518.55	22-Mar-05	9:10 AM	64.45	454.10	0.4	454.02
CW-04M	518.55	18-May-05	6:12 AM	62.69	455.86	0.4	455.77
CW-04D	518.55	07-Feb-05	12:40 PM	64.42	454.13	0.9	454.80
CW-04D	518.55	23-Feb-05	1:21 PM	64.55	454.00	0.9	454.69
CW-04D	518.55	22-Mar-05	9:25 AM	62.73	455.82	0.9	456.52
CW-04D	518.55	18-May-05	6:11 AM	63.11	455.44	0.9	456.14
OW-01S	550.15	21-Dec-04	1:34 PM	95.34	454.81	0.2	454.76
OW-01S	550.15	06-Jan-05	9:07 AM	95.51	454.64	0.2	454.59
OW-01S	550.15	13-Jan-05	7:31 AM	95.78	454.37	0.2	454.32
OW-01S	550.15	22-Mar-05	9:43 AM	96.32	453.83	0.2	453.80
OW-01S	550.15	10-May-05	8:44 AM	94.40	455.75	0.2	455.72
OW-01S	550.15	18-May-05	6:31 AM	94.37	455.78	0.2	455.75

# TABLE B-2Water Level Measurements and Groundwater ElevationsGroundwater and Hydrogeologic InvestigationInterim Measures No 3. Injection Area, PG&E Topock Compressor Station

Logotion ID	Measuring Point Elevation	Data	Time	Depth to Water	Raw Water Elevation	Salinity	Adjusted Groundwater Elevation
Location ID	(ft MSL)	Dale	Time	(ft btoc)	(ft MSL)	(%)	(ft MSL)
OW-01M	550.36	01-Oct-04	9:00 AM	94.52	455.84	0.3	455.69
OW-01M	550.36	18-Nov-04	1:08 PM	95.13	455.23	0.3	455.12
OW-01M	550.36	21-Dec-04	12:29 PM	95.44	454.92	0.3	454.79
OW-01M	550.36	06-Jan-05	9:03 AM	95.61	454.75	0.3	454.61
OW-01M	550.36	13-Jan-05	7:28 AM	95.81	454.55	0.3	454.41
OW-01M	550.36	22-Mar-05	9:45 AM	94.64	455.72	0.3	455.58
OW-01M	550.36	10-May-05	11:14 AM	94.61	455.75	0.3	455.60
OW-01M	550.36	18-May-05	6:32 AM	94.61	455.75	0.3	455.60
OW-01D	550.36	30-Sep-04	11:10 AM	94.65	455.71	0.6	455.75
OW-01D	550.36	18-Oct-04	9:18 AM	95.02	455.35	0.6	455.38
OW-01D	550.36	18-Nov-04	11:58 AM	95.30	455.07	0.6	455.16
OW-01D	550.36	21-Dec-04	10:58 AM	95.67	454.70	0.6	454.84
OW-01D	550.36	06-Jan-05	9:09 AM	95.78	454.58	0.6	454.72
OW-01D	550.36	13-Jan-05	7:33 AM	95.90	454.46	0.6	454.60
OW-01D	550.36	22-Mar-05	9:42 AM	96.36	454.01	0.6	454.05
OW-01D	550.36	10-May-05	12:20 PM	94.84	455.52	0.6	455.57
OW-01D	550.36	18-May-05	6:30 AM	94.83	455.53	0.6	455.58
OW-02S	548.75	29-Dec-04	3:06 PM	93.98	454.77	0.1	454.69
OW-02S	548.75	06-Jan-05	8:40 AM	94.20	454.55	0.1	454.47
OW-02S	548.75	13-Jan-05	7:25 AM	94.04	454.71	0.1	454.65
OW-02S	548.75	22-Mar-05	9:45 AM	94.90	453.85	0.1	453.79
OW-02S	548.75	11-May-05	9:48 AM	92.92	455.83	0.1	455.76
OW-02S	548.75	18-May-05	6:26 AM	92.95	455.80	0.1	455.73
OW-02M	548.52	06-Jan-05	8:42 AM	93.83	454.69	0.5	454.66
OW-02M	548.52	13-Jan-05	7:23 AM	94.35	454.17	0.5	454.14
OW-02M	548.52	27-Jan-05	2:43 PM	94.20	454.32	0.5	454.30
OW-02M	548.52	22-Mar-05	9:49 AM	96.40	452.12	0.5	452.10
OW-02M	548.52	11-May-05	8:46 AM	92.90	455.62	0.5	455.57
OW-02M	548.52	18-May-05	6:24 AM	92.88	455.64	0.5	455.59
OW-02D	549.01	06-Jan-05	8:44 AM	94.71	454.30	1.0	455.05
OW-02D	549.01	13-Jan-05	7:21 AM	94.90	454.11	1.0	454.90
OW-02D	549.01	13-Jan-05	9:31 AM	95.00	454.01	1.0	454.80
OW-02D	549.01	22-Mar-05	9:48 AM	95.33	453.68	1.0	454.31
OW-02D	549.01	10-May-05	1:21 PM	93.86	455.15	1.0	455.76
OW-02D	549.01	18-May-05	6:27 AM	93.82	455.19	1.0	455.80
OW-03S	558.58	28-Oct-04	12:10 PM	103.20	455.38	0.1	455.33
OW-03S	558.58	16-Nov-04	12:14 PM	103.18	455.40	0.1	455.35
OW-03S	558.58	15-Dec-04	9:52 AM	103.57	455.01	0.1	454.96
OW-03S	558.58	22-Mar-05	9:07 AM	104.28	454.30	0.1	454.26
OW-03S	558.58	18-May-05	6:03 AM	102.61	455.97	0.1	455.92
OW-03M	558.90	28-Oct-04	10:38 AM	103.40	455.50	0.2	455.23
OW-03M	558.90	16-Nov-04	11:35 AM	103.48	455.42	0.2	455.15
OW-03M	558.90	15-Dec-04	8:58 AM	103.80	455.10	0.2	454.86
OW-03M	558.90	22-Mar-05	9:05 AM	104.55	454.35	0.2	454.11
OW-03M	558.90	18-May-05	6:05 AM	102.95	455.95	0.2	455.70

# TABLE B-2Water Level Measurements and Groundwater ElevationsGroundwater and Hydrogeologic InvestigationInterim Measures No 3. Injection Area, PG&E Topock Compressor Station

	Measuring Point			Depth to Water	Raw Water Elevation	Salinitv	Adjusted Groundwater Elevation
Location ID	(ft MSL)	Date	Time	(ft btoc)	(ft MSL)	(%)	(ft MSL)
OW-03D	558.63	28-Oct-04	8:27 AM	103.04	455.58	0.3	455.18
OW-03D	558.63	16-Nov-04	10:26 AM	103.10	455.52	0.3	455.12
OW-03D	558.63	14-Dec-04	2:00 PM	103.30	455.33	0.3	454.94
OW-03D	558.63	22-Mar-05	9:22 AM	104.15	454.48	0.3	454.08
OW-03D	558.63	18-May-05	6:06 AM	102.60	456.02	0.3	455.62
OW-05S	551.75	21-Dec-04	2:48 PM	96.83	454.92	0.1	454.87
OW-05S	551.75	06-Jan-05	8:48 AM	97.09	454.66	0.1	454.61
OW-05S	551.75	13-Jan-05	7:17 AM	97.28	454.47	0.1	454.42
OW-05S	551.75	22-Mar-05	9:42 AM	97.74	454.01	0.1	453.96
OW-05S	551.75	11-May-05	10:56 AM	95.92	455.83	0.1	455.77
OW-05S	551.75	18-May-05	6:18 AM	95.95	455.80	0.1	455.74
OW-05M	551.75	06-Jan-05	8:53 AM	96.93	454.82	0.5	454.72
OW-05M	551.75	13-Jan-05	7:13 AM	97.09	454.66	0.5	454.57
OW-05M	551.75	13-Jan-05	11:40 AM	97.12	454.63	0.5	454.54
OW-05M	551.75	22-Mar-05	9:41 AM	97.54	454.21	0.5	454.19
OW-05M	551.75	11-May-05	11:44 AM	95.95	455.80	0.5	455.70
OW-05M	551.75	18-May-05	6:19 AM	96.07	455.68	0.5	455.58
OW-05D	552.35	22-Dec-04	10:22 AM	97.63	454.72	0.7	454.97
OW-05D	552.35	06-Jan-05	8:57 AM	97.61	454.74	0.7	454.95
OW-05D	552.35	13-Jan-05	7:12 AM	97.74	454.61	0.7	454.82
OW-05D	552.35	22-Mar-05	9:40 AM	98.20	454.15	0.7	454.25
OW-05D	552.35	11-May-05	1:03 PM	96.92	455.43	0.7	455.50
OW-05D	552.35	18-May-05	6:20 AM	96.93	455.42	0.7	455.49
MW-13	488.64	24-Sep-04	10:09 AM	32.33	456.31	0.1	456.25
MW-13	488.64	16-Dec-04	12:24 PM	32.00	456.64	0.1	456.58
MW-13	488.64	11-Mar-05	11:14 AM	35.38	453.26	0.1	453.21
MW-13	488.64	22-Mar-05	9:11 AM	35.24	453.40	0.1	453.35
MW-13	488.64	18-May-05	6:12 AM	32.81	455.83	0.1	455.77
MW-14	570.99	20-Sep-04	1:30 PM	115.26	455.73	0.1	455.67
MW-14	570.99	16-Dec-04	12:59 PM	116.50	454.49	0.1	454.43
MW-14	570.99	09-Mar-05	12:43 PM	117.05	453.94	0.1	453.88
MW-14	570.99	22-Mar-05	9:20 AM	117.26	453.73	0.1	453.67
MW-14	570.99	07-Apr-05	9:04 AM	116.48	454.51	0.1	454.45
MW-14	570.99	11-May-05	7:24 AM	115.40	455.59	0.1	455.53
MW-14	570.99	18-May-05	7:25 AM	115.29	455.70	0.1	455.64
MW-18	545.32	24-Sep-04	8:54 AM	89.33	455.99	0.1	455.92
MW-18	545.32	16-Dec-04	2:12 PM	90.42	454.90	0.1	454.83
MW-18	545.32	09-Mar-05	11:21 AM	91.03	454.29	0.1	454.22
MW-18	545.32	22-Mar-05	9:14 AM	91.13	454.19	0.1	454.12
MW-18	545.32	11-May-05	8:10 AM	89.60	455.72	0.1	455.65
MW-18	545.32	12-May-05	8:10 AM	89.60	455.72	0.1	455.65
MW-18	545.32	18-May-05	6:56 AM	89.41	455.91	0.1	455.83

# TABLE B-2 Water Level Measurements and Groundwater Elevations Groundwater and Hydrogeologic Investigation Interim Measures No 3. Injection Area, PG&E Topock Compressor Station

Location ID	Measuring Point Elevation (ft MSL)	Date	Time	Depth to Water (ft btoc)	Raw Water Elevation (ft MSL)	Salinity (%)	Adjusted Groundwater Elevation (ft MSL)
MW-37S	485.97	23-Sep-04	8:54 AM	31.30	454.67	0.2	454.51
MW-37S	485.97	13-Dec-04	1:00 PM	32.42	453.55	0.2	453.40
MW-37S	485.97	11-Mar-05	10:15 AM	34.29	451.68	0.2	451.53
MW-37S	485.97	22-Mar-05	9:08 AM	33.23	452.74	0.2	452.59
MW-37S	485.97	07-Apr-05	12:57 PM	32.20	453.77	0.3	453.63
MW-37S	485.97	18-May-05	6:20 AM	31.00	454.97	0.3	454.83
MW-37D	486.19	24-Sep-04	9:42 AM	31.41	454.78	0.8	454.93
MW-37D	486.19	14-Dec-04	12:07 PM	32.39	453.80	0.8	453.96
MW-37D	486.19	11-Mar-05	10:48 AM	33.28	452.91	0.8	453.07
MW-37D	486.19	22-Mar-05	9:25 AM	33.16	453.03	0.8	453.19
MW-37D	486.19	18-May-05	6:18 AM	31.25	454.94	0.9	455.35
MW-41S	480.07	18-Nov-04	11:00 AM	25.42	454.65	0.5	454.65
MW-41S	480.07	16-Dec-04	11:26 AM	25.92	454.15	0.5	454.14
MW-41S	480.07	10-Mar-05	2:51 PM	26.87	453.20	0.5	453.19
MW-41S	480.07	22-Mar-05	9:15 AM	26.58	453.49	0.5	453.48
MW-41S	480.07	18-May-05	6:27 AM	24.13	455.94	0.2	455.84
MW-41M	479.83	18-Nov-04	10:05 AM	24.80	455.04	1.1	455.82
MW-41M	479.83	15-Dec-04	12:28 PM	25.21	454.63	1.1	455.34
MW-41M	479.83	11-Mar-05	10:08 AM	26.14	453.70	1.1	454.37
MW-41M	479.83	22-Mar-05	9:16 AM	26.31	453.52	1.1	454.20
MW-41M	479.83	18-May-05	6:26 AM	24.16	455.67	1.1	456.35
MW-41D	479.42	18-Nov-04	8:45 AM	24.95	454.47	1.4	456.27
MW-41D	479.42	15-Dec-04	11:16 AM	25.32	454.10	1.4	455.83
MW-41D	479.42	11-Mar-05	8:55 AM	26.25	453.17	1.4	454.88
MW-41D	479.42	22-Mar-05	9:30 AM	26.33	453.09	1.4	454.80
MW-41D	479.42	18-May-05	6:25 AM	24.36	455.06	1.4	456.65
IW-02	550.10	06-Jan-05	10:24 AM	95.53	454.57		
IW-02	550.10	07-Jan-05	7:25 AM	95.52	454.58		
IW-02	550.10	09-Jan-05	7:30 AM	95.98	454.12		
IW-02	550.10	10-Feb-05	12:44 PM	95.80	454.30		
IW-03	554.44	14-Jan-05	7:35 AM	100.00	454.44		
IW-03	554.44	15-Jan-05	7:46 AM	100.08	454.36		
IW-03	554.44	10-Feb-05	1:16 PM	100.05	454.39		

#### Notes:

All water level data are manual measurements of static water levels collected during groundwater sampling and IM-3 testing activities.

 $\begin{array}{lll} \mbox{ft MSL} & \mbox{feet mean sea level} \\ \mbox{ft btoc} & \mbox{feet below top of casing} \\ \mbox{\muS/cm} & \mbox{micro siemens per centimeter} \\ \mbox{---} & \mbox{not available} \end{array}$ 

## B1: MW-41 and OW-3 Well Clusters





PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA **CH2MHILL** 



# B2: Compliance Wells CW-1, CW-2, CW-3, and CW-4







## Appendix B Hydrogeologic and Geophysical Logging Data



## Appendix C Additional Groundwater Sampling Data and Water Chemistry Plots

# C1: Groundwater Samples Collected from Boreholes During Drilling

#### TABLE C1-1

Water Quality Results for Groundwater Samples Collected from Boreholes During Drilling Groundwater and Hydrogeologic Investigation

Interim Measures No 3. Injection Area, PG&E Topock Compressor Station

			Labo	oratory Concent	rations	Field Measurements	
			Field Test Analysis	Certified	Lab Data		
Boring ID	Sample Date	Borehole Interval (ft bgs)	Hexavalent Chromium (ug/L)	Dissolved Total Chromium	Total Dissolved Solids	pH (pH units)	Specific Conductance (µS/cm)
CW-01	05-Jan-05	100-118		13.1	920		2400
CW-01	06-Jan-05	160-176		ND (1.0)	1890	8.30	3900
CW-01	07-Jan-05	220-240		ND (1.0)	2980	8.50	5700
CW-01	09-Jan-05	280-300		ND (1.0)	2980	8.30	7400
CW-01	11-Jan-05	340-347		ND (1.0)	5960	7.90	1100
CW-02	19-Jan-05	108-128				8.10	2300
CW-02	20-Jan-05	168-188		ND (1.0) ^	2400 ^	7.60	4300
CW-02	20-Jan-05	228-248		ND (1.0) ^	2860 ^	8.10	5400
CW-02	21-Jan-05	288-308		ND (1.0) ^	4770 ^	8.10	8300
CW-02	21-Jan-05	348-368		ND (1.0) ^	7810 ^	7.80	13300
CW-02	22-Jan-05	368-385		ND (1.0) ^	13200 ^		
CW-03	20-Jan-05	120-136		ND (1.0) ^	1830 ^	8.10	3400
CW-03	21-Jan-05	180-200		ND (1.0) ^	2240 ^	8.10	4600
CW-03	22-Jan-05	246-260		ND (1.0) ^	5330 ^	8.70	8500
CW-03	24-Jan-05	300-322		ND (1.0) ^	5910 J^	7.60	9800
CW-03	25-Jan-05	340-360		ND (1.0) ^	10500 ^	6.90	13900
CW-04	11-Jan-05	58-78		4.90 ^	745 ^	8.10	1700
CW-04	11-Jan-05	118-138		ND (1.0) ^	2020 J^	8.40	4100
CW-04	12-Jan-05	178-198		ND (1.0) ^	2910 ^	8.30	5800
CW-04	13-Jan-05	238-258		ND (1.0) ^	6500 J^	8.30	8700
CW-04	13-Jan-05	298-318		ND (1.0) ^	5320 J^	8.30	9000
MW-41D	23-Oct-04	60-70	ND (10) S^	ND (1.0) ^*	2200 J^	8.20	4100
MW-41D	24-Oct-04	130-140	44.0 S^	31.3 ^*	4300 J^	7.50	6400
MW-41D	26-Oct-04	240-250	ND (10) S^	2.30 ^*	9410 ^	8.30	11700
OW-01D	11-Sep-04	100-116	14.0 S^	5.00 ^*	1030 ^	7.60	1700
OW-01D	12-Sep-04	160-180	ND (10) S^	ND (1.0) ^*	2620 ^	7.90	4300
OW-01D	14-Sep-04	220-236	ND (10) S^	ND (1.0) ^*	4550 J^		7500
OW-02D	22-Nov-04	60-80		ND (1.0) ^	820 J^	10.0	1900
OW-02D	30-Nov-04	120-140		ND (1.0) ^	972 ^	8.40	2400
OW-02D	02-Dec-04	200-220				8.30	3900
OW-03D	05-Oct-04	192-202	ND (10) S^	ND (1.0) *	2550		
OW-03D	10-Oct-04	230-253	ND (10) S^	ND (1.0) *	2770		
OW-05D	10-Nov-04	100-120		17.6 ^*	944 ^	7.90	1700
OW-05D	14-Nov-04	150-170		ND (1.0) ^	6560 J^	8.30	2700
OW-05D	14-Nov-04	330-350		ND (1.0) ^	7500 ^		

Notes:

mg/L results in milligrams per liter

ug/L results in micrograms per liter

field filtered

parameter not analyzed ----

ND parameter not detected at the listed reporting limit.

S J ^ Screening level data

concentration estimated by laboratory or validation

autovalidation

# C2: Stiff Water Chemistry Diagrams

FIGURE C2-1 Stiff Water Quality Diagrams for Bat Cave Wash Area Well Samples Groundwater and Hydrogeologic Investigation Interim Measures No. 3 Injection Area, PG&E Topock Compressor Station



Note the different concentration scales for each sample.

FIGURE C2-2 Stiff Water Quality Diagrams for East Mesa Area Well Samples Groundwater and Hydrogeologic Investigation Interim Measures No. 3 Injection Area, PG&E Topock Compressor Station



Note the different concentration scales for each sample.

FIGURE C2-3 Stiff Water Quality Diagrams for West Mesa Area Well Samples Groundwater and Hydrogeologic Investigation Interim Measures No. 3 Injection Area, PG&E Topock Compressor Station



Note the different concentration scales for each sample.

## Appendix D Soil and Groundwater Analytical Data for CW-2D Boring and Well

### D1: VOC and SVOC Analyses for Borehole CW-2 Soil and Groundwater Samples

Borehole CW-2D Soil Samples 380 ft and 385 ft - VOC and SVOC Analyses Groundwater and Hydrogeologic Investigation Interim Measures No 3. Injection Area, PG&E Topock Compressor Station

	VOCs S	W 8260		VOCs S	W 8260
Analyte	Result	Units	Analyte	Result	Units
CW-2-380			CW-2-380		
1,1,1,2-tetrachloroethane	ND (0.2)	mg/kg	Dibromochloromethane	ND (0.2)	mg/kg
1,1,1-trichloroethane	ND (0.2)	mg/kg	Dibromomethane	ND (0.2)	mg/kg
1,1,2,2-tetrachloroethane	ND (0.2)	mg/kg	Dichlorodifluoromethane	ND (0.5)	mg/kg
1,1,2-trichloroethane	ND (0.2)	mg/kg	Ethyl-t-butyl ether	ND (0.5)	mg/kg
1,1-dichloroethane	ND (0.2)	mg/kg	Ethylbenzene	ND (0.2)	mg/kg
1,1-dichloroethene	ND (0.2)	mg/kg	Freon 113	ND (0.5)	mg/kg
1,1-dichloropropene	ND (0.2)	mg/kg	Hexachlorobutadiene	ND (0.2)	mg/kg
1,2,3-trichlorobenzene	ND (0.2)	mg/kg	Isopropylbenzene	ND (0.2)	mg/kg
1,2,3-trichloropropane	ND (0.2)	mg/kg	M+p-xylenes	ND (0.4)	mg/kg
1,2,4-trichlorobenzene	ND (0.2)	mg/kg	Methyl t-butyl ether (mtbe)	ND (0.5)	mg/kg
1,2,4-trimethylbenzene	ND (0.2)	mg/kg	Methylene chloride	ND (0.2)	mg/kg
1,2-dibromo-3-chloropropane	ND (0.5)	mg/kg	N-butylbenzene	ND (0.2)	mg/kg
1,2-dibromoethane	ND (0.2)	mg/kg	N-propylbenzene	ND (0.2)	mg/kg
1,2-dichlorobenzene	ND (0.2)	mg/kg	Naphthalene	ND (0.2)	mg/kg
1,2-dichloroethane	ND (0.2)	mg/kg	O-xylene	ND (0.2)	mg/kg
1,2-dichloropropane	ND (0.2)	mg/kg	P-chlorotoluene	ND (0.2)	mg/kg
1,3,5-trimethylbenzene	ND (0.2)	mg/kg	P-isopropyltoluene	ND (0.2)	mg/kg
1,3-dichlorobenzene	ND (0.2)	mg/kg	Sec-butylbenzene	ND (0.2)	mg/kg
1,3-dichloropropane	ND (0.2)	mg/kg	Styrene	ND (0.2)	mg/kg
1,4-dichlorobenzene	ND (0.2)	mg/kg	T-amyl methyl ether	ND (0.5)	mg/kg
2,2-dichloropropane	ND (0.2)	mg/kg	T-butylbenzene	ND (0.2)	mg/kg
2-butanone	ND (1.0)	mg/kg	Tetrachloroethene	ND (0.2)	mg/kg
2-chlorotoluene (o-chlorotoluene)	ND (0.2)	mg/kg	Toluene	ND (0.2)	mg/kg
2-hexanone	ND (1.0)	mg/kg	Trans-1,2-dichloroethene	ND (0.2)	mg/kg
Acetone	ND (1.0)	mg/kg	Trans-1,3-dichloropropene	ND (0.2)	mg/kg
Acrolein	ND (2.0)	mg/kg	Trichloroethene	ND (0.2)	mg/kg
Acrylonitrile	ND (1.0)	mg/kg	Trichlorofluoromethane	ND (0.5)	mg/kg
Benzene	ND (0.2)	mg/kg	Vinyl chloride	ND (0.5)	mg/kg
Braomochloromethane	ND (0.2)	mg/kg			
Bromobenzene	ND (0.2)	mg/kg			
Bromodichloromethane	ND (0.2)	mg/kg			
Bromoform	ND (0.2)	mg/kg			
Bromomethane	ND (0.2)	mg/kg			
Carbon tetrachloride	ND (0.2)	mg/kg			
Chlorobenzene	ND (0.2)	mg/kg			
Chloroethane	ND (0.5)	mg/kg			
Chloroform	ND (0.2)	mg/kg			
Chloromethane	ND (0.5)	mg/kg			
Cis-1,2-dichloroethene	ND (0.2)	mg/kg			
Cis-1,3-dichloropropene	ND (0.2)	mg/kg			
Di-isopropyl ether	ND (0.5)	mg/kg	1		

Notes:

VOC volatile organic compound

SVOC semi-volatile organic compound

mg/kg results in milligrams per kilogram

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Borehole CW-2D Soil Samples 380 ft and 385 ft - VOC and SVOC Analyses Groundwater and Hydrogeologic Investigation Interim Measures No 3. Injection Area, PG&E Topock Compressor Station

	SVOCs SW 8270C			SVOCs S	W 8270C
Analyte	Result	Units	Analyte	Result	Units
CW-2-380			CW-2-380		
1,2,4-trichlorobenzene	ND (0.33)	mg/kg	Bis(2-chloroisopropyl)ether	ND (0.33)	mg/kg
1,2-dichlorobenzene	ND (0.33)	mg/kg	Butyl benzyl phthalate	ND (0.33)	mg/kg
1,3-dichlorobenzene	ND (0.33)	mg/kg	Carbazole	ND (0.33)	mg/kg
1,4-dichlorobenzene	ND (0.33)	mg/kg	Chrysene	ND (0.33)	mg/kg
2,4,5-trichlorophenol	ND (0.33)	mg/kg	Di-N-butyl phthalate	ND (0.33)	mg/kg
2,4,6-trichlorophenol	ND (0.33)	mg/kg	Di-N-octyl phthalate	ND (0.33)	mg/kg
2,4-dichlorophenol	ND (0.33)	mg/kg	Dibenzo(a,h)anthracene	ND (0.33)	mg/kg
2,4-dimethylphenol	ND (0.33)	mg/kg	dibenzofuran	ND (0.33)	mg/kg
2,4-dinitrophenol	ND (0.83)	mg/kg	diethyl phthalate	ND (0.33)	mg/kg
2,4-dinitrotoluene	ND (0.33)	mg/kg	dimethyl phthalate	ND (0.33)	mg/kg
2,6-dinitrotoluene	ND (0.33)	mg/kg	Fluoranthene	ND (0.33)	mg/kg
2-Chloronaphthalene	ND (0.33)	mg/kg	Fluorene	ND (0.33)	mg/kg
2-chlorophenol	ND (0.33)	mg/kg	Hexachlorobenzene	ND (0.33)	mg/kg
2-methylnaphthalene	ND (0.33)	mg/kg	Hexachlorobutadiene	ND (0.33)	mg/kg
2-methylphenol	ND (0.33)	mg/kg	Hexachlorocyclopentadiene	ND (0.33)	mg/kg
2-nitroaniline	ND (0.33)	mg/kg	Hexachloroethane	ND (0.33)	mg/kg
2-nitrophenol	ND (0.33)	mg/kg	Indeno(1,2,3-cd)pyrene	ND (0.33)	mg/kg
3,3'-dichlorobenzidene	ND (0.83)	mg/kg	Isophorone	ND (0.33)	mg/kg
3-nitroaniline	ND (0.83)	mg/kg	N-Nitroso-di-n-propylamine	ND (0.33)	mg/kg
4,6-dinitro-2-methylphenol	ND (0.33)	mg/kg	N-Nitrosodimethylamine	ND (0.33)	mg/kg
4-bromophenyl phenyl ether	ND (0.33)	mg/kg	N-nitrosodiphenylamine	ND (0.33)	mg/kg
4-chloro-3-methylphenol	ND (0.33)	mg/kg	Naphthalene	ND (0.33)	mg/kg
4-chloroaniline	ND (0.33)	mg/kg	Nitrobenzene	ND (0.33)	mg/kg
4-chlorophenyl phenyl ether	ND (0.33)	mg/kg	Pentachlorophenol/pcp	ND (0.83)	mg/kg
4-methylphenol	ND (0.33)	mg/kg	Phenanthrene	ND (0.33)	mg/kg
4-nitroaniline	ND (0.83)	mg/kg	Phenol	ND (0.33)	mg/kg
4-nitrophenol	ND (0.83)	mg/kg	Pyrene	ND (0.33)	mg/kg
Acenaphthene	ND (0.33)	mg/kg			
Acenaphthylene	ND (0.33)	mg/kg			
Anthracene	ND (0.33)	mg/kg			
Benzidene	ND (0.83)	mg/kg			
Benzo(a)anthracene	ND (0.33)	mg/kg			
Benzo(a)pyrene	ND (0.33)	mg/kg			
Benzo(b)fluoranthene	ND (0.33)	mg/kg			
Benzo(ghi)perylene	ND (0.33)	mg/kg			
Benzo(k)fluoranthene	ND (0.33)	mg/kg			
Benzoic acid	ND (0.83)	mg/kg			
Benzyl alcohol	ND (0.33)	mg/kg			
Bis (2-chloroethoxy) methane	ND (0.33)	mg/kg			
Bis (2-ethylhexyl) phthalate	ND (0.33)	mg/kg			
Bis(2-chloroethyl)ether	ND (0.33)	mg/kg			

Notes:

VOC volatile organic compound SVOC semi-volatile organic compound

mg/kg results in milligrams per kilogram

Borehole CW-2D Soil Samples 380 ft and 385 ft - VOC and SVOC Analyses Groundwater and Hydrogeologic Investigation Interim Measures No 3. Injection Area, PG&E Topock Compressor Station

	VOCs S	W 8260		VOCs S	W 8260
Analyte	Result	Units	Analyte	Result	Units
CW-2-385			CW-2-385	•	
1,1,1,2-tetrachloroethane	ND (0.2)	mg/kg	Dibromochloromethane	ND (0.2)	mg/kg
1,1,1-trichloroethane	ND (0.2)	mg/kg	Dibromomethane	ND (0.2)	mg/kg
1,1,2,2-tetrachloroethane	ND (0.2)	mg/kg	Dichlorodifluoromethane	ND (0.5)	mg/kg
1,1,2-trichloroethane	ND (0.2)	mg/kg	Ethyl-t-butyl ether	ND (0.5)	mg/kg
1,1-dichloroethane	ND (0.2)	mg/kg	Ethylbenzene	ND (0.2)	mg/kg
1,1-dichloroethene	ND (0.2)	mg/kg	Freon 113	ND (0.5)	mg/kg
1,1-dichloropropene	ND (0.2)	mg/kg	Hexachlorobutadiene	ND (0.2)	mg/kg
1,2,3-trichlorobenzene	ND (0.2)	mg/kg	Isopropylbenzene	ND (0.2)	mg/kg
1,2,3-trichloropropane	ND (0.2)	mg/kg	M+p-xylenes	ND (0.4)	mg/kg
1,2,4-trichlorobenzene	ND (0.2)	mg/kg	Methyl t-butyl ether (mtbe)	ND (0.5)	mg/kg
1,2,4-trimethylbenzene	ND (0.2)	mg/kg	Methylene chloride	ND (0.2)	mg/kg
1,2-dibromo-3-chloropropane	ND (0.5)	mg/kg	N-butylbenzene	ND (0.2)	mg/kg
1,2-dibromoethane	ND (0.2)	mg/kg	N-propylbenzene	ND (0.2)	mg/kg
1,2-dichlorobenzene	ND (0.2)	mg/kg	Naphthalene	ND (0.2)	mg/kg
1,2-dichloroethane	ND (0.2)	mg/kg	O-xylene	ND (0.2)	mg/kg
1,2-dichloropropane	ND (0.2)	mg/kg	P-chlorotoluene	ND (0.2)	mg/kg
1,3,5-trimethylbenzene	ND (0.2)	mg/kg	P-isopropyltoluene	ND (0.2)	mg/kg
1,3-dichlorobenzene	ND (0.2)	mg/kg	Sec-butylbenzene	ND (0.2)	mg/kg
1,3-dichloropropane	ND (0.2)	mg/kg	Styrene	ND (0.2)	mg/kg
1,4-dichlorobenzene	ND (0.2)	mg/kg	T-amyl methyl ether	ND (0.5)	mg/kg
2,2-dichloropropane	ND (0.2)	mg/kg	T-butylbenzene	ND (0.2)	mg/kg
2-butanone	ND (1.0)	mg/kg	Tetrachloroethene	ND (0.2)	mg/kg
2-chlorotoluene (o-chlorotoluene)	ND (0.2)	mg/kg	Toluene	ND (0.2)	mg/kg
2-hexanone	ND (1.0)	mg/kg	Trans-1,2-dichloroethene	ND (0.2)	mg/kg
Acetone	ND (1.0)	mg/kg	Trans-1,3-dichloropropene	ND (0.2)	mg/kg
Acrolein	ND (2.0)	mg/kg	Trichloroethene	ND (0.2)	mg/kg
Acrylonitrile	ND (1.0)	mg/kg	Trichlorofluoromethane	ND (0.5)	mg/kg
Benzene	ND (0.2)	mg/kg	Vinyl chloride	ND (0.5)	mg/kg
Braomochloromethane	ND (0.2)	mg/kg			
Bromobenzene	ND (0.2)	mg/kg			
Bromodichloromethane	ND (0.2)	mg/kg			
Bromoform	ND (0.2)	mg/kg			
Bromomethane	ND (0.2)	mg/kg			
Carbon tetrachloride	ND (0.2)	mg/kg			
Chlorobenzene	ND (0.2)	mg/kg			
Chloroethane	ND (0.5)	mg/kg			
Chloroform	ND (0.2)	mg/kg			
Chloromethane	ND (0.5)	mg/kg			
Cis-1,2-dichloroethene	ND (0.2)	mg/kg			
Cis-1,3-dichloropropene	ND (0.2)	mg/kg			
Di-isopropyl ether	ND (0.5)	mg/kg			

Notes:

VOC volatile organic compound

SVOC semi-volatile organic compound

mg/kg results in milligrams per kilogram

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Borehole CW-2D Soil Samples 380 ft and 385 ft - VOC and SVOC Analyses Groundwater and Hydrogeologic Investigation Interim Measures No 3. Injection Area, PG&E Topock Compressor Station

	SVOCs SW 8270C			SVOCs S	W 8270C
Analyte	Result	Units	Analyte	Result	Units
CW-2-385			CW-2-385		
1,2,4-trichlorobenzene	ND (0.33)	mg/kg	Bis(2-chloroisopropyl)ether	ND (0.33)	mg/kg
1,2-dichlorobenzene	ND (0.33)	mg/kg	Butyl benzyl phthalate	ND (0.33)	mg/kg
1,3-dichlorobenzene	ND (0.33)	mg/kg	Carbazole	ND (0.33)	mg/kg
1,4-dichlorobenzene	ND (0.33)	mg/kg	Chrysene	ND (0.33)	mg/kg
2,4,5-trichlorophenol	ND (0.33)	mg/kg	Di-N-butyl phthalate	ND (0.33)	mg/kg
2,4,6-trichlorophenol	ND (0.33)	mg/kg	Di-N-octyl phthalate	ND (0.33)	mg/kg
2,4-dichlorophenol	ND (0.33)	mg/kg	Dibenzo(a,h)anthracene	ND (0.33)	mg/kg
2,4-dimethylphenol	ND (0.33)	mg/kg	dibenzofuran	ND (0.33)	mg/kg
2,4-dinitrophenol	ND (0.83)	mg/kg	diethyl phthalate	ND (0.33)	mg/kg
2,4-dinitrotoluene	ND (0.33)	mg/kg	dimethyl phthalate	ND (0.33)	mg/kg
2,6-dinitrotoluene	ND (0.33)	mg/kg	Fluoranthene	ND (0.33)	mg/kg
2-Chloronaphthalene	ND (0.33)	mg/kg	Fluorene	ND (0.33)	mg/kg
2-chlorophenol	ND (0.33)	mg/kg	Hexachlorobenzene	ND (0.33)	mg/kg
2-methylnaphthalene	ND (0.33)	mg/kg	Hexachlorobutadiene	ND (0.33)	mg/kg
2-methylphenol	ND (0.33)	mg/kg	Hexachlorocyclopentadiene	ND (0.33)	mg/kg
2-nitroaniline	ND (0.33)	mg/kg	Hexachloroethane	ND (0.33)	mg/kg
2-nitrophenol	ND (0.33)	mg/kg	Indeno(1,2,3-cd)pyrene	ND (0.33)	mg/kg
3,3'-dichlorobenzidene	ND (0.83)	mg/kg	Isophorone	ND (0.33)	mg/kg
3-nitroaniline	ND (0.83)	mg/kg	N-Nitroso-di-n-propylamine	ND (0.33)	mg/kg
4,6-dinitro-2-methylphenol	ND (0.33)	mg/kg	N-Nitrosodimethylamine	ND (0.33)	mg/kg
4-bromophenyl phenyl ether	ND (0.33)	mg/kg	N-nitrosodiphenylamine	ND (0.33)	mg/kg
4-chloro-3-methylphenol	ND (0.33)	mg/kg	Naphthalene	ND (0.33)	mg/kg
4-chloroaniline	ND (0.33)	mg/kg	Nitrobenzene	ND (0.33)	mg/kg
4-chlorophenyl phenyl ether	ND (0.33)	mg/kg	Pentachlorophenol/pcp	ND (0.83)	mg/kg
4-methylphenol	ND (0.33)	mg/kg	Phenanthrene	ND (0.33)	mg/kg
4-nitroaniline	ND (0.83)	mg/kg	Phenol	ND (0.33)	mg/kg
4-nitrophenol	ND (0.83)	mg/kg	Pyrene	ND (0.33)	mg/kg
Acenaphthene	ND (0.33)	mg/kg			
Acenaphthylene	ND (0.33)	mg/kg			
Anthracene	ND (0.33)	mg/kg			
Benzidene	ND (0.83)	mg/kg			
Benzo(a)anthracene	ND (0.33)	mg/kg			
Benzo(a)pyrene	ND (0.33)	mg/kg			
Benzo(b)fluoranthene	ND (0.33)	mg/kg			
Benzo(ghi)perylene	ND (0.33)	mg/kg			
Benzo(k)fluoranthene	ND (0.33)	mg/kg			
Benzoic acid	ND (0.83)	mg/kg			
Benzyl alcohol	ND (0.33)	mg/kg			
Bis (2-chloroethoxy) methane	ND (0.33)	mg/kg			
Bis (2-ethylhexyl) phthalate	ND (0.33)	mg/kg			
Bis(2-chloroethyl)ether	ND (0.33)	mg/kg			

Notes:

VOC volatile organic compound SVOC semi-volatile organic compound

mg/kg results in milligrams per kilogram

Borehole CW-2D Groundwater Grab Sample 375 ft - VOC and SVOC Analyses Groundwater and Hydrogeologic Investigation Interim Measures No 3. Injection Area, PG&E Topock Compressor Station

	SVOCs	E 625		SVOCs	E 625
Analyte	Result	Units	Analyte	Result	Units
CW-2-375			CW-2-375		
1,2,4-trichlorobenzene	ND (50)	µg/L	Bis(2-chloroethyl)ether	ND (50)	µg/L
1,2-dichlorobenzene	ND (50)	µg/L	Bis(2-chloroisopropyl)ether	ND (50)	µg/L
1,2-diphenylhydrazine	ND (50)	µg/L	Butyl benzyl phthalate	ND (50)	µg/L
1,3-dichlorobenzene	ND (50)	µg/L	Carbazole	ND (50)	µg/L
1,4-dichlorobenzene	ND (50)	µg/L	Chrysene	ND (50)	µg/L
2,4,5-trichlorophenol	ND (50)	µg/L	Di-N-butyl phthalate	ND (50)	µg/L
2,4,6-trichlorophenol	ND (50)	µg/L	Di-N-octyl phthalate	ND (50)	µg/L
2,4-dichlorophenol	ND (50)	µg/L	Dibenzo(a,h)anthracene	ND (50)	µg/L
2,4-dimethylphenol	ND (50)	µg/L	dibenzofuran	ND (50)	µg/L
2,4-dinitrophenol	ND (130)	µg/L	diethyl phthalate	ND (50)	µg/L
2,4-dinitrotoluene	ND (50)	µg/L	dimethyl phthalate	ND (50)	µg/L
2,6-dinitrotoluene	ND (50)	µg/L	Fluoranthene	ND (50)	µg/L
2-Chloronaphthalene	ND (50)	µg/L	Fluorene	ND (50)	µg/L
2-chlorophenol	ND (50)	µg/L	Hexachlorobenzene	ND (50)	µg/L
2-methylnaphthalene	ND (50)	µg/L	Hexachlorobutadiene	ND (50)	µg/L
2-methylphenol	ND (50)	µg/L	Hexachlorocyclopentadiene	ND (50)	µg/L
2-nitroaniline	ND (50)	µg/L	Hexachloroethane	ND (50)	µg/L
2-nitrophenol	ND (50)	µg/L	Indeno(1,2,3-cd)pyrene	ND (50)	µg/L
3,3'-dichlorobenzidene	ND (50)	µg/L	Isophorone	ND (50)	µg/L
3-nitroaniline	ND (130)	µg/L	N-Nitroso-di-n-propylamine	ND (50)	µg/L
4,6-dinitro-2-methylphenol	ND (50)	µg/L	N-Nitrosodimethylamine	ND (50)	µg/L
4-bromophenyl phenyl ether	ND (50)	µg/L	N-nitrosodiphenylamine	ND (50)	µg/L
4-chloro-3-methylphenol	ND (50)	µg/L	Naphthalene	ND (50)	µg/L
4-chloroaniline	ND (50)	µg/L	Nitrobenzene	ND (50)	µg/L
4-chlorophenyl phenyl ether	ND (50)	µg/L	Pentachlorophenol/pcp	ND (130)	µg/L
4-methylphenol	ND (50)	µg/L	Phenanthrene	ND (50)	µg/L
4-nitroaniline	ND (130)	µg/L	Phenol	ND (50)	µg/L
4-nitrophenol	ND (130)	µg/L	Pyrene	ND (50)	µg/L
Acenaphthene	ND (50)	µg/L		VOCs S	W 8260
Acenaphthylene	ND (50)	µg/L			
Anthracene	ND (50)	µg/L	Analyte	Result	Units
Benzidene	ND (130)	µg/L	CW-2-375		
Benzo(a)anthracene	ND (50)	µg/L	1,1,1,2-tetrachloroethane	ND (2.0)	µg/L
Benzo(a)pyrene	ND (50)	µg/L	1,1,1-trichloroethane	ND (2.0)	µg/L
Benzo(b)fluoranthene	ND (50)	µg/L	1,1,2,2-tetrachloroethane	ND (2.0)	µg/L
Benzo(ghi)perylene	ND (50)	µg/L	1,1,2-trichloroethane	ND (2.0)	µg/L
Benzo(k)fluoranthene	ND (50)	µg/L	1,1-dichloroethane	ND (2.0)	µg/L
Benzoic acid	ND (130)	µg/L	1,1-dichloroethene	ND (2.0)	μg/L
Benzyl alcohol	ND (50)	µg/L	1,1-dichloropropene	ND (2.0)	µg/L
Bis (2-chloroethoxy) methane	ND (50)	µg/L	1,2,3-trichlorobenzene	ND (2.0)	μg/L
Bis (2-ethylhexyl) phthalate	ND (50)	µg/L	1.2.3-trichloropropane	ND (2 0)	ua/l

Notes:

VOC volatile organic compound

SVOC semi-volatile organic compound

µg/L results in micrograms per liter

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Borehole CW-2D Groundwater Grab Sample 375 ft - VOC and SVOC Analyses Groundwater and Hydrogeologic Investigation Interim Measures No 3. Injection Area, PG&E Topock Compressor Station

	VOCs S	W 8260		VOCs S	W 8260
Analyte	Result	Units	Analyte	Result	Units
CW-2-375			CW-2-375	•	
1,2,4-trichlorobenzene	ND (2.0)	µg/L	Methyl t-butyl ether (mtbe)	ND (5.0)	µg/L
1,2,4-trimethylbenzene	ND (2.0)	µg/L	Methylene chloride	ND (2.0)	µg/L
1,2-dibromo-3-chloropropane	ND (5.0)	µg/L	N-butylbenzene	ND (2.0)	μg/L
1,2-dibromoethane	ND (2.0)	µg/L	N-propylbenzene	ND (2.0)	μg/L
1,2-dichlorobenzene	ND (2.0)	µg/L	Naphthalene	ND (2.0)	µg/L
1,2-dichloroethane	ND (2.0)	µg/L	O-xylene	ND (2.0)	µg/L
1,2-dichloropropane	ND (2.0)	µg/L	P-chlorotoluene	ND (2.0)	µg/L
1,3,5-trimethylbenzene	ND (2.0)	µg/L	P-isopropyltoluene	ND (2.0)	µg/L
1,3-dichlorobenzene	ND (2.0)	µg/L	Sec-butylbenzene	ND (2.0)	µg/L
1,3-dichloropropane	ND (2.0)	µg/L	Styrene	ND (2.0)	µg/L
1,4-dichlorobenzene	ND (2.0)	µg/L	T-amyl methyl ether	ND (5.0)	µg/L
2,2-dichloropropane	ND (2.0)	µg/L	T-butylbenzene	ND (2.0)	µg/L
2-butanone	ND (10)	µg/L	Tetrachloroethene	ND (2.0)	µg/L
2-chlorotoluene (o-chlorotoluene)	ND (2.0)	µg/L	Toluene	ND (2.0)	µg/L
2-hexanone	ND (10)	µg/L	Trans-1,2-dichloroethene	ND (2.0)	µg/L
Acetone	ND (10)	µg/L	Trans-1,3-dichloropropene	ND (2.0)	µg/L
Acrolein	ND (20)	µg/L	Trichloroethene	ND (2.0)	µg/L
Acrylonitrile	ND (10)	µg/L	Trichlorofluoromethane	ND (5.0)	µg/L
Benzene	ND (2.0)	µg/L	Vinyl chloride	ND (5.0)	µg/L
Braomochloromethane	ND (2.0)	µg/L			
Bromobenzene	ND (2.0)	µg/L			
Bromodichloromethane	ND (2.0)	µg/L			
Bromoform	ND (2.0)	µg/L			
Bromomethane	ND (5.0)	µg/L			
Carbon tetrachloride	ND (2.0)	µg/L			
Chlorobenzene	ND (2.0)	µg/L			
Chloroethane	ND (5.0)	µg/L			
Chloroform	ND (2.0)	µg/L			
Chloromethane	ND (5.0)	µg/L			
Cis-1,2-dichloroethene	ND (2.0)	µg/L			
Cis-1,3-dichloropropene	ND (2.0)	µg/L			
Di-isopropyl ether	ND (5.0)	µg/L			
Dibromochloromethane	ND (2.0)	µg/L			
Dibromomethane	ND (2.0)	µg/L			
Dichlorodifluoromethane	ND (5.0)	µg/L			
Ethyl-t-butyl ether	ND (5.0)	µg/L			
Ethylbenzene	ND (2.0)	µg/L			
Freon 113	ND (5.0)	µg/L			
Hexachlorobutadiene	ND (2.0)	µg/L			
Isopropylbenzene	ND (2.0)	µg/L			
M+p-xylenes	ND (4.0)	µg/L			

Notes:

VOC volatile organic compound

SVOC semi-volatile organic compound

µg/L results in micrograms per liter

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	ABORATORIES, INC.	CHA	IN OF CUSTODY RECC	кр д		IAT PIPER
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TRUESDAIL INDEPENDENT TESTING, FO	LABORA	IORIES, I	INC. AL ANALYSES			1420	Estabilish FRANKLIN AVENUE - TUS	ed 1931
	Cllent:	CH2MHIII-Topoc 155 Grand Ave., Oakland, CA 946	⊧k , Suite 1000 512	REF	Proj	ect Lab. No.: Bennet Date:	1) /30-6239 - FAX (/ 14) 839050 January 27, 2005	/ 30-5462 · www.truesdall.com
M	Client Contact: Sample: Project Name: P.C. Number: ethod Number: Batch Number:	Paul Bertucci Ground Water/1 { 320861.TP.70.30 8017991 8280B 050126	Sample 1.02		Sa Rec A	mpling Date: selving Date: nalysis Date: Matrix: Sampler:	January 25, 2005 January 26, 2005 January 26, 2005 μg/L Water N/A	
	Investigation:	Volatile Organic (	Compounds	Analytical Results			Page 1 of	0
Para	meter		704698-MB	939050-3			Samp	9
	Cilinton	Tple ID:	Method Blank	CW2-375			RLs	
Acel	TOP OF		- CIN	- CIN			10.0	
Acro	lein			2 QN			20.0	
ACIV	onitrile		Ð	QN			10.0	
tert-A	Vmyl Methyl Ether		QN	DN			5.0	
Benz	ene		QN	DN			2.0	
Bron	lobenzene		QN	DN			2.0	
Bron	nochloromethane		Q	QN			2,0	
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	lufand						2.0	
	10100		UN				10.0	
	Whenzene		GN	<u>a</u>			2.0	
sec-E	Sutvibenzene		QN	QZ			20	
(ert-B	tutvlbanzene		QN	QN			2.0	
lert-B	utyl Ethyl Ether		QN	QN			5,0	
tert-B	utyl Methyl Ether		ND	DN			5.0	
Carb	on Tetrachloride		DN	ND			2.0	
Chloi	robenzene		QN	ND			2.0	
Chlor	roelhane		Q	Q			5.0	
Chio	rotorm		ON C				2:0	
	romethane			ON ON			0.0	
	lociolizene						20	
Dibro	mochloromethane		QN	QN			20	
1,2-D	Nibrama-3-Chloroprop	Dane Dane	DN	QN			5.0	
1,2-D	libromoethane		DN	DN			· 2.0	
Dibro	momethane		QN	QN			2.0	
1' <u>2-U</u>	lichlorobenzene			<u>UN</u>			2.0	
	lichiorobenzene						0.0	
Dichli	orodifluoromethane		QN	CIN CIN			2.0	
-1.1-D	Vichloroethane		QN	QN			2.0	
1,2-D	lichloroethane		DN	QN			2,0	
1,1-0	Vichloroethene		QN	2			2.0	
cis-1.	2-Dichloraethene		QN	QN			2,0	

10.78

This report applies only to the samples, investigated and Is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or In part, in any advertising or publicity matter without prior written authorization from these laboratories.

Report Continued

CH2MHill-Topock 8260B Cllent: Method Number:

TRUESDAIL LABORATORIES, INC.

939050 า/3ศ Project Lab. No.: Units:

	Analytical Results		Page 2 of 3
Parameter	704698-MB	93805 <b>0-</b> 3	Sample
Sample ID:	Method Blank	CW2-375	RLS
Dijution Factor	4		
Irans-1,2-Dichloroethene	QN	QN	2.0
1,2-Dichloropropane	QN	QN	2.0
1,3-Dichoropropane	QN	DN	2.0
2,2-Dichloropropane	QN	QN	2.0
1,1-Dichloropropene	QN	GN	2.0
cis-1.3-Dichloropropene	QN	QN	2.0
trans-1,3-Dichloropropene	QN .	QN	2:0
Diisopropyl Ether	QN	QN	5.0
Ethylbenzene	QN	Q	2.0
Hexachlorobutadiene	QN	QN	2.0
2-Hexanone	QN	QN	10.0
lsopropylbenzene	QN	QN	2,0
4-Isopropyltoluene	QN	QN	2.0
4-Methyl-2-Pentanone	QN	QN	10.0
Methylene Chloride	QN	Q	2.0
Naphthalene	ND	DN	2.0
n-Propy ibenzene	QN	QN	2.0
Siyrene	ŇD	DN	2.0
1,1,1,2-Tetrachloroethane	ND	QN	2.0
1,1,2,2-Tetrachloroethane	ND	ND	2.0
Terrachloroethene	DN	ND	2.0
Toluene	DN	ND	2.0
1,2,3-Trichlorobenzene	ND	DN	2.0
1,2,4-Trichlorobenzene	DN	DN	2.0
1,1,1-Trichloroethane	ND	DN	2.0
1,1,2-Thichloroethane	DN	DN	2.0
Trichlorocthene	ND	ON	2.0
Trichloroftuoromethane	ND	ND	5.0
1,1,2-Trichtorom/fluoroethane	DN	DN	5.0
1,2,3-Trichloropropanc	DN	QN	2.0
1,2,4-Trimethylbenzene	DN	DN	2.0
1,3,5-Trimethylbenzene	QN	ND	2.0
Vinyl Chloride	QN	QN	5.0
m,p-Xylene	QN	DN	4.0
o-Xylene	QN	QN	2.0
SC	Surrogate %	Recovery	APR
1,2-Dichloroethane-d4 50	86.1%	93,1%	73-126
Toluene-d8 50	98,9%	95.8%	81-117
Bromofluorobenzene 50	101%	95.1%	76-127

ND: Nol detected or befow timit of detection. RL: Reporting limit, or least amount of analyte quantifiable based on

average sample size used and analytical technique employed.

APR: Allowable Percent Recovory SC⁻ Spike Concentration This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from these laboratories.

TRUESDAIL LABORATORIES, INC.

Report Continued

Project Lab. No.: 939050 Units: μg/L	Page 3 of 3		Sample	RIS
s (TIC)		TIC Report	939050-3	CW2-375
:H2MHIII-Topock 260B: Tentatively Identified Compounds			704898-MB	ID: Method Blank
Cllent: C Method Number: 8:			Parameter	Sample

Parameter	704898-MB	939050-3	Sample
Sample ID:	Method Blank	CW2-375	RLs
Dilution Factor.	+	-	
2-Propyl-1-pentanol	DN	15.1	2.0

RL: Reporting limit, or least amount of analyte guantifable based on average sample size used and snalytical techniquo employed.

Julia Nayberg, Project Manager Analytical Services, Truesdall Laboratories, Inc. 1 20000000 milit ! _

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INDEPENDENT TESTING, FORENSIC SCIENCE, AND ENVIRONMENTAL ANALYSES

Established 1931

Client Contact: Sample: Project Name: P.O.#: Method Number:	155 Grand Ave., Suite 1000 Oakland, CA 94612 Pauf Bertucci Ground Water/1 Sample 320661.TP.70.30.02 8017991 8260B	QC Lab. No.: Project Lab. No.: Spiked Sample: Report Date: Sampling Date: Receiving Date: Analysis Date:	704698 939050 NVA January 27, 2005 January 25, 2005 January 26, 2005
Run Batch No.:	050126	Units:	ро/L
Investigation:	Volatile Organic Compounds	Dilution Factor:	1

# Quality Control/Quality Assurance Report

MRCCS						MRCVS				
Parameter	Measured.	Theoretica	Percent	Accuracy	Flag	Measured .	Theoretica	Percent	Accuracy	Flag
	Value	Value	Recovery	Control Limits		Value	Value	Recovery	Control Limits	
1,1-Dichloroethene	20.4	20	102	75-125	PASS	47.5	50	95.0	75-125	PASS
Benzene	22.1	20	110	75-125	PASS	50.2	50	100	75-125	PASS
Tríchloroethene	24.0	20	120	75-125	PASS	56.1	50	112	75-125	PASS
Toluene	23.8	20	119	75-125	PASS	52.1	50	104	75-125	PASS
Chlorobenzene	23.9	20	120	75-125	PASS	50.3	50	101	75-125	PASS

# Laboratory Control Spike (Duplicate)

	Spike	Ľ	tecovered		Pe	rcent			Precisio	N & A	CCUL	acy
Parameter	Conc.	ů	ncentration		Rei	sovery	RPD	Flag	Cant	trol Li	mlts	
	ng/L	rcs	LCSD	MB	rcs	LCSD	%		%RPD	% R(	ŠCO	ery
1,1-Dichlarocthene	25	19,6	22.2	0.0	78.2	89.0	12.9	PASS	20.2	70	ì	123
Benzene	25	27.8	29.7	0.0	111	119	6.54	PASS	19.5	83	,	124
Trichloroethene	25	22.7	24.6	0.0	90.6	98.4	8.21	PASS	17.6	70	1	133
Toluene	25	27.9	29.4	0.0	112	118	5.13	PASS	16.2	8		126
Chlorobenzene	25	24.2	26.1	0.0	96.9	105	7.59	PASS	18.0	80	,	126

MRCCS: Mid Range Calibration Check Standard (second source) MRCVS: Mid Range Calibration Verification Standard LCS: Laboratory Control Spike MS: Matrix Spike

Flag: "Pass" If within Control Limits; otherwise "Fall" %RPD: Relative Percent Difference

Julla Nayberg, Project Mangger Analytical Services, Truesdail Laboratories, Inc.

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TRUESDAIL LAB( INDEPENDENT TESTING, FORENSICS	<b>DRATORIES, INC</b> CIENCE, AND ENVIRONMENTAL AN	C. ALYSES		Established 1931
Cilent:	CH2M HILL-Topock 155 Grand Ave., Sulte 1000 Oakland, CA 94612	REPC	JRT ST	14201 FRANKLIN AVENUE · TUSTIN, CALIFORNIA 92780-7008 (714) 730-6239 · FAX (714) 730-6462 · www.truesdail.com
Client Contact: Sample: Project Number: P.O. Number: Method Number: Investigation:	Paul Bertucci Ground Water/I Sample 320661.TP.70.30.02 801799 EPA 625 Semi-Volatite Organic Compour	ş		QC Lab. No.: 704695 Project Lab. No.: 939050 Report Date: January 28, 2005 Sampling Date: January 22, 2005 Receiving Date: January 25, 2005 Analysis Date: January 26, 2005
		Analvtical Result	(0)	sampred by. or Page 1 of 3
Parameter	Sample ID: Sample Amount:	704695-MB Method Blank 1000	939050 CW2-375 200	Sample RLs
4	Dilution Factor.	← čž		6
Accuaptuene			D N	50
Anthracene		QN	ON	50
Benzidine		DN	ON	125
Benzoic Acid		Ŋ	QN	125
Benzo [a] anthracene		ON	QN	20
Benzo [b] fluoranthene		ON 2	ON ON	00
Benzo [K] fluoranththene				00
Benzo (g. n.) Jeryiene Renzo (al pyrene		C ZZ	QN	50
Benzyl Alcohol		ON	QN	60
Bis (2-chloroethoxy) metha	90	QN	ND	50
Bis (2-chloroethyl) ether		ON	ND	50
Bis (2-chloroisopropyl) ethe	sr.	DN	ND	50
Bis (2-ethylhexyl) phthalate	,	ÛN	Ŋ	50
4-Bromophenyl phenyl ethe		Q	QN	50
Butylbenzylphthalate		QN	<b>DN</b>	30
Carbazole		<b>GN</b>	QN	20
4-Chloroaniline		QN	ON	00
4-Chloro-3-methylphenol		Q Q		
2. Chicrochemol			CN CN	50
A Chlorophenid chemil ache		CN CN	CN CN	50
Chrysene		ON ON	CIN N	50
Dihenz [a h] anthracene			QN	50
Dihenzofiran		CIN CIN	ON N	50
Di-n-butvlohthalate		QN	QN	60
I.2-Dichlorobenzene		QN	QN	50
1,3-Díchlarobenzenc		QN	QN	50
1,4-Dichlorobenzene		DN	DN	50
3,3'-Dichlorobenzidine		NO	ŊD	125
2,4-Dichlorophenol		DN	QN	50
Diethylphthalate		DN	QN	50
2,4-Dimethylphenol		QN	QN	0.9
This report applies only to the sample	a oreamnlas investinated and	ie not necessarily indicative of the di	alth or condition of annarantly	identical or similar scottade . As a mutual protoction to allonte the public

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				14201 FRANKLIN AVENUE · TUSTIN, CALIFORNI [714] 730-6239 · FAX (714) 730-6462 · www
Cilent: Method Number:	CH2M HILL-Topock EPA 625			Project Lab. No.: 939050 Units: µg/L
		Analytical Res	ults	Page 2 of 3
Parameter		704695-MB	939050	Sample
	Sample ID:	Method Blank	CW2-375	RLS
	Sample Amount: Division Ecology	1000	200	
Dimethylphthalate	UILDULI 1 0001.	- ND	- 01	
4.6-Dinitro-2-methylpheno		QN		8
2.4-Dinitrophenol		DN	QN	125
2.4-Dinitrotoluene		ND	QN	6
2,6-Dinitrotoluene		QN	QN	50
Di-n-octylphthalate		ND	DN	50
1,2-Diphenylhydrazine		QN	QN	50
Fluoranthene		QN	QN	50
Fluorenc		QN	QN	50
Hexachlorobenzene		QN	QN	50
Hexachlorobutadiene		QN	QN	20 20
Hexachlorocyclopentadicn		DN	ND	50
Hexachloroethane		QN	QN	50
Indeno [1,2,3-cd] pyrene		QN	QN	50
Isophorone		QN	QN	50
2-Methylnapthalene		QN	QN	50
2-Methylphenol		QN	QN	20
4-Methylphenol		QN	GN	
Naphthalene		QN	CN	
Z-Nitroaniline		QN	QN	
3-Nitroaniline		QN	QN	125
4-Nitroaniline		ND	dN	125
Nitrobenzene		QN	QN	50
2-Nitrophenol		QN	QN	50
4-Nitrophenol		QN	ND	125
N-Nitrosodimethylamine		QN	QN	50
N-Nitrosodiphenylamine		DN	DN	50
N-Nitroso-di-n-propylamin		DN	QN	50
Pentachlorophenol		ON	QN	125
Phenanthrene		QN	QN	50
Phenol		QN	QN	50
Pyrenc		ON	QN	50
1,2,4-Trichlorobenzene		QN	QN	50
2,4,5-Trichlorophenol		QN	QN	50
2,4,6-Trichlorophenol		ND	QN	50
	timit of detection.		, I	Dar Jack

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ND: Not detected or below Jimit of detection.

RL: Reporting flmit, or least amount of analyte quantifiable based on

Analytical Services, Truesdail Laboratories, Inc. Julia Nayberg, Project Manager 17000 341

average sample size used and analytical technique employed.

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Lab. No.: 704695 Lab. No.: 939050
oor Date: January 26, 2005 Ing Date: January 22, 2005 Ing Date: January 25, 2005 sis Date: January 26, 2005 Units: μg/L Matrix: Water
Page 1 of 1
Allowable
Percent -
Kecovery (%)
25-114
27-128
33-128
15-133
10-129
24-117
55-123
24-137
- 27 e

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**TRUESDAIL LABORATORIES, INC.** 

INDEPENDENT TESTING, FORENSIC SCIENCE, AND ENVIRONMENTAL ANALYSES I

Established 1931	14201 FRANKLIN AVENUE · TUSTIN, CALIFORNIA 92780-7008 (714) 730-6239 · FAX (714) 730-6462 · www.tubedail.com	QC Lab. No.: 704895 Project Lab. No.: 939050 Spiked Sample ID: N/A	Report Date: January 28, 2005	Sampiling Date: January 22, 2005	Receiving Date: January 25, 2005	Analysis Date: January 26, 2005	Units: µg/L
ES		REPORT					
RENSIC SCIENCE, AND ENVIRONMENTAL ANALYS		CH2M HILL-Yopock 165 Grand Ave., Sulte 1000 Oaktand, CA 94612		Paul Bertucc1	Ground Water/1 Sample	320661.TP.70,30.02	601799
VDENT TESTING, FO		Client:		Client Contact:	Sample:	Project Number:	P.O. Number:

# Quality Control/Quality Assurance Calibration Report

Semi-Volatile Organic Compounds

EPA 625

Method Number: Investigation:

1 81

Sampler DIlution Factor:

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2	
느	1
2	

MRCCS						MRCVS					
Parameter	Measured	Theoretical	Percent	Accuracy	Flag	Parameter	Measured	Theoretical	Percent	Accuracy	Flag
	Value	Value	Recovery	Control Limits			Value	Value	Recovery	Control Limits	
2-Chlerophenol	50.0	50.0	6.66	75-125	PASS	2-Chlorophenol	50.7	50.0	101	75-125	PASS
1,4-Dichlorobenzenc	43.7	50.0	87.3	75-125	PASS	I,4-Dichlorobenzene	49.3	50.0	98.7	75-125	PASS
N-Nitroso-di-n-propylamine	52.5	50.0	105	75-125	PASS	N-Nitroso-di-n-propylamine	55.8	50.0	112	75-125	PASS
1,2,4-Trichlorobenzene	49.4	50,0	98.8	75-125	PASS	1,2,4-Trichlorobenzens	48.4	50.0	96,8	75-125	PASS
4-Chloro-3-methylphenol	53.4	50.0	107	75-125	PASS	4-Chloro-3-methylphenol	52.5	50.0	105	75-125	PASS
Accnapthene	51.4	50.0	103	75-125	PASS	Accnapthene	51.3	50.0	103	75-125	PASS
2,4-Dinitrotoluene	55.7	50.0	111	75-125	PASS	2,4-Dinitrotoluene	54.2	50.0	108	75-125	PASS
Pyrene	41.9	50.0	83.9	75-125	PASS	Pyrene	45.1	50.0	90.2	75-125	PASS

## Quality Control/Quality Assurance Spikes Report

	Spike		Rocovered		Perci	ant			Preciálo	n & Accuracy
Parameter	Conc.		Concentration		Recov	Via'	RPD	Flag	Cont	rol Limits
	ng/L	LCS	rcsd	MB	rcs	LCSD	%		%RPD	% Recovery
2-Chlorophenol	150	95.8	100	0.0	63,8	66.5	4,1	PASS	20	49-98
1,4-Dichlorobenzene	100	64.0	70.1	0.0	<b>64.0</b>	70.1	9.1	PASS	17	46-90
N-Nitroso-di-n-propylamine	100	65.8	69.6	0.0	65.8	69.69	5.6	PASS	24	48-108
1,2,4-Trictulorobenzene	100	67.1	69.0	0.0	67.1	69.0	2.7	PASS	15	48-85
4-Chlore-3-methylphenol	150	113	117	0.0	75.3	78.2	3.8	PASS	13	70-130
Acenapthene	100	70.8	74.2	0.0	70.8	74.2	4.B	PASS	15	57-95
2,4-Dinitrotoluene	100	73.1	78.6	0.0	73.1	78.6	7.2	PASS	9.0	70-92
Pyrens	100	74.3	82.3	0.0	74.3	82.3	10.2	PASS	19	70-130

MRCCS: Mid Range Calibration Check Standard (second source) MRCVS: Mid Range Celibration Verification Standard

LCS: Laboratory Control Spike

%RPD: Relative Percent Difference

Flag: "Pass" if within Control Limits; otherwise "Fail"

D= Detectod; result must be greater then zero.

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Julia Nayberg, Project Managér Analytical Services, Truesdail Laborátories, Inc.

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Cllent:	CH2MHIII-Topock 155 Grand Ave., Sulte 1000	REPORT		14201 FRANKLIN AVENUE - TUSTIN, CALIFORNIA 92780-7008 (714) 730-6239 - FAX (714) 730-6462 - www.truesdeil.com
	Oakland, CA 94612		QC Lab. No.: Project Lab. No.:	704699 839050
Client Contact: Sample: Project Name:	Paul Bertuccl Soli/2 Samples 320661,TP.70.30.02		Report Date: Sampling Date: Receiving Date:	January 28, 2005 January 22, 2005 January 25, 2005
Run Batch Number: Run Batch Number:	8260B 050127		Natrix: Value Units: Units: Matrix:	mg/kg Soll
Investigation:	Volatile Organic Compounds Al	nalytical Results	Sampler:	N/A Page 1 of 2
Parameter	704699-MB	B38050-1	939050-2	Sample
San	nple ID: Method Blank	CW2-380	CW2-385	RLs
Dilution	Factor. 0,10	0.10	0.10	
Acetone	QN	DN	DN	1,00
Acrolein	Q	QN	DN	2,00
AcrylonItrile	QN	QN	QN	1.00
tert-Amyl Methyl Ether	QN	Ŋ	QN	0.50
Benzene	ON	DN	ON	0.20
Bromobenzene	DN	DN	QN	0.20
Bromochloromethane	QN	QN	DN	0.20
Bromodichloromethane	QN	QN	Q	0.20
Bromoform	Q	QN	ON .	0,20
Bromomethane	ON	CIN I	DN .	0.20
tert-Butano!	QN	QN	ON	5.00
2-Bulanone	QN	QN	QN	1.00
n-Bulylbenzene	QN	QN	QN	0.20
sec-Butylbenzene	Ŋ	QN	Q	0.20
tert-Butylbenzene	QN	DN	QN	0.20
tert-Butyi Ethyl Ether	ND	ND	DN	0.50
tert-Butyl Methyl Ether	DN	ND	ND	0.50
Carbon Tetrachloride	DN	DN	ND	0.20
Chlorobenzene	ND	QN	QN	0.20
Chloroethane	QN	Q	QN	0.50
Chloroform	QN	DN	QN	0.20
Chloromethane	QN	QN	Q	0.60
2-Chlarotoluene	DN	DN	QN	0.20
4-Chlorotoluene	DN	DN	QN	0.20
Dibromochloromethane	QN	DN	QN	0.20
1,2-Dibromo-3-Chloropro	pane ND	ND	DN	0.50
1,2-Dibromoethane	ND	DN	ND	0.20
Dibromomethane	ND	QN	DN	0.20
1,2-Dichlorobenzene	QN	QN	Q	0.20
1,3-Dichlorobenzene	Q	QN	QN	0.20
1,4-Dichlorobenzene	Q	QN	Q	0.20
Dichlorodifluoromethane	QN	ON	Q	0.50
1,1-Dichloroethane	Q	2	Q	0.20
1,2-Dichloroethane	QN	QN	QN	0.20
1,1-Dichloroethene	DN	02	ON	0.20

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TRUESDAIL LABORATORIES, INC.

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CH2MHill-Topock Paul Bertuccl Client: Client Contact:

Report Continued

QC Lab. No.: 704699 Project Lab. No.: 939050

	Analytical R	esults		Page 2 of 2
Parameter	704699-MB	939050+1	939050-2	Sample
Sample (D:	Method Blank	CW2-380	CW2-385	RLS
Dilution Factor.	0.10	0.10	0.10	
trans-1,2-Dichloroethene	QN	<b>GN</b>	DN	0.20
),2-Dichloropropane	QN	QN	ND	0.20
1,3-Dichoropropane	QN	QN	ND	0.20
2.2-Díchloropropane	QN	QN	DN	0.20
1,1-Dichloropropene	QN	QN	ND	0.20
cis-1,3-Dichlaropropene	QN	QN	QN	0.20
trans-1,3-Dichloropropene	QN	QN	ND	0.20
Diisopropyl Ether	QN	QN	ND	0.50
Bthylbenzene	QN	QN	QN	0.20
Hexachlorobutadiene	QN	QN	ND	0.20
2-Hexanone	QN	QN	QN	1.00
Isopropylbenzene	QN	QN	QN	0.20
4-Isopropyltoluene	DN	QN	DN	0.20
4-Methyl-2-Pentanone	QN	QN	QN	1.00
Methylene Chloride	QN	ND	QN	0.20
Naphthalene	QN	QN	DN	0.20
n-Propylbenzene	QN	QN	ON	0.20
Styrene	QN	QN	QN	0.20
1.1.1.2-Tetrachlorocthane	QN	QN	DN	0.20
1,1,2,2-Tetrachloroethane	QN	QN	QN	0,20
Tetrachlorocthene	QN	ND	ON	0.20
Tolucne	QN	DN	QN	0.20
1.2.3-Trichlorobenzene	QN	QN	ND	0.20
1.2.4-Trichlorobenzenc	ON	ND	QN	0.20
1.1.1-Trichloroethane	QN	QN	QN	0.20
1.1.2-Trichloroethane	QN	QN	QN	0.20
Trichloroethene	QN	ND	QN	0.20
Trichlorofluoromethane	QN	DN	DN	0.50
1,1,2-Trichlorothiluoroethane	QN	QN	DN	0.50
1,2,3-Trichloropropane	QN	DN	ON	0.20
1,2,4-Thimethylbenzenc	QN	QN	DN	0.20
1,3,5-Trimethylbenzene	QN	QN	DN	0.20
Vinyl Chloride	QN	QN	QN	0.50
m,p-Xylene	QN	QN	QN	0,40
o-Xylene	QN	DN	DN	0.20
SC		Surrogate % Recovery		APR
1,2-Dichloroethane-d4 50	95.7%	92.5%	88.2%	69-131
Toluene-d8 50	96.8%	95.1%	%6.99%	82-116
Bromofluorobenzene 50	85.7%	106%	112%	70-133

ND; Not detected or below limit of detection.

RL: Reporting limit, ar least amount of analyte quantifiable based on average sample size used and analylical technique employed. APR. Allowable Percent Recovery

SC: Spike Concentration

the nay he Julia Nayberg , Project Manager د مربر

Analytical Services, Truesdall Laboratories, Inc.

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INDEPENDENT TESTING, FORENSIC SCIENCE, AND ENVIRONMENTAL ANALYSES

Established 1931	14201 FRANKLIN AVENUE - TUSTIN, CALIFORNIA 92780-7008 (714) 730-6239 - FAX (714) 730-6462 - www.tuesdail.com		QC Lab. No.: 704699	Project Lab. No.: 939050	Spiked Sample: N/A	Report Date: January 28, 2005	Sampling Date: Jenuary 22, 2005	Receiving Date: January 25, 2005	Analysis Date: January 27, 2005	Units: µg/L	Dilution Factor: 1	Reported BV: PN
		REPORT										
L ANALYSES		CH2MHill-Topock 155 Grand Ave Suite 1000	Oakland, CA 94612		Paul Bertucci	Solv2 Samples	320661_TP.70.30.02	8017991	8260B	050127	Volatile Organic Compounds	•
SCIENCE, AND ENVIRONMENTA		Cllent:			Client Contact:	Sample:	Project Name:	P.O. Number:	Method Number:	Run Batch No.:	Investigation:	I

### Quality Control/Quality Assurance Report

MRCCS						MRCVS				
Parameter	Measured 1	Theoretica	Percent	Accuracy	Flag	Measured <b>T</b>	heoretica	Percent	Accuracy	Flag
	Value	Value	Recovery	Control Limits	5	Value	Value	Recovery	Control Limits	
1, 1-Dichloroethene	18.1	20	90.4	75-125	PASS	53.8	50	108	75-125	PASS
Benzene	19.1	20	95.7	75-125	PASS	60.1	20	120	75-125	PASS
Trichloroethene	21.2	20	106	75-125	PASS	59,5	50	119	75-125	PASS
Toluene	19.8	20	99.1	75-125	PASS	55,1	50	110	75-125	PASS
Chlorobenzene	19.3	20	96.5	75-125	PASS	52.0	50	104	75-125	PASS

### Laboratory Control Spike (Duplicate)

	Spike	œ	ecovered		Pe	rcent			Precisio	1 & L	Accu	racy
Parameter	Conc.	CO	ncentration		Rec	sovery	RPD	Flag	Cont	trolL	Ĩ	10
	ug/L	LCS	LCSD	MB	rcs	rcsp	%		%RPD	% R	eco	/ery
1,1-Dichloroethene	25	20.1	18.9	0.0	80.3	75.5	6.11	PASS	20.2	70	•	123
Benzene	25	25.2	30.2	0.0	101	121	18.1	PASS	19.5	83	•	124
Trichloroethene	25	24.7	24.9	0.0	98.6	99.4	0.77	PASS	17.6	70	•	133
Toluenc	25	27.0	30.3	0.0	108	121	11.5	PASS	16.2	84	•	126
Chlorobenzene	25	24.9	24.7	0.0	99.5	98.7	0.81	PASS	18.0	80	•	126

MRCCS: Mid Range Calibration Check Standard (second source) MRCVS: Mid Range Calibration Verification Standard %RPD: Relative Percent Difference LCS: Laboratory Control Spike MS: Matrix Spike

Flag: "Pass" If within Control Umits; otherwise "Fail"

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Julia Nayberg , Project Managar Analytical Services, Truesdall Laboratorles, Inc.

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from these laboratories.

Clinic         Clinic <thclin< th="">         Clini         Clini</thclin<>	TRUESDAIL LABO INDEPENDENT TESTING, FORENSIC SCI	RATORIES, INC. IENCE, AND ENVIRONMENTAL ANALYS	SES			Established 1931
International production of the second productio	Client:	CH2M HILL-Topock 155 Grand Ave., Sufte 1000 Oakland, CA 94612	RE	PORT	14201 FRA (714) 730	NKLIN AVENUE - TUSTIN, CALIFORNIA 92780-7008 -6239 - FAX (714) 730-6462 - www.truesdail.com
Tandling	Client Contact: Sample: Project Number: P.O. Number: Method Number: Investigation:	Paul Bertuccl Solt/2 Samples 320661.TP.70.30.02 801799 EPA 8270C Serri-Volstille Organic Compounds			QC Lab. No.: Project Lab. No.: Report Date: Sampling Date: Recelving Date: Analysis Date: Units:	704714 939050 February 3, 2005 January 22, 2005 February 2, 2005 February 2, 2005 πog/kg
Transfer         Total         200604         200604         200604         Sample           Sample         Sample         Sample         040,348         040,348         Kample           Total Pacter         1         1         1         1         1           Total Pacter         1         1         1         1         1           Total Pacter         10         00         00         00         00         00           Annuality         Name         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00	,		Analvtical Res	ults	Sampled By:	BT Page 1 of 3
Outlow Freed         1         1         1           Attending         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0	Parameter	Sample ID: Samola Amount (o):	704714-MB Method Blank 30.1	939050-1 CW-2-380 30.2	939050-2 CW-2-385 30.7	Sample RLs
Antiologiese         ND		Dilution Factor.		1.1		
Accombinition         ND	Acenapthene		DN	ND	QN	0.33
Antifacente         NO	Accnaphthylene		R	QN	QN	0.33
Restance         NO         <	Anthracene		QN	QN		0.33
Beno (b)         NO         <	Benzidine					0,83
Bears D I Internetiene         NO         NO         NO         NO         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O         O </td <td>Benzo (a) onthracene</td> <td></td> <td></td> <td>Q</td> <td>DN N</td> <td>0.33</td>	Benzo (a) onthracene			Q	DN N	0.33
Bezze IA (Incernitulenee         ND         ND         ND         ND         033           Bezze IA/Incernitulenee         ND         ND         ND         ND         033           Bezze IA/LorentyDertene         ND         ND         ND         ND         033           Bezze IA/LorentyDertene         ND         ND         ND         ND         033           Bezze IA/LorentyDertene         ND         ND         ND         ND         033           Bezze IA/LorentyD (Intertene         ND         ND         ND         033           Bis (2-chlorenting) entere         ND         ND         ND         033           Bis (2-chlorenting) entere         ND         ND         ND         033           Bis (2-chlorenting) entere         ND         ND         ND         033           Contracte         ND         ND         ND         033           Dertexet         ND         ND         ND         033           Contracte         ND         ND         ND         033           Dertexet         ND         ND         ND         033           Contracte         ND         ND         ND         033           Contre	Benzo (b) fluoranthene		QN	UN I	Q	0.33
Barers (g/s) (per/enter         ND	Benzo [k] fluoranththene		QN	ND	QN	0.33
Barry Algoint         ND         ND         ND         ND         0.03           Barry Algoint alter         ND         ND         ND         ND         0.03           Contrough Allower Algoint alter         ND         ND         ND         0.03         0.03           Contrough Allower All	Benzo [g,h,ì] perylene		ND	ND	QN	0,33
Barryl Alcohol         ND         ND         ND         ND         0.83           Bit (2-th)ronsieprogy) etter         ND         ND         ND         0.33           Bit (2-th)ronsieprogy         ND         ND         ND         0.33           Chorealline         ND <td>Benzo [a] pyrene</td> <td></td> <td>DN</td> <td>ND</td> <td>QN</td> <td>0.33</td>	Benzo [a] pyrene		DN	ND	QN	0.33
Big (2-billoredyther) methane         ND         ND         ND         ND         0.33           Big (2-billoredyther)         ND         ND         ND         0.33           Big (2-billoredyther)         ND         ND         ND         0.33           Eurobecke         ND         ND         ND         0.33           Cubroxybither         ND         ND         ND         0.33           Crobroxybithere	Benzyl Alcohol		QN	QN	9	0.33
Bit (2-chlorectry/) other         ND         ND         ND         ND         ND         0.33           Bis (2-chlorectry/) phthate         ND         ND         ND         ND         0.33           Bis (2-chlorectry/) phthate         ND         ND         ND         0.33           Carbozole         ND         ND         ND         0.33           Carbozole         ND         ND         ND         0.33           Carbozole         ND         ND         ND         0.33           Chlorecapithaten         ND         ND         ND         0.33           Chrysten	Bis (2-chloroethoxy) metha	ane	<u>GN</u>	QN		0.33
Bits         Carbonenerseption         ND         ND <td>Bis (2-chlorocthyl) ether</td> <td></td> <td>Q</td> <td>9</td> <td></td> <td>0.33</td>	Bis (2-chlorocthyl) ether		Q	9		0.33
Per Comparison         No	Eis (2-chloroisopropyi) eth	let				0.33
Targebreit         Barberstyphend         ND         ND<	A Borneshand shared athe			ON ON		0.33
Carbacole         ND         ND         ND         ND         0.33           4.Chloroaniline         ND         ND         ND         0.33           4.Chloroaniline         ND         ND         ND         0.33           4.Chloroaniline         ND         ND         ND         0.33           2.Chloroaphtalene         ND         ND         ND         0.33           2.Chloroaphtanyl phenyl ether         ND         ND         0.33         0.33           2.Chloroaphtangt         ND         ND         ND         0.33         0.33           Discould         ND         ND         ND         0.33         0.33           Discholoberizatine	Rutvihenzvinhthalate	2	2 Q	2	e Q	0.33
4-Chlorantline         ND         ND         ND         0.33           4-Chloroantline         ND         ND         ND         0.33           4-Chloroaphthatee         ND         ND         ND         0.33           2-Chloroaphthatee         ND         ND         ND         0.33           2-Chloroaphthatee         ND         ND         ND         0.33           2-Chloroaphthatee         ND         ND         ND         0.33           2-Chloroaphtee         ND         ND         ND         0.33           2-Chloroaphtee         ND         ND         ND         0.33           2-Chlorobhtenty Intervete         ND         ND         ND         0.33           Distructure         ND         ND         ND         0.33           J-Dichloroberizene <td>Carbazole</td> <td></td> <td>ND</td> <td>QN</td> <td>QN</td> <td>0.33</td>	Carbazole		ND	QN	QN	0.33
-Chloron3-trethylphenol         ND         ND         ND         03           2-Chloronaphthalene         ND         ND         ND         0.33           2-Chloronphenol         ND         ND         ND         0.33           2-Chlorophenol         ND         ND         0.33         0.33           Dibenzefarm         ND         ND         ND         0.33           Dibenzefarm         ND         ND         0.33         0.33           Dibenzefarm         ND         ND         0.33         0.33           Dibenzefarm         N	4-Chloroaniline		QN	QN	Q	0.33
2-Chloronaphtalene     ND     ND     ND     ND     0.33       2-Chlorophtaol     ND     ND     ND     ND     0.33       2-Chlorophtaol     ND     ND     ND     0.33       Chryste     ND     ND     ND     0.33       Diberzoftum     ND     ND     ND     0.33       Discroftum     ND     ND     ND     0.33       1/2-Dichloroberzzene     ND	4-Chloro-3-methylphenol		ND	ND	QN	0.33
2-Chlorophenol     ND     ND     0.33       2-Chlorophenol     ND     ND     0.33       4-Chlorophenyl phenyl ether     ND     ND     0.33       Chrysene     ND     ND     ND     0.33       Chrysene     ND     ND     ND     0.33       Dibenz [a,h] anthracene     ND     ND     0.33       Dibenz [a,h] anthracene     ND     ND     0.33       Dibenz [a,h] anthracene     ND     ND     0.33       Dibenzene     ND     ND     ND     0.33       Distributhalate     ND     ND     0.33     0.33	2-Chloronaphthalene		ND	QN	QN	0.33
4-Chlorophenyl phenyl ether         ND         ND         ND         0.33           Chrysene         ND         ND         ND         0.33           Chrysene         ND         ND         ND         0.33           Dibenz [a,h] anthracene         ND         ND         ND         0.33           Dibenzoftman         ND         ND         ND         0.33           J.3-Dichlorobenzene         ND         ND         ND         0.33           J.4-Dichlorobenzene         ND         ND         ND         0.33           J.3-Dichlorobenzene         ND         ND         ND         0.33           J.4-Dichlorobenzene         ND         ND         ND         0.33           J.4-Dichlorobenzene         ND         ND         0.33         0.33           J.4-Dichlorobenzene         ND         ND         0.33         0.33	2-Chlorophenol		QN	Q	QN	0.33
Chrystene         ND         ND         ND         0.33           Diberz [a,h] anthracene         ND         ND         ND         0.33           Diberzo furan         ND         ND         ND         0.33           Distributorberzene         ND         ND         ND         0.33           Distrithorob	4-Chlorophenyl phenyl ethe	er	ND	QN	QN	0.33
Dibenz [4,1] anthracene         ND         ND         0.33           Dibenzoftman         ND         ND         0.33           Dibenzoftman         ND         ND         0.33           Dibenzoftman         ND         ND         0.33           Disenzoftman         ND         ND         0.33           Disenzore         ND	Chrysene		QN	ND	QN	0.33
Dibenzofturan         ND         ND         0.33           Dirabutylphthalate         ND         ND         0.33	Dibenz [a,h] anthracene		ON	QN	DN	0.33
Dira-butylphthalateNDNDND0.331,2-DichloroberzeneNDNDND0.331,3-DichloroberzeneNDNDND0.331,4-DichloroberzeneNDNDND0.333,3-DichloroberzeneNDNDND0.332,4-DichloroberzeneNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND	Dibenzofurun		ON	ND	QN	. 0.33
1,2-DichlorobenzeneND0.331,3-DichlorobenzeneNDND0.331,4-DichlorobenzeneNDNDND0.333,3-DichlorobenzeneNDNDND0.333,3-DichlorobenzeneNDNDND0.332,4-DichlorophenolNDNDND0.33DichlylphthalateNDNDND0.332,5-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,4-DichlorophenolNDNDND0.332,5-DichlorophenolNDNDND0.33	Dí-n-butylphthalate		QN	QN	QN	0.33
1.3-Dichlorobenzene         ND         0.33           1.3-Dichlorobenzene         ND         0.33           1.4-Dichlorobenzene         ND         0.33           3.3-Dichlorobenzene         ND         0.33           2.4-Dichlorobenzene         ND         0.33           2.4-Dichlorobenzene         ND         0.33           2.4-Dichlorobenzene         ND         0.83           2.4-Dichlorobenzene         ND         ND         0.83           2.4-Dichlorobhenol         ND         ND         0.33           Dichtylphhalate         ND         ND         0.33           Dichtylphhalate         ND         ND         0.33	1,2-Dichlorobenzene		DN	QN	9	0.33
1.4-Dichloroberizene     NU     NU     0.33       3.3-Dichloroberizene     ND     0.83       2.4-Dichlorophenol     ND     ND     0.83       Dichtylphhalate     ND     ND     0.33       2.5-Dichlorophenol     ND     0.33     0.33	1,3-Dichlorobenzene		ON	QN		0.33
J.JDichlorobenizatine     NU     NU     NU       J.4-Dichlorophenol     ND     ND     0.03       Dichtylphhalate     ND     ND     0.33       Dichtylphhalate     ND     ND     0.33	1.4-Dichlorobenzene		מא			0,35
L-4-Unchlorophanol     NU     U     U-03       Dictry/phthalate     ND     ND     0.33       Dictry/phthalate     ND     ND     0.33	3, 3'-Dichlorobenzidine		DN.	UN G		0.83
	2,4-Dichlorophenol		UN	ON I	אַמ	0.33
	Dicthylphthalate		מא	a		0.33

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Client: Method Number:	CH2M HILL-Topock EPA 8270C			Project Lab. No.: 939050 Units: mg/kg	
		Analytical Result	S		Page 2 of 3
Parameter		704714-MB	939050-1	939050-2	Sample
	Sample IU: Sample Amount:	Method Blank	30.2	30.2	KLS
	Dilution Factor		1	1	
Dimethylphthalate		QN	DN	QN	0.33
4.6-Dinitro-2-methylphenol		QN	QN	ON	0.33
2,4-Dinitrophenol		QN	QN	QN	0.83
2,4-Dinitrotoluene		QN	QN	QN	0.33
2,6-Dinitrotoluene		QN	DN	ND	0.33
Di-n-octylphthalate		QN	QN	DN	0.33
1,2-Diphenyltydrazine		QN	QN	QN	0.33
Fluoranthene		DN	QN	ON	0.33
Fluorene		DN	QN	DN	0.33
Hexachlorobenzene		DN	GN	ND	0,33
Hexachlorobutadiene		GN	DN	ND	0.33
Hexachlorocyclopentadiene		GN	QN	ND	0.33
Hexachloroethane		DN	ND	ND	0.33
Indeno [1,2,3-cd] pyrcne		QN	ND	ND	0.33
Isophorone		QN	DN	ND	0.33
2-Methylnapthalene		DN	ND	ND	0.33
2-Methylphenol		QN	Ŋ	QN	0.33
4-Methylphenol		DN	DN	QN	0.33
Naphthalene		QN	DN	QN	0.33
2-Nitroaniline		ND	ON	ND	0.33
3-Nitroanilîne		DN	QN	DN	0.83
4-Nitroaniline		DN	QN	QN	0.83
Nitrobenzene		QN	DN	DN	0.33
2-Nitrophenol		DN	DN	DN	0.33
4-Nitrophenol		DN	DN	ND	0.83
N-Nitrosodimethylamine		GN	ND	DN	0.33
N-Nitrosodiphenylamine		ON	ND	DN	0.33
N-Nitroso-di-n-propylamine		ON	ND	DN	0.33
Pentachlorophenol		DN	ND	DN	0.83
Phenanthrene		QN	ND	DN	0.33
Phenol		DN	DN	DN	0.33
Pyrene		ON	ND	ND	0.33
1,2,4-Trichlorobenzene		DN	DN	QN	0.33
2,4,5-Trichlorop <u>henol</u>		DN	DN	QN	0.33
2,4,6-Trichlorophenol		DN	QN	QN	0.33

ND: Not detectad or below limit of detection. RL: Reporting limit, or least amount of analyte quantifiable based on

Julia Nayberg, Project Manager Dan 7024 V

This report applies the standing and analytical isoming analysis in ot necessarily indicative of the quality or condition of apparently identical. Services, Truesdall Laboratories, find a not active to clients, the public, and these laboratories, they are not apparently identical of similar products. As a mutual protection to clients, the public, and these laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from these laboratories.

Report Continued

TRUESDAIL LABORATORIES, INC.

TRUESDAIL LABORATORIES, INC.

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Report Continued

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CH2M HILL-Topock	EPA 625 Tentatively Identified
Client:	Method Number:

**Compounds and Tentative Concentrations** 

939050 mg/kg Project Lab. No.: Unlts:

	Analytical Re	esults		Page 3 of 3
Parameter	704714-MB	939050-1	939050-2	Sample
Sample ID:	Method Blank	CW-2-380	CW-2-385	RLS
Sample Amount:	30.1	30.2	30.2	
Dílution Factor:	1	-	-	
4-Hydroxy-4-Methyl-2-Pentanone	8.4	8.0	6.2	0.33
4-Methyl-3-Penten-2-one	1.8	1.3	1.1	0.33
Toluene	DN	DN	0.9	0.33

RL: Reporting timit, or least amount of analyte quantifiable based on ND: Not detected, or below limit of detection.

average sample size used and analytical technique employed.

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Julia Nayberg, Project Manager Analytical Services, Truesdali Laboratories, Inc.

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			REPORT	14201 FRANKL (714) 730-62	IN AVENUE · TUSTIN, CALIFORNIA  92780-700 39 · FAX (714) 730-6462 · www.tnesdail.co
Client:	:H2M HiLL-Topock 55 Grand Ave., Sult bakland, CA 94612	e 1000		QC Lab. No.: Project Lab. No.: Report Date:	704714 839050 February 3, 2005
Client Contact: F	'aul Bertucci Auto comoto			Sampling Date:	January 22, 2005
Protect Number: 3	20661.TP.70.30.02			Analvsis Date:	February 20, 2005
P.O. Number: 8	01799			Units:	μg/L
Method Number: E	PA 8270C			Matrix:	Water
1	Ana	lytical Results - Sur	rrogate % Recovery		Page 1 of 1
Parameter		704714-MB	939050-1	939050-2	Allowable
	Sample ID:	Method Blank	CW-2-380	CW-2-385	Percent
Sam	ple Amount:	30.1	30.2	30.2	Recovery
Dik	ution Factor:	-	÷	-	(%)
	sc				
2-Fluorophenol	150	66.6%	50.8%	42.6%	25-121
Phenol - d5	150	74.1%	54.1%	43.0%	24-113
2-Chlorophenol - d4	150	75.4%	53.7%	42.2%	20-130
1,2-Dichlorobenzene - d4	100	78.2%	58.4%	47.2%	20-130
Nitrobenzene • d5	100	74.9%	58.0%	48.B%	23-120
2-Fluorobiphenyl	100	84.3%	59.9%	50.3%	30-115
2,4,6-Tribromophenol	150	74.7%	77.3%	66.4%	19-122
Terphenyl - d14	100	93.1%	89.0%	92.8%	18-137

Analytical Services, Truesdail Laboratories, Jac

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TRUESDAIL LABORATORIES, INC.

INDEPENDENT TESTING, FORENSIC SCIENCE, AND ENVIRONMENTAL ANALYSES

155 Grand Ave., Sulte 1000 CH2M HILL-Topock Oakland, CA 94612 Cllent:

Semi-Volatile Organic Compounds 320661.TP.70.30.02 Soil/2 Samples Paul Bertucci EPA 8270C 801799 Project Number: P.O. Number: Method Number: Investigation: Client Contact: Sample:

REPORT

Project Lab. No.:

939050 704714

QC Lab. No.:

14201 FRANKLIN AVENUE · TUSTIN, CALIFORNIA 82780-7008 (714) 730-6239 · FAX (714) 730-6462 · www.turesdall.com

Established 1931

January 22, 2005 January 25, 2005 February 3, 2005 Report Date: Sampling Date:

February 2, 2005 J⁄6́d Analysis Date: Receiving Date: Unlts:

ВТ Dilution Factor:

Sampler:

# Quality Control/Quality Assurance Calibration Report

MRCCS						MRCVS					
Parameter	Measured	Theoretical	Percent	Accuracy	Flag	Parameter	Measured	Theoretical	Percent	Accuracy	Flag
	Value	Value	Recovery	Control Limits			Value	Value	Recovery	Control Limits	
2-Chlorophenol	49.6	50.0	99.2	75-125	PASS	2-Chlorophenol	48.4	50.0	96.8	75-125	PASS
1,4-Dichlorobenzene	48.3	50.0	92.6	75-125	PASS	1,4-Dichlorobenzene	49.4	50,0	98,9	75-125	PASS
N-Nitroso-di-n-propylamine	52.6	50.0	105	75-125	PASS	N-Nitroso-di-n-propylamine	52.9	50.0	106	75-125	PASS
1,2,4-Trichlorobenzene	50.7	50.0	101	75-125	PASS	1,2,4-Trichlorobenzene	50,8	50.0	102	75-125	PASS
4-Chloro-3-methylphenol	52.6	50.0	105	75-125	PASS	4-Chloro-3-methylphenol	54.3	50,0	109	76-125	PASS
Acenapthene	49.4	50.0	98.8	75-125	PASS	Accnapthene	48.8	50.0	97.5	75-125	PASS
2,4-Dinitrotoluene	54,3	50.0	109	75-125	PASS	2,4-Dinitrotoluene	56.D	50.0	112	75-125	PASS
Putrie	48.1	50.0	96.2	75-125	PASS	Purene	48.2	50.D	96.3	75-125	PASS

## Quality Control/Quality Assurance Spikes Report

	Spike		Recovered		Perci	ant			Precision	n & Accuracy
Parameter	Conc.		Concentration		Recor	(ery	RPD	Flag	Cont	rol Limits
	ng/L	rcs	LCSD	MB	SJI	LCSD	۳.		%RPD	% Recovery
2-Chlorophenol	150	103	105	0.0	68.3	70.2	2.7	PASS	16	47-88
1,4-Dichlorobenzene	100	69.5	69.1	0.0	69.5	69.1	0.6	PASS	22	40-95
N-Nitroso-di-n-propylamine	100	73,2	71.7	0.0	73,2	71.7	2.1	PASS	24	46-107
1,2,4-Trichlorobenzene	100	65,6	71.9	0.0	65.8	71.9	9.3	PASS	16	43-88
4-Chloro-3-methylphenol	150	110	122	0.0	73.3	81.0	10,0	PASS	18	45-93
Accnapthene	100	72.5	73.4	0,0	72.5	73.4	1.2	PASS	18	50-96
2,4-Dinitroto/uene	100	79.2	71.3	0.0	79.2	71.3	10.6	PASS	11	62-89
Pyrene	100	80.4	78.4	0,0	80.4	78.4	2.5	PASS	23	59-113

MRCCS: Mid Range Calibration Check Standard (second source) MRCVS: Mid Range Calibration Verlification Standard Flag: "Pass" If within Control Limits; otherwise "Fait" %RPD; Relative Percent Difference LCS: Laboratory Control Spike

D= Delected: result must be greater than zero.

Analytical Services, Truesdail Laboratories, Inc. Julia Nayberg, Project Marager Q 3

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public, and these laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from these laboratories.

### D2: VOC and SVOC Analyses for Well CW-2D Groundwater Samples

### TABLE D-3

VOC and SVOC Analytical Results, Well CW-2D, Groundwater Sampling February 23, 2005 Groundwater and Hydrogeologic Investigation Interim Measures No 3. Injection Area, PG&E Topock Compressor Station

	VOCs S	W 8260		VOCs S	SW 8260
Analyte	Result	Units	Analyte	Result	Units
CW-2D - 2/23/2005	•		CW-2D - 2/23/2005		
1,1,1,2-tetrachloroethane	ND (1.0)	µg/L	Methyl t-butyl ether (mtbe)	ND (1.0)	µg/L
1,1,1-trichloroethane	ND (1.0)	µg/L	Methylene chloride	ND (1.0)	µg/L
1,1,2,2-tetrachloroethane	ND (1.0)	µg/L	N-butylbenzene	ND (1.0)	µg/L
1,1,2-trichloroethane	ND (1.0)	µg/L	N-propylbenzene	ND (1.0)	µg/L
1,1-dichloroethane	ND (1.0)	µg/L	O-xylene	ND (1.0)	µg/L
1,1-dichloroethene	ND (1.0)	µg/L	Sec-butylbenzene	ND (1.0)	µg/L
1,2,3-trichloropropane	ND (1.0)	µg/L	Styrene	ND (1.0)	µg/L
1,2,4-trichlorobenzene	ND (1.0)	µg/L	T-butylbenzene	ND (1.0)	µg/L
1,2,4-trimethylbenzene	ND (1.0)	µg/L	Tetrachloroethene	ND (1.0)	µg/L
1,2-dibromo-3-chloropropane	ND (2.0)	µg/L	Toluene	ND (1.0)	µg/L
1,2-dibromoethane	ND (1.0)	µg/L	Total xylenes	ND (2.0)	µg/L
1,2-dichlorobenzene	ND (1.0)	µg/L	Trans-1,2-dichloroethene	ND (1.0)	µg/L
1,2-dichloroethane	ND (1.0)	µg/L	Trichloroethene	ND (1.0)	µg/L
1,2-dichloropropane	ND (1.0)	µg/L	Vinyl chloride	ND (1.0)	µg/L
1,3,5-trimethylbenzene	ND (1.0)	µg/L			
1,3-dichlorobenzene	ND (1.0)	µg/L			
1,4-dichlorobenzene	ND (1.0)	µg/L			
2-butanone	ND (10)	µg/L			
2-chlorotoluene (o-chlorotoluene)	ND (1.0)	µg/L			
Acetone	ND (10) R	µg/L			
Acrolein	ND (10) R	µg/L			
Acrylonitrile	ND (10)	µg/L			
Benzene	ND (1.0)	µg/L			
Bromobenzene	ND (1.0)	µg/L			
Bromodichloromethane	ND (1.0)	µg/L			
Bromoform	ND (1.0)	µg/L			
Bromomethane	ND (1.0)	µg/L			
Carbon disulfide	ND (1.0)	µg/L			
Carbon tetrachloride	ND (1.0)	µg/L			
Chlorobenzene	ND (1.0)	µg/L			
Chloroethane	ND (1.0)	µg/L			
Chloroform	ND (1.0)	µg/L			
Chloromethane	ND (1.0)	µg/L			
Cis-1,2-dichloroethene	ND (1.0)	µg/L			
Dibromochloromethane	ND (1.0)	µg/L			
Dichlorodifluoromethane	ND (1.0)	µg/L			
Ethylbenzene	ND (1.0)	µg/L			
Freon 113	ND (1.0)	µg/L			
Isopropylbenzene	ND (1.0)	µg/L			
M+p-xylenes	ND (1.0)	µg/L			
Methyl isobutyl ketone	ND (10)	µg/L			

Notes:

VOC volatile organic compound

SVOC semi-volatile organic compound

µg/L results in micrograms per liter

ND parameter not detected at the listed reporting limit.

R rejected data

### TABLE D-3

VOC and SVOC Analytical Results, Well CW-2D, Groundwater Sampling February 23, 2005 Groundwater and Hydrogeologic Investigation Interim Measures No 3. Injection Area, PG&E Topock Compressor Station

	SVOCs S	W 8270C		SVOCs S	W 8270C
Analyte	Result	Units	Analyte	Result	Units
CW-2D - 2/23/2005	•		CW-2D - 2/23/2005		
1,2,4-trichlorobenzene	ND (10)	µg/L	dimethyl phthalate	ND (10)	µg/L
1,2-dichlorobenzene	ND (10)	µg/L	Fluoranthene	ND (10)	µg/L
1,3-dichlorobenzene	ND (10)	µg/L	Fluorene	ND (10)	µg/L
1,4-dichlorobenzene	ND (10)	µg/L	Hexachlorobenzene	ND (10)	µg/L
2,4,5-trichlorophenol	ND (10)	µg/L	Hexachlorobutadiene	ND (10)	µg/L
2,4,6-trichlorophenol	ND (10)	µg/L	Hexachloroethane	ND (10)	µg/L
2,4-dichlorophenol	ND (10)	µg/L	Indeno(1,2,3-cd)pyrene	ND (10)	µg/L
2,4-dimethylphenol	ND (10)	µg/L	Isophorone	ND (10)	µg/L
2,4-dinitrophenol	ND (20)	µg/L	N-Nitroso-di-n-propylamine	ND (10)	µg/L
2,4-dinitrotoluene	ND (10)	µg/L	N-nitrosodiphenylamine	ND (10)	µg/L
2,6-dinitrotoluene	ND (10)	µg/L	Naphthalene	ND (10)	µg/L
2-Chloronaphthalene	ND (10)	µg/L	Nitrobenzene	ND (10)	µg/L
2-chlorophenol	ND (10)	µg/L	Pentachlorophenol/pcp	ND (20)	µg/L
2-methylnaphthalene	ND (10)	µg/L	Phenanthrene	ND (10)	µg/L
2-methylphenol	ND (10)	µg/L	Phenol	ND (10)	µg/L
2-nitroaniline	ND (10)	µg/L	Pyrene	ND (10)	µg/L
3,3'-dichlorobenzidene	ND (10)	µg/L			
3-nitroaniline	ND (10)	µg/L			
4,6-dinitro-2-methylphenol	ND (20)	µg/L			
4-chloroaniline	ND (10)	µg/L			
4-methylphenol	ND (10)	µg/L			
4-nitroaniline	ND (10)	µg/L			
4-nitrophenol	ND (20)	µg/L			
Acenaphthene	ND (10)	µg/L			
Acenaphthylene	ND (10)	µg/L			
Anthracene	ND (10)	µg/L			
Benzo(a)anthracene	ND (10)	µg/L			
Benzo(a)pyrene	ND (10)	µg/L			
Benzo(b)fluoranthene	ND (10)	µg/L			
Benzo(ghi)perylene	ND (10)	µg/L			
Benzo(k)fluoranthene	ND (10)	µg/L			
Bis (2-ethylhexyl) phthalate	ND (10)	µg/L			
Bis(2-chloroethyl)ether	ND (10)	µg/L			
Bis(2-chloroisopropyl)ether	ND (10)	µg/L			
Butyl benzyl phthalate	ND (10)	µg/L			
Chrysene	ND (10)	µg/L			
Di-N-butyl phthalate	ND (10)	µg/L			
Di-N-octyl phthalate	ND (10)	µg/L			
Dibenzo(a,h)anthracene	ND (10)	µg/L			
dibenzofuran	ND (10)	µg/L			
diethyl phthalate	ND (10)	µg/L	1		

### Notes:

VOC volatile organic compound

SVOC semi-volatile organic compound

µg/L results in micrograms per liter

ND parameter not detected at the listed reporting limit.

R rejected data

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CLIENT CHZMHIN				X	ATRIX CO	DE	CODE			NALYS		E BER		F	AT
MOIET TOPOCK PGIE GI	ЧP			DW-Dri	king Water	<u> </u>	= lor	9 		<u>م</u> د,	2 V 9920			Rush hrs.	
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econ as practical (but hat prior to faileen (1.2) carendar cares) aftar usuuance or. clients expense mileus directed to writing otherwise.	אווע אסקשו נבספענבסב	३४ ३. व्यं विकास्तव ।	ample dispon	schodule u	pro-arranged v	HIN EMAX.	Disposal fee for J	tamples oc	n ve by c	A TRUK ZZ	se nos-hés	ndour under	1 be \$2.00	er ample. EMAX will relate notar	מווג אמייף ופג גם לאפ בוומות אן לאפ

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### SW 5030B/8260B VOLATILE ORGANICS BY GC/MS

***********			
Client :	CH2M HILL	Date Collected:	02/23/05
Project :	PGLE'S TOPOCK GAS COMPRESSOR STA	T Date Received:	02/24/05
Batch No. :	058167	Date Extracted:	03/01/05 13:36
Sample ID:	CW-02D-002	Date Analyzed:	03/01/05 13:36
Lab Samp ID:	B167-02	Dilution Factor:	1
Lab File ID:	RBC808	Matríx :	WATER
Ext Btch ID:	V067B67	% Moisture :	NA
Calib. Ref.:	RBC509	Instrument ID :	T-067
**********		323 <b>225232222222</b>	

	RESULTS	RL	MOL
PARAMETERS	(ug/L)	(ug/L)	(ug/L)
1.1.2.TETRACHLOROETHANE	ND .		.2
1,1,1-TRICHLOROETHANE	ND	1	.2
1,1,2,2-TETRACHLOROETHANE	ND	1	.2
1.1.2-TRICHLOROETHANE	ND	1	. 2
1,1-DICHLOROETHANE	ND	1	. 2
1.1-DICHLOROETHENE	ND	1	.2
1,2,3-TRICHLOROPROPANE	ND	1	.5
1.2.4-TRICHLOROBENZENE	ND	1	.2
1.2.4-TRIMETHYLBENZENE	ND	1	· .2
1.2-DIBROMO-3-CHLOROPROPANE	ND	2	. 5
1,2-DICHLOROBENZENE	ND	1	.2
1.2-DICHLOROETHANE	ND	1	.2
1,2-DICHLOROPROPANE	ND	1	.2
1,2-ETHYLENEDIBROMIDE	ND	1	.2
1,3,5-TRIMETHYLBENZENE	ND	1	. 2
1, 3-DICHLOROBENZENE	ND	1	. 2
1,4-DICHLOROBENZENE	ND	1	. 2
2-CHLOROTOLUENE	ND	1	.2
BENZENE	ND	1	.2
BROMOBENZENE	ND	1	.2
BROMODICHLOROMETHANE	ND	1	. 2
BROMOFORM	ND	1	.3
BROMOMETHANE	ND	1	.2
CARBON TETRACHLORIDE	ND	1	.2
CHLOROBENZENE	ND	1	.2
CHLOROETHANE	ND	1	. 2
CHLOROFORM	ND	1	. 2
CHLOROMETHANE	ND	1	. 2
CIS-1,2-DICHLOROETHENE	ND	1	. 2
DIBROMOCHLOROMETHANE	ND	1	. 2
DICHLORODIFLUOROMETHANE	ND	1	، 3
ETHYLBENZENE	ND	1	. 2
ISOPROPYL BENZENE	ND	1	. 2
M/P-XYLENES	ND	1	. 5
METHYLENE CHLORIDE	ND	1	.5
N-BUTYLBENZENE	ND	1	. 2
N-PROPYLBENZENE	ND	1	. 2
O-XYLENE	ND	1	. 2
SEC-BUTYLBENZENE	ND	1	. 2
STYRENE	ND	1	. 2
TERT-BUTYLBENZENE	ND	1	. 2
TETRACHLOROETHYLENE	ND	1	. 2
TOLUENE	ND	1	- 2
TRANS-1, 2-DICHLOROETHENE	ND	1	.2
TRICHLOROETHENE	ND	1	. 2
VINYL CHLORIDE	ND	1	. 2
ACETONE	ND	10	5
2-BUTANONE	ND	10	5
MTBE	ND	1	. 2
112TRICHLORO122TRIFLUOROETHANE	ND	1	. 2
4-METHYL-2-PENTANONE	ND	10	5
ACROLEIN	ND	10	5
ACRYLONITRILE	ND	10	5
CARBON DISULFIDE	ND	1	.2
XYLENES TOTAL	ND	2	.7
SURROGATE PARAMETERS	RECOVERY	QC LIMIT	
1.2-DICHLOROFTHANE-D4	101	63-143	
4-BROMOFLIJOROBENZENE	98	63-143	
TOLUENB-D8	104	63-143	
	704	474 474	

RL: Reporting Limit

### SW 50308/82608 Volatile organics by GC/MS

Client :	CH2M HILL	Date Collected:	NA
Project :	PG&E'S TOPOCK GAS COMPRESSOR STAT	Date Received:	03/01/05
Batch No. :	05B167	Date Extracted:	03/01/05 05:42
Sample ID:	MBLK1W	Date Analyzed:	03/01/05 05:42
Lab Samp ID:	V067B67B	Dilution Factor:	1
Lab File ID:	RBC795	Matrix :	WATER
Ext Btch ID:	V067B67	<pre>% Moisture :</pre>	NA
Calib. Ref.:	RBC509	Instrument ID :	<b>T-067</b>
		**********************	********

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	RESULTS	RL	MDL
PARAMETERS	(Ug/L)	(ug/L)	(ug/L)
	مريد الله	1	
	ATD	1	. 2
1 1 2.2-TETRACHLOROETHANE	ND	1	
	ND	î	. 2
1,1-DICHLOROETHANE		î	.2
1 1-DICHLOROFTHEME	ND	1	.2
1 2 3-TRICHLOROPROPANE	ND	1	
1.2 A-TRICHLOROBENZENE	ND	1	.5
1,2,4-TRIMETHYLBENZENE	ND	1	.2
1.2-DTBROMO-3-CHLOROPROPANE	ND	2	.5
1.2-DICHLOROBENZENE	ND	1	.2
1.2-DICHLOROETHANE	ND	ĩ	.2
1.2-DICHLOROPROPANE	ND	1	.2
1.2-ETHYLENEDIBROMIDE	ND	1	.2
1.3.5-TRIMETHYLBENZENE	ND	1	.2
1,3-DICHLOROBENZENE	ND	1	. 2
1,4-DICHLOROBENZENE	ND	ī	.2
2-CHLOROTOLUENE	ND	1	. 2
BENZENE	ND	1	. 2
BROMÓBENZENE	ND	1	. 2
BROMODICHLOROMETHANE	ND	1	. 2
BROMOFORM	ND	1	.3
BROMOMETHANE	ND	1	. 2
CARBON TETRACHLORIDE	ND	1	. 2
CHLOROBENZENE	ND	1	. 2
CHLOROETHANE	ND	1	.2
CHLOROFORM	ND	1	.2
CHLOROMETHANE	ND	ī	.2
CIS-1, 2-DICHLOROETHENE	ND	1	.2
DIBROMOCHLOROMETHANE	ND	1	. 2
DICHLORODIFLUOROMETHANE	ND	1	.3
ETHYLBENZENE	ND	1	. 2
ISOPROPYL BENZENE	ND	1	.2
M/P-XYLENES	ND	1	.5
METHYLENE CHLORIDE	ND	1	ء 2
N-BUTYLBENZENE	ND	1	.2
N-PROPYLBENZENE	ND	1	. 2
O-XYLENE	ND	1	. 2
SEC-BUTYLBENZENE	ND	1	.2
STYRENE	ND	1	. 2
TERT-BUTYLBENZENE	ND	1	.2
TETRACHLOROETHYLENE	ND	1	. 2
TOLUENE	ND	1	. 2
TRANS-1,2-DICHLOROETHENE	ND	1	. 2
TRICHLOROETHENE	ND	1	. 2
VINYL CHLORIDE	ND	1	. 2
ACETONE	ND	10	5
2-BUTANONE	ND	10	5
MTBE	ND	1	. 2
112TRICHLORO122TRIPLUOROETHANE	ND	1	. 2
4-methyl-2-pentanone	ND	10	5
ACROLEIN	ND	10	5
ACRYLONITRILE	ND	10	S
CARBON DISULFIDE	ND	1	. 2
XYLENES TOTAL	ND	2	.7
SURROGATE PARAMETERS	& RECOVERY	QC LIMIT	
1,2-DICHLOROETHANE-D4	103	63-143	
4-BROMOPLUOROBENZENE	98	63-143	
TOLUENE-D8	103	63-143	

RL: Reporting Limit

### EMAX QUALITY CONTROL DATA LCS/LCD ANALYSIS

CLIENT: PROJECT: BATCH NO.: METHOD:	CH2M HILL PG&B'S TOPOCK 05B167 SW 5030B/82601	GAS COMPRES	SOR STAT								
MATRIX: DILUTION FACTOR: CAMPIE TD.	WATER 1 Mey vig	<del>, , ,</del>	4		TOM &	STURE :	MA				
CALLES SAMP ID: LAB SAMP ID: LAB FILE ID: DATE EXTRACTED: DATE ANALYZED: PREP. BATCH: CALIB. REF:	V0678678 R8C795 03/01/0505:42 03/01/0505:42 V067867 R8C509	V067B67L RBC792 03/01/0503 03/01/0503 03/01/0503 V067B67 RBC509	V067 RBC7 8.52 03/0 1:52 03/0 8.52 03/0 RBC5	867C 93 1/0504:29 1/0504:29 867 09	DATE	COLLECTED: RECEIVED:	NA 03/01/05				
ACCRSSION:											
PARAMETER	a :	(ug/L)	spike AMT (ug/L)	רזא SE נעק/נט)	A REC	SPIKE AMT (ug/L)	BSD RSI (ug/L)	T BSD	крр ( \$ )	QC LIMIT ( % )	MAX RPD ( % )
1,1-Dichloroethe	ne	QN	10	10.	2 102	10	10.	5 10	m	60-130	30
Benzene		Q .	10		0 100	01	10.	301	~ ~ ~	70-130	00
Toluene		R R	10	,	100	01	10.	10		70-130	200
Trichloroethene		Ð	10	10.	4 104	10	10.	8 10	8	70-130	30
13 14 14 14 14 14 14 14 14 14 14 14 14 14	10 13 14 14 14 14 14 14 14 14 14 14	13 13 13 14 14 14 14 14 14 14 14			8788222222				0 4 1 1 4 4 4 1 1 1 1 1 1 1 1	5 # 9 6 9 8 9 6 9 6 9 6 9 6 9 6 9 6 9 6 9 6	
SURROGATE PARAME	S) TER	PIKE AMT E (ug/L)	TLST SE (UG/L)	BS REC	SPIKE AMT (ug/L)	BSD RSLT (ug/L)	BSD & REC	OC LIMIT			
1,2-Dichloroethau 4-Bromofluorohen	ne-d4 zene	01	10.4 8.0	104	10	10.6 8.9	106	70-130			
Toluene-d8		9	10.4	104	10	66.6	100	70-130			

SW 3520C/	8270C		
SEMI VOLATILB ORGA	NICS BY GC/	MS	
Client : CH2M HILL	Date	Collected:	02/23/05
Project : PG&E'S TOPOCK GAS COMPRESSOR	STAT Date	Received:	02/24/05
Batch No. : 05B167	Date	Extracted:	02/28/05 16:00
Sample ID: CW-02D-002	Date	Analyzed:	03/02/05 18:18
Lab Samp ID: B167-02	Diluc	ion Factor:	1.02
Lab File ID: RCZ051	Matri:	x :	WATER
Ext Btch ID: SVB031W	8 MOL	sture :	NA M 048
	18511 	anent ID :	
	RESULTS	RL	MDL
PARAMETERS	(ug/L)	(ug/L)	(ug/L)
1, 2, 4-TRICHLOROBENZENE		10	5.1
1 3-DICHLORÓBENZENE	ND ND	10	3.L 5 1
1 A-DICHLOROBENZENE	NT	10	51
2,4,5-TRICHLOROPHENOL	ND	10	5.1
2,4,5-TRICHLOROPHENOL	ND	10	5.1
2,4-DICHLOROPHENOL	ND	10	5.1
2,4-DIMETHYLPHENOL	ND	10	5.1
2,4-DINITROPHENOL	ND	20	5.1
2, 4-DINITROTOLUENE	DN	10	5.1
2,6-DINITROTOLUENE	ND	10	5.1
2-CHLORONAPHTHALENE	ND	10	5.1
2-CHLOROPHENOL	ND	10	5.1
2-METHYLNAPHTHALENE	ND	10	5.1
2-METHYLPHENOL	ND	10	5.1
	ND	10	5.1
3_NITEONNILINE		10	5.1
A = 6 - DINITE 0 - 2 - METRYLERENOL	ND	20	5.1
4-CHLOROANTLINE	ND	10	5.1
4-METHYLPHENOL (1)	ND	10	5.1
4-NITROANILINE	ND	10	5.1
4-NITROPHENOL	ND	20	5.1
ACENAPHTHENE	ND	10	5.1
ACENAPHTHYLENE	ND	10	5.1
ANTHRACENE	ND	10	5.1
BENZO (A) ANTHRACENE	ND	10	5.1
BENZO(A) PYRENE	ND	10	5.1
BENZO (B) FUORANTHENE BENZO (K) BI FOR NYIVENE	ND	10	5.1
BENZO(R) F LUORAN I HENEBENZO(C H T) DERVIENE		10	5.1
BIS (2-CHLOROFTHYL) FTHRR	ND	10	5 1
BIS (2 - CHLOROI SOPROPYL) ETHER	ND	10	5.1
BIS (2-ETHYLHEXYL) PHTHALATE	ND	10	5.1
BUTYLBENZYLPHTHALATE	ND	10	5.1
CHRYSENE	ND	10	5.1
DI-N-BUTYLPHTHALATE	ND	10	5.1
DI-N-OCTYLPHTHALATE	ND	10	5.1
DIBENZO (A, H) ANTHRACENE	ND	10	5.1
DIBENZOFURAN	ND	10	5.1
DIETHYLPHTHALATE	ND	10	5.1
	ND	10	5.1
FLUORENE	ND	10	5.1 5 1
HEXACHLOROBENZENE	ND	10	5.1
HEXACHLOROBUTADIENE	ND	10	5.1
HEXACHLOROETHANE	ND	10	5.1
INDENO (1, 2, 3-CD) FYRENE	ND	10	5.1
ISOPHORONE	ND	10	5.1
N-NITROSO-DI-N-PROPYLAMINE	ND	10	5.1
N-NITROSODIPHENYLAMINE (2)	ND	10	5.1
NAPHTHALENE	ND	10	5.1
NTTRUBENGENE DEMERGENE NTTRUBENGENE	ND	10	5.1
PHENANTHRENR		20	5.1
PHENOL	ND	10	5.1
PYRENE	ND	10	5.1

PHENOL	ND	10
PYRENE	ND	10
SURROGATE PARAMETERS	* RECOVERY	QC LIMIT
2,4,5-TRIBROMOPHENOL	72	36-143
2-FLUOROBIPHENYL	77	36-143
2-FLUOROPHENOL	55	36-143
NITROBENZENE-D5	69	36-143
PRENOL-D5	65	36-143
TERPHENYL-D14	105	45-143

.

RL: Reporting Limit
(1): Cannot be separated from 3-Methylphenol
(2): Cannot be separated from Diphenylamine

### SW 3520C/8270C SEMI VOLATILE ORGANICS BY GC/MS

Client :	CH2M HILL	Date Collected:	NA
Project :	PG&E'S TOPOCK GAS COMPRESSOR STAT	Date Received:	02/28/05
Batch No. :	058167	Date Extracted:	02/28/05 15:00
Sample ID:	MBLK1W	Date Analyzed:	03/02/05 17:13
Lab Samp ID:	SVB031WB	Dilution Pactor:	1
Lab File ID:	RCZ048	Matrix :	WATER
Ext Btch ID:	SVB031W	<pre>% Moisture :</pre>	NA
Calib. Ref.:	RBZ051	Instrument ID :	T-048

	RESULTS	RL	MDL
PARAMETERS	(ug/L)	(ug/L)	(ug/L)
1,2,4-TRICHLOROBENZENE	ND	10	5
1,2-DICHLOROBENZENE	ND	10	5
1, 3-DICHLOROBENZENE	ND	10	5
1,4-DICHLOROBENZENE	ND	10	5
2, 4, 5-TRICHLOROPHENOL	ND	10	5
2,4,6-TRICHLOROPHENOL	ND	10	5
2, 4-DICHLOROPHENOL	ND	10	5
2,4-DIMETRYLPHENOL	ND	10	5
	ND	20	2
	ND	10	3
	ND	10	5
	ND	10	5
2 - METHYLNA DHTHALENE	NO	10	5
2-METHYLPHENOL	ND	10	5
2-NITROANILINE	ND	10	5
3. 3'-DICHLOROBENZIDINE	ND	10	5
3-NITROANILINE	ND	10	5
4.6-DINITRO-2-METHYLPHENOL	ND	20	5
4-CHLOROANILINE	ND	10	5
4-METHYLPHENOL (1)	ND	10	5
4-NITROANILINE	ND	10	5
4-NITROPHENOL	ND	20	5
ACENAPHTHENE	ND	10	5
ACENAPHTHYLENE	ND	10	5
ANTHRACENE	ND	10	5
BENZÓ (A) ANTERAČENE	ND	10	5
BENZO (A) PYRENE	ND	10	5
BENZO (B) FLUORANTHENE	ND	10	5
BENZO (K) FLUORANTHENE	ND	10	5
BENZO (G, H, I) PERYLENE	ND	10	5
BIS (2-CHLOROETHYL) ETHER	ND	10	5
BIS (2-CHLOROISOPROPYL) ETHER	ND	10	5
BIS (2-ETHYLHEXYL) PHTHALATE	ND	10	5
BUTYLBENZYLPHTHALATE	ND	10	5
CHRYSENE	ND	10	5
DI-N-BUTYLPHTHALATE	ND	10	5
DI-N-OCTYLPHTHALATE	ND	10	5
DIBENZO (A, H) ANTHRACENE	ND	10	5
DIBENZOPURAN	ND	10	5
DIETHYLPHTHALATE	ND	10	5
DIMETHYLPHTHALATE	ND	10	5
FLUCKANTHENE	ND	10	5
FLUORENE	ND	10	2
HEXACHLOROBENZENE	ND	10	5
HEXACHLOROBUTADIENE	ND	10	5
$\frac{1}{1} \frac{1}{1} \frac{1}{2} \frac{1}$	ND	10	5 6
INDENO(1,2,3~CD)FIRENE	ND	10	5
ISOPHORONE N_NITRASA_DI_N_PRAPYLANINE	ND	10	2
N-NITROSON EVENING (2)	ND	10	5
N-NIIKOSODIEILLAIDAILLAG (2)	ND	10	2
NTTPARENT	ND	10	5
PENTACHLOROPHENOI.	ND	20	5
PHENANTHRENE	ND	10	5
PHENOI	ND	10	5
PYRENE	ND	10	5
SURROGATE PARAMETERS	& RECOVERY	OC LIMIT	5
		20 DINIL 	
2, 3, 0 - 1 redrug of the second $2 - 1$ redrug of the second $2 - 1$ redrug of the second	01 57	36-143	
	57	26-143	
	57	20-142	
NIIRODINGENE*US DEDMAL-D5	27	36-143	
TEPPHENVL-D1A	02 02	A5-143	

RL: Reporting Limit (1): Cannot be separated from 3-Methylphenol (2): Cannot be separated from Diphenylamine

### EMAX QUALITY CONTROL DATA LCS/LCD ANALYSIS

CLIENT; PROJECT; BAYTCH NO. : METHOD:	CH2M HILL PG&E'S TOPOCK 05B167 SW 3520C/8270	GAS COMPRE	ESSOR STAT			ф Ф Ф Ф Ф Ф Ф Ф Ф Ф Ф		1 0 12 13 14 0 0 0 0 0 0 0 0 0 0			
NATRIX: DILUTION FACTOR: SAMPLE ID: LAB SAMP ID: LAB FILE ID: LAB FILE ID: DATE EXALYZED: PREP. BATCH: FREF. BATCH: CALIB. REF:	WATER 1 MBLKIW SVB031WB RC2048 02/228/0516.00 03/02/0517:13 SVB031W RB2051	1 SVB031ML SVB031ML 8C2049 02/28/051 03/02/052 SVB031W RB2051	1 SVB SVB SVB RCX 16:00 02/1 17:35 03/1 17:35 03/1 RBZ	031WC 050 28/0516:00 28/0517:57 031W 051	& MOIS DATE C DATE R	TURE: OLLECTED: BCEIVED:	NA Na 02/28/05				
ACCESSION: PARAMETER	æ	Lank rslj (ug/l)	SPIKE AMT (ug/L)	BS RSLT (ug/L)	B5 8 RBC	SPIKE AMT (ug/l)	BSD_RSLT (ug/L)	BSD & REC	RPD ( % )	QC LIMIT ( % )	MAX RPD ( & )
1,2,4-Trichlorob 1,4-Dichlorobenz 2,4-Dinitrotolue 2-Chlorophenol 4-Nitrophenol Acenaphthene n-Nitroso-di-n-p Pentachloropheno Phenol Pyrene	enzene ene ne ropylamine 1	66566666666 66566666666666666666666666		9 6 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9 7 9	8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	99999999999999999999999999999999999999	44809877798 66090100108	0044064700	30-130 30-130 50-130 40-130 40-130 40-130 40-130 40-130 40-130 40-130	00000000000000000000000000000000000000

	SPIKE ANT	BS RSLT	Sa	SPIKE AMT	BSD RSLT	<b>B</b> SD	OC LIMIT
SURROGATE PARAMETER	(J/Bn)	(1/6n)	& REC	(J/6n)	(7/6n)	& REC	(8)
2,4,6-Tribromophenol	150	178	118	150	162	108	40-130
2-Fluorobiphenyl	100	80.1	80	100	81.9	82	40-130
2-Fluorophenol	150	106	11	150	92.1	61	40-130
Nitrobenzene-d5	100	73.7	74	100	66.6	67	40-130
Phenol-d5	150	115	77	150	94.7	63	40 - 130
Terphenyl-d14	100	110	110	100	103	103	50-130

### Appendix E Hydraulic Testing Data and Documentation

### E1: Step Test Results











### E2: Spinner Test Results



**– CH2M**HILL



### E3: IW-2 Extraction Well Test Results








# E4: IW-2 Injection Well Test #1 Results









# E5: IW-2 Injection Well Test #2 Results









### E6: IW-3 Extraction Well Test Results









# E7: IW-3 Injection Well Test Results









# E8: Cooper-Jacob/MLU Test Results



326128.01.07.DO _Fig E8-1Drawup at IW_3/17/05_ccc_sfo









#### FIGURE E8-3 IW-2 MLU SIMULATION

IM-3 GROUNDWATER INVESTIGATION PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA











#### FIGURE E8-4 IW-3 MLU SIMULALATION

IM-3 GROUNDWATER INVESTIGATION PG&E TOPOCK COMPRESSOR STATION NEEDLES, CALIFORNIA

CH2MHILL

# Appendix F Model Simulation of Effects of Injection Well Operation

### APPENDIX F Model Simulation of the Effects of Treated Groundwater Injection

#### Introduction

At the request of the Department of Toxic Substances Control, the Topock groundwater model was used to simulate injection of treated water at the East Mesa wells IW-2 and IW-3. The main objective of this simulation was to evaluate whether planned injection at the East Mesa could compromise plume capture at extraction well TW-2D.

Test data from these wells and surrounding observation wells was used to estimate hydraulic parameters using the MLU software, as described in the main body of the report. The results, listed in Table 7-6 in the main document and described in more detail in Appendix E, were assigned to the injection region of the model. Model simulation of the hydraulic testing produced reasonably good matches to the observed data.

The groundwater flow model that was developed for the Topock site is described in detail in a report that is currently in preparation. The report is to be released in July 2005. The model is briefly described below, along with its application for the injection procedure.

The model is composed of five layers, the top four being unconsolidated materials, and the bottom layer being bedrock. Wells IW-2 and IW-3 are screened in the middle and lower zones of the Alluvial Aquifer, corresponding to layers 2, 3, and 4 of the model. For the simulations, it was assumed that 50 gallons per minute (gpm) were pumped from TW-2D, and 50 gpm were injected at the East Mesa, evenly divided between the two injection wells (25 gpm each). In reality, the actual injection rate will be somewhat less than the extraction rate because some of the water will be trucked from the site as reverse osmosis concentrate. The volume or concentrate to be trucked is yet to be determined. An injection rate equal to the extraction rate was assigned to make the simulations more conservative. If more water is pumped than is injected, the capture zone of the extraction wells would be enhanced. The injection rate was distributed among the model layers on the basis of measured hydraulic properties.

Two scenarios were simulated to evaluate the potential movement of water from the injection points. The first scenario included pumping year round at 50 gpm which is the minimum pumping rate specified by DTSC by letter of February 14, 2005. The second scenario incorporated pumping at 50 gpm for 6 months of the year and pumping at treatment system capacity of 135 gpm for periods of lower river levels (typically during fall and winter) which corresponds to an average annual pumping rate of 92.5 gpm. This greater rate was simulated separately and produced results that were effectively identical to the 50 gpm simulations, described below. These two scenarios bracket the anticipated pumping rates and intermediate rates are also expected to give identical results.

### **Injection Simulation Results**

Injection simulation results are presented in the form of particle tracking maps on Figures F-1 through F-3. These figures show the paths of groundwater "particles" starting at the injection wells in layer 2 (Figure F-1), layer 3 (Figure F-2), and layer 4 (Figure F-3) and moving forward in time. As injected water moves through the aquifer, it travels upward according to the natural gradient at the site. The particle tracks change color as they move into different model layers. Tick marks on the particle tracks are assigned at travel intervals of 1 year, assuming an effective porosity of 0.05. This value of effective porosity results in greater travel velocity than would be calculated from measured parameters in order to account for any preferred pathways in the subsurface that could have much higher conductivity than the average values measured with the aquifer test data. According to the results, injected water reaches the observation wells within a few months and reaches the compliance wells in 1 to 5 years (see Table F-1). Approximately 40 percent of the injected water is captured by well TW-2D, and the remainder follows the natural regional hydraulic gradient in an easterly direction. Modeled travel times are estimates and will be refined following the start of injection, when sampling results from observation wells can provide data on actual travel times of injected water.

DTSC has required that a shallow compliance monitoring well be added to each of the CWclusters in order to document movement in this zone of the aquifer. A workplan for these installations will be submitted to DTSC for approval.

#### Effect of Injection on Particles within Plume

To evaluate whether injection will have an effect on plume capture, particles were started from all model nodes within the plume boundaries, defined as hexavalent chromium [Cr(VI)] concentrations equal to or greater than 50 micrograms per liter ( $\mu$ g/L). As shown on Figures F-4, F-5, F-6, and F-7, particles from all nodes in all four model layers in the plume area terminate at well TW-2D, even with both IW-2 and IW-3 actively injecting water. Any escaping particles would have been evident as lines extending out of the plume area. The figures show all particle tracks contained within the plume boundaries are ultimately extracted by well TW-2D. These simulations predict that injection will not have an adverse impact on the extraction of affected groundwater, that is, it will not reduce the ability for TW-2D to capture the plume over its full lateral and vertical extent.

Well	Layer	Injection Well	Average Travel Time (years)
CW-1M	1	IW-3	NA ¹
CW-1M	2	IW-3	1.8
CW-1D	3	IW-3	1.3
CW-1D	4	IW-3	1.2
CW-2M	1	IW-2	5.6
CW-2M	2	IW-2	2.9
CW-2D	3	IW-2	2.0
CW-2D	4	IW-2	1.7
CW-3M	1	IW-2	5.3
CW-3M	2	IW-2	3.4
CW-3D	3	IW-2	2.4
CW-3D	4	IW-2	2.0
CW-4M	1	IW-3	NA ¹
CW-4M	2	IVV-3	4.9
CW-4D	3	IVV-3	3.1
CW-4D	4	IVV-3	2.5

TABLE F-1 (a) Time to Compliance Walls (Simulation at Injection Date of EO anm)

Notes: ¹ Not applicable—simulated injection water did not reach this well at this model layer.



RDD \\ODIN\PROJ\TOPOCK\FIGURES\MXD\IM3_FIGURES\IM3_FIGF-01.MXD IM3_FIGF-01.PDF 6/21/2005 16:08:37



RDD \\ODIN\PROJ\TOPOCK\FIGURES\MXD\IM3_FIGURES\IM3_FIGF-02.MXD IM3_FIGF-02.PDF 6/21/2005 16:15:14

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RDD \\ODIN\PROJ\TOPOCK\FIGURES\MXD\IM3_FIGURES\IM3_FIGF-04.MXD IM3_FIGF-04.PDF 6/17/2005 16:33:36

NEEDLES, CALIFORNIA

#### CH2MHILL -



RDD \\ODIN\PROJ\TOPOCK\FIGURES\MXD\IM3_FIGURES\IM3_FIGF-04.MXD IM3_FIGF-04.PDF 6/17/2005 16:33:36

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RDD \\ODIN\PROJ\TOPOCK\FIGURES\MXD\IM3_FIGURES\IM3_FIGF-07.MXD IM3_FIGF-07.PDF 6/17/2005 16:36:25

CH2MHILL -

## Appendix G: Model Output from PHREEQC Runs (CD-ROM)

## Appendix G

This information refers to the model output files contained on the attached CD-ROM.

## Model Output from PHREEQC Runs

Scenario 1: Mixing of blended injection water with average East Mesa groundwater
Scenario 2: Mixing of post-treatment water with average East Mesa groundwater
Scenario 3: Mixing of RO permeate water with average East Mesa groundwater
Scenario 4: Mixing of blended water with lower-depth interval East Mesa groundwater
Scenario 5: Mixing of post-treatment water with lower-depth interval East Mesa groundwater

Note: file extention ".pqi" indicates model input file, and extension ".pqo" indicates output file