WELL INSTALLATION REPORT (EPAMW16, EPAMW17, and EPAMW18) FOR SAN GABRIEL VALLEY NPL AREA 3 REMEDIAL INVESTIGATION/FEASIBILITY STUDY

Prepared for

U.S. Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, California 94105

February 2006

Prepared by

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(EPAMW16, EPAMW17, and EPAMW18)
FOR SAN GABRIEL VALLEY NPL AREA 3
REMEDIAL INVESTIGATION/FEASIBILITY STUDY

SAN GABRIEL BASIN
LOS ANGELES COUNTY, CALIFORNIA

EPA CONTRACT NO. 68-W-98-225
EPA WORK ASSIGNMENT NO. 041-RICO-09ES
CH2M HILL PROJECT NO. 335379.FI.03

Prepared for
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Acronyms

°C	degrees Celsius
bgs	below ground surface
Caltrans	California Department of Transportation
cc	cubic centimeters
EC	electrical conductivity
EPA	U.S. Environmental Protection Agency
FSP	Field Sampling Plan
IDW	investigation-derived waste
lbs	pounds
MCL	maximum contaminant level
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mL	milliliter
MP	multiport
NDMA	n-nitrosodimethylamine
NPL	National Priorities List
NTU	nephelometric turbidity units
QA	quality assurance
RI	Remedial Investigation
STLC	Soluble Threshold Limit Concentration
TCLP	Toxicity Characteristics Leaching Procedure
TD	total depth
TPH	total petroleum hydrocarbons
TPHg	total petroleum hydrocarbon-gasoline
TTLC	total threshold limit concentration
USCS	Unified Soil Classification System
VOC	volatile organic compound
WET`	Waste Extraction Test

1.0 Introduction

This report has been prepared to document field and laboratory activities associated with the second phase of Remedial Investigation (RI) activities for San Gabriel Valley National Priorities List (NPL) Area 3 (Area 3). The first phase of RI activities involved the installation and sampling of three conventional monitoring wells (EPAMW11, EPAMW12A, and EPAMW12B) and three multiport (MP) monitoring wells (EPAMW13, EPAMW14, and EPAMW15). Activities associated with the first phase of the RI are documented in *Draft Well Installation Report for San Gabriel Valley NPL Area 3 Remedial Investigation/Feasibility Study* (U.S. Environmental Protection Agency [EPA], 2003b). The location of Area 3 is shown in Figure 1-1.

Field activities for the second phase of RI work included installation and sampling of two conventional monitoring wells and one MP monitoring well. These activities were performed in accordance with the *Field Sampling Plan for San Gabriel Valley NPL Area 3 Remedial Investigation Field Activities* (EPA, 2003a) and *Field Sampling Plan Addendum No. 1 for San Gabriel Valley NPL Area 3 Remedial Investigation Field Activities* (EPA, 2004).

This report presents information, data, analyses, and procedures for well installation and sampling activities. General field and laboratory activities described in this report are:

- Installation of two conventional monitoring wells – EPAMW17 (MW1-7) and EPAMW18 (MW1-8) – screened at 270 to 320 and 196 to 226 feet below ground surface (bgs), respectively.
- Installation of one MP Well – EPAMW16 (MW1-6) – screened in seven 10-foot intervals and completed to a depth of 820 feet bgs.
- Sampling of the wells for low-detection-limit volatile organic compounds (VOCs) following development activities.

A chronology of well installation activities, which summarizes project milestones and start/completion dates, is presented in Table 1-1. The objectives of the well installation and groundwater sampling activities, as described in the Field Sampling Plan Addendum No. 1 (FSP Addendum), are as follows:

- Refine the three-dimensional nature and extent of VOC contamination in Area 3.
- Refine EPA understanding of the groundwater flow directions and hydraulic gradients in the groundwater aquifers within Area 3.
- Verify the location of the fault in the western OU and assess the potential for contaminant migration across the fault.
- Collect groundwater data that would assist in identifying contaminant source areas within Area 3.

Site background is explained in detail in Section 2 of the Field Sampling Plan (FSP) (EPA, 2003a).

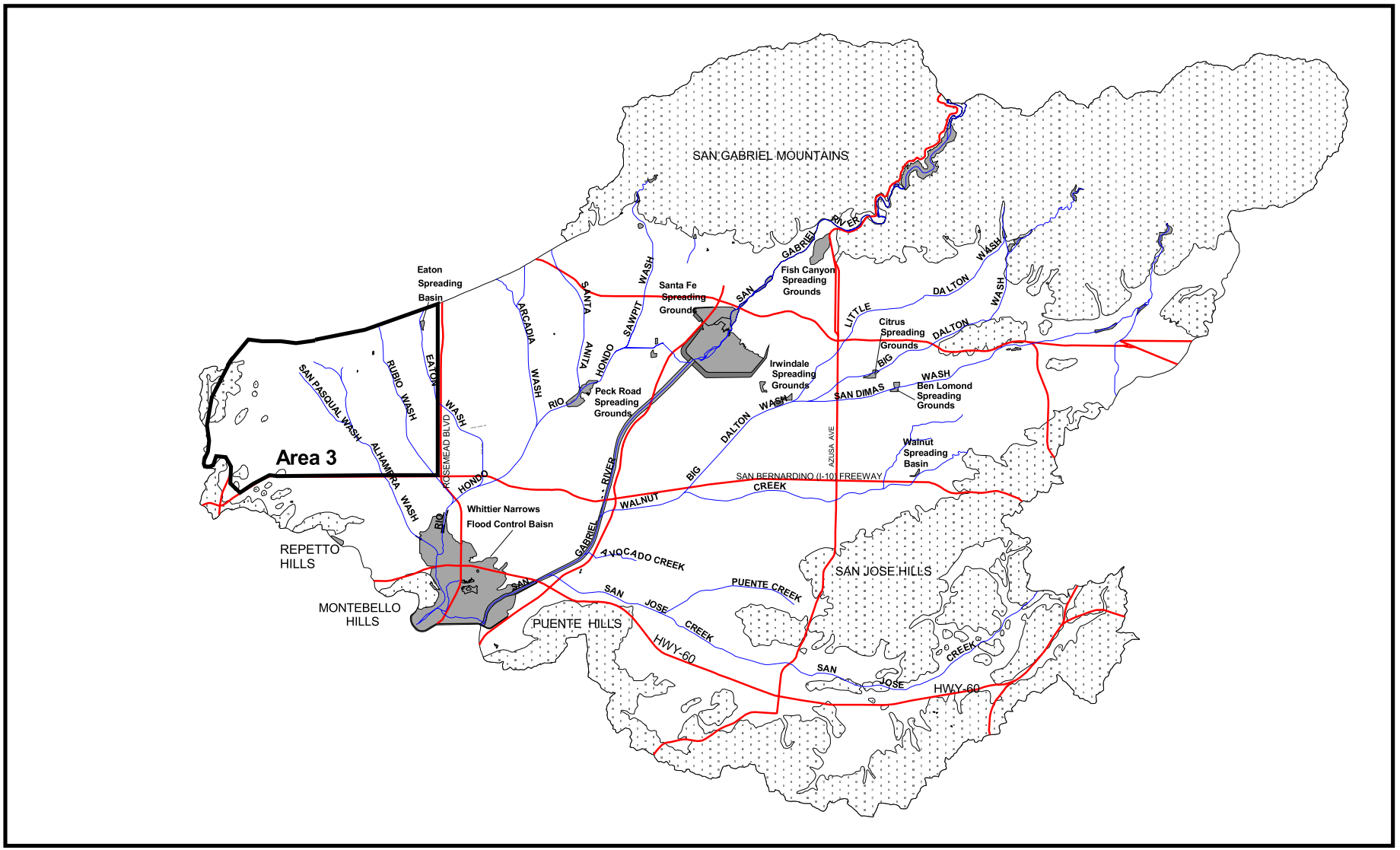

FIGURE 1-1
LOCATION MAP

San Gabriel Valley NPL Area 3
Well Installation Report

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Table 1-1
Well Installation Chronology
San Gabriel Valley NPL Area 3
Well Installation Report

Field Activity	MP Well	Conventional Wells	
	MW1-6	MW1-7	MW1-8
	Date Accomplished		
Mobilization - Start	12/01/04	01/03/05	04/11/05
Mobilization - Finish	12/08/04	01/04/05	04/15/05
Drilling - Start	12/06/04	01/03/05	04/11/05
Drilling - Finish	12/16/04	01/06/05	04/19/05
Well Construction - Start	12/17/04	01/10/05	04/21/05
Well Construction - Finish	12/19/04	01/11/05	04/22/05
Demobilization	12/20/04	01/14/05	04/26/05
Well Development - Start	12/21/04	01/13/05	04/25/05
Well Development - Finish	02/01/05	01/28/05	05/06/05
Westbay Installation - Start	02/18/05	NA	NA
Westbay Installation - Finish	02/21/05	NA	NA
Westbay Purge - Start	02/22/05	NA	NA
Westbay Purge - Finish	02/28/05	NA	NA
Roll-off bins and Baker Tanks Offsite	03/17/05	02/23/05	04/26/05
Initial Sampling	03/30/05	02/15/05	05/25/05
Total Time Onsite (months)	3.5	2.0	1.0

Notes:
MP = Multiport
NA = Not Applicable

1.1 Report Organization

This report is organized into five sections and four appendices, as listed below.

Section 1 Introduction

Section 2 Field Methods and Procedures

Section 3 Sampling Results

Section 4 Project Deviations and Complications

Section 5 References

Appendix A Lithologic Boring Logs

Appendix B Geophysical Logs

Appendix C Video Survey Reports

Appendix D Multiport Monitoring Well Completion Report

2.0 Field Methods and Procedures

This section describes the drilling, installation, and development of the new conventional monitoring wells and MP monitoring well in Area 3. Sampling of solid and liquid wastes associated with disposal of investigation-derived waste (IDW) is also discussed in this section. Locations of the new wells are shown in Figure 2-1.

With the exception of deviations described in Section 4, the procedures used during the field activities followed those provided in the FSP (EPA, 2003a) and FSP Addendum (EPA, 2004).

2.1 Access and Well Drilling Permits

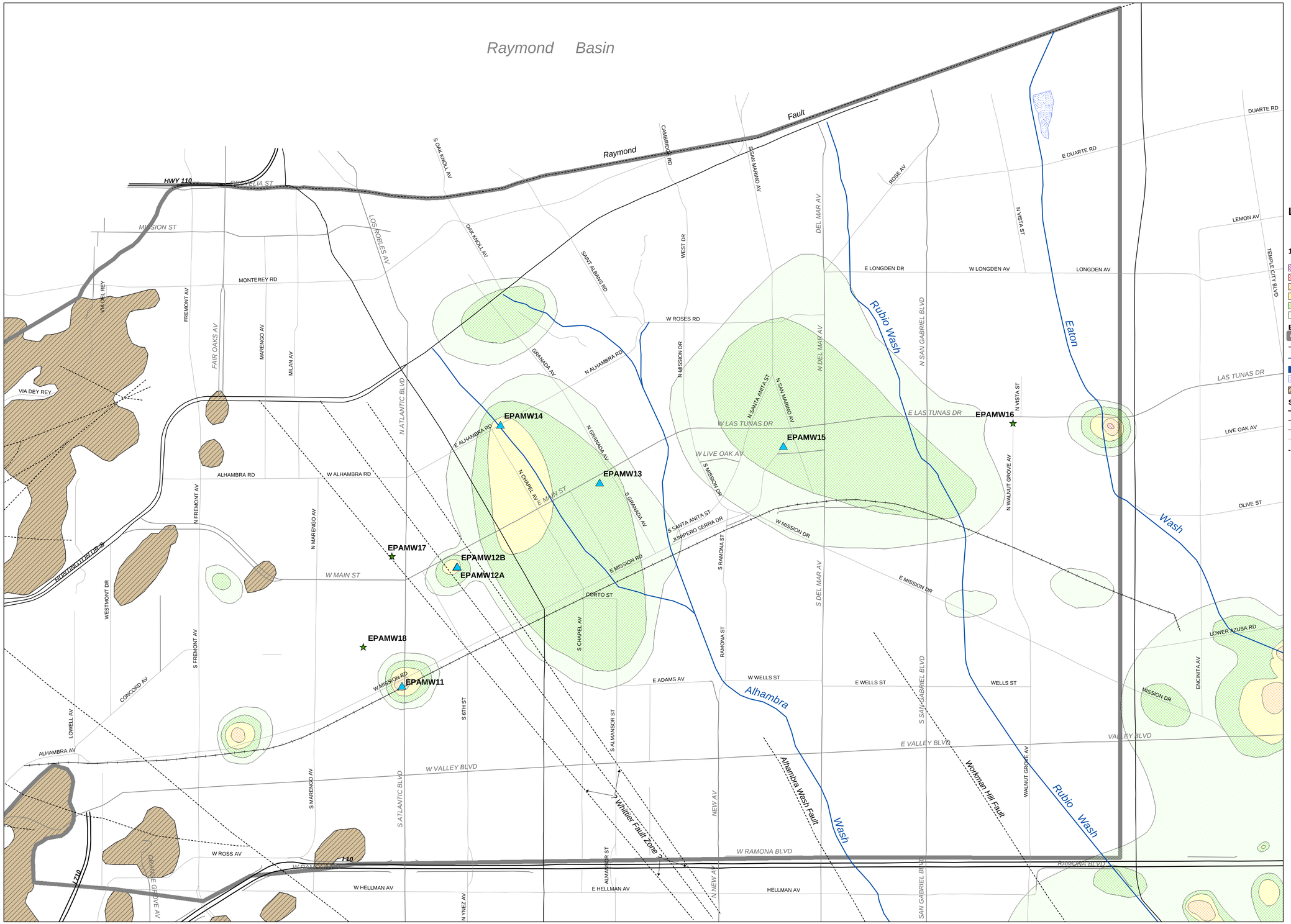
CH2M HILL, as a contractor to EPA, assisted EPA with coordination of the efforts required to obtain site access and the well drilling permits required by local agencies for installation of groundwater monitoring wells. The wells are located in the cities of Alhambra and San Gabriel, California. CH2M HILL coordinated with the cities of Alhambra and San Gabriel to (1) gain public acceptance of the well installation activities, (2) notify nearby residents of the upcoming activities, and (3) to create adequate traffic and noise control systems at each well location. Although exempt from paying permit fees per Superfund regulations, EPA/CH2M HILL complied with all well permit requirements of the Los Angeles County Department of Health Services.

In accordance with city and state guidelines, the appropriate traffic control equipment was placed around each of the well construction areas. Noise levels from drilling rigs and generators were a special concern with residents near the well locations. Therefore, noise levels were minimized using sound curtains around the perimeter of the drilling area at each well.

2.2 Drilling Procedures

WDC Exploration and Wells (WDC), of Montclair, California, drilled boreholes for installation of the monitoring wells. Fieldwork started on December 1, 2004, at EPAMW16. The conventional and MP monitoring wells were drilled using the direct (mud)-rotary technique and nominal 12-inch-diameter bits.

Drilling mud was used to prevent the collapse of boreholes and to remove cuttings from the boreholes. Drilling mud reduces the possibility of cross-contamination of groundwater zones because the mud invades the formation along the borehole walls, forming a low-permeability mud cake. The mud is removed later from the borehole during well development. To prevent collapse of the borehole, the drilling mud properties were monitored and maintained, and the mud generally was kept circulating throughout the



NOTES:

1. THE AREAS OF CONTAMINATION SHOWN REPRESENT SIMPLIFIED APPROXIMATIONS BASED ON THE LAST AVAILABLE CONCENTRATION (THROUGH 03/01/04) OF ANY VOC. DATA POINTS MORE THAN FIVE YEARS OLD WERE GENERALLY NOT CONSIDERED.
   BECAUSE CONTAMINATION CONCENTRATIONS VARY WITH TIME, A WELL MAY AT TIMES PRODUCE WATER WITH DIFFERENT CONTAMINANT LEVELS THAN THOSE INDICATED. DIFFERENCES COULD ALSO BE CAUSED BY VERTICAL VARIATIONS IN CONTAMINATION (THE FIGURE IS A TWO-DIMENSIONAL DEPICTION OF CANTAMINATION THAT ACTUALLY VARIES WITH DEPTH).
   THE FIGURE SHOWS ONLY REGIONAL VARIABILITY IN CONTAMINATION. IN MUCH OF THE BASIN, DISTANCES BETWEEN DATA POINTS ARE IN THE 1000'S OF FEET. THUS, THERE IS SIGNIFICANT UNCERTAINTY IN THE TRUE LOCATIONS OF THE CONCENTRATION CONTOURS.

FIGURE 2-1
MONITORING WELL LOCATIONS AND 2003 COMPOSITE VOC CONTAMINATION
SAN GABRIEL VALLEY NPL AREA 3
WELL INSTALLATION REPORT

borehole. Drilling mud properties were maintained as follows, until the well casing was ready to be installed:

- Weight: 9 to 10 pounds (lbs)/gallon
- Viscosity: 30 to 40 seconds per quart
- Sand Content Did not exceed 1 percent
- 30-minute water loss 15 to 25 cubic centimeters (cc)

Drilling mud consisted of bentonite and water. No drilling additives were used at any of the wells. Water used for drilling mud was obtained from fire hydrants owned by the cities of Alhambra and San Gabriel. WDC obtained the required permits and water meters to access the water from the hydrants.

2.3 Formation Sampling

An onsite CH2M HILL hydrogeologist collected and logged drill cuttings from the boreholes at 10-foot intervals, or at significant changes in borehole lithology. Formation sampling is described briefly below.

2.3.1 Lithologic Logging

In the direct-mud rotary method, approximately 2 gallons of drill cuttings were collected from the mud discharge pipe in each of two or three empty, 5-gallon buckets. More than one bucket was used to guarantee enough sample volume. After collecting the sample, the remaining portions of the 5-gallon buckets were filled with fresh water. The contents of each bucket were allowed to settle for approximately 3 minutes, then the top few gallons were poured off and fresh water was added again. This procedure was continued until the viscosity of the mud was reduced, thus allowing the cuttings to settle to the bottom of the buckets. The cuttings then were observed visually and described. The lithological boring logs, presented in Appendix A, show the locations, dates each boring was started and completed, and names of the field hydrogeologists. Each log describes the geologic material encountered, along with the Unified Soil Classification System (USCS) classification. Cuttings were collected and placed in labeled, plastic, self-closing bags and clear, plastic, fishing tackle boxes.

2.3.2 Geophysical Logging

Pacific Surveys of Claremont, California, a subcontractor to WDC, performed geophysical logging of each nominal 12-inch-diameter borehole immediately after completing borehole drilling. The results from the geophysical logging of the boreholes were used in conjunction with lithological logs to aid in selection of the well screen intervals. Caliper logging was performed just before well construction activities commenced to confirm borehole size. The following geophysical logs were run in each borehole:

- Electric (16- and 64-inch normal resistivity, spontaneous potential)
- Guard resistivity

- Gamma ray
- Sonic
- Caliper

The lithologic logs (Appendix A), actual drill cuttings, and geophysical logs (Appendix B) of the boreholes were reviewed to select the monitoring (screen) zone(s) for each well.

2.4 Well Construction

Immediately after completion of geophysical logging, the well screen depth, or depths in the case of the multiport well, was selected based on the interpretation of the subsurface lithology and geophysical logs of the boreholes. Seven screen depth zones were chosen for the MP well, EPAMW16. One screen interval was chosen for each of the two conventional monitoring wells, EPAMW17 and EPAMW18.

In some cases, geophysical logs, screen intervals, and/or water quality data from nearby wells, were reviewed to assist in selection of monitoring zone(s) for each well. In addition, future groundwater levels were considered, as groundwater levels at the time of well construction were at historic lows for the San Gabriel Basin.

The primary considerations in determining the screen locations for the MP well were:

- High permeability and porosity – Sand or gravel intervals were selected because they are expected to provide the primary pathways for contaminant migration.
- Thickness of the permeable units – Thickness of the interval was greater than 10 feet.
- Thickness of potential confining units – The confining unit was thick enough to provide a potential confining boundary to the permeable unit, at least on a local scale.

Screen intervals for each of the two conventional monitoring wells (EPAMW17 and EPAMW18) were determined based on the apparent position of the water table. The sonic velocity/variable density log was used to estimate the depth at which the surrounding formation was saturated (i.e., saturation indicating the water table location). For EPAMW17, the well screen was placed across the water table (extending above the current water table) to allow for any rise in the regional water table. At both conventional wells the regional water table was found in fine-grained bedrock, below the more permeable alluvium.

Following drilling and geophysical logging, flush-threaded (with O-rings) well screen and blank casing were placed into each borehole. The annular space of the borehole surrounding each screen was backfilled with selected gravel packs. Gravel pack selection was based on the lithologic logs and visual observation of drilling cuttings. Gravel pack was placed around each screen zone, generally extending about 10 feet above and below each screen.

Transition sand and a 1:1 mixture of granular bentonite and sand were placed above and below the gravel pack, surrounding the blank casing. In the case of the conventional wells, a 1:1 mixture of granular bentonite and sand was used to backfill the bottom of the borehole

to approximately the total depth (TD) of the well. Transition sand and a 1:1 mixture of granular bentonite and sand were placed above the gravel pack, surrounding the blank casing. The remaining annular space of the borehole above the uppermost screen was backfilled with cement grout to the ground surface. The purpose of the transition sand was to prevent bentonite or grout from invading the gravel pack material.

Annular seals, consisting of a 1:1 mixture (by dry volume) of bentonite chips and No. 3 Monterey sand, were placed between each screen zone in the MP well and above the one screen interval in the conventional wells. The two constituents of the annular seal were mixed dry in a hopper, then injected at specific depths using a tremmie pipe. This procedure was repeated until all screened intervals were gravel packed and sealed. The uppermost annular seal in the MP well consisted of cement grout with a small amount of bentonite powder to reduce shrinking and cracking. After the seals were installed, each screen interval was developed as described in Section 2.5.

General well construction details and screen intervals for the new MP and conventional wells are shown in Tables 2-1 and 2-2, respectively. Construction information includes casing and annular materials, gradation of gravel pack, and transition sand selected. Additional information for MP and conventional wells is presented in the following subsections. Video surveys were run at MP well EPAMW16 to assess the integrity of the casing joints and to confirm the depths of the well screens after well construction and development. A video survey was also performed at EPAMW17 to confirm that the unsaturated portion of the well screen had been developed adequately. The results of the video surveys are presented in Appendix C.

2.4.1 Multiport Monitoring Well Construction

Typical MP well construction is presented in Figure 2-2. Construction of MP wells includes installation of the 4-inch-inner-diameter blank casing and screen in the borehole and placement of the Westbay System with packers inside the 4-inch well casing after well development.

Westbay Instruments, Ltd. (Westbay) of Vancouver, Canada, performed installation of the Westbay System. Multiport wells are equivalent in function to a series of nested monitoring wells, but require only one casing (with sampling tool access) in a single borehole. The system incorporates couplings, casings, and permanently inflated packers into a single instrumentation string that is installed inside a cased borehole with multiple screened intervals. This allows sampling of discrete depth intervals and measurement of water levels in those zones from a well constructed of a single casing with separate monitoring ports.

The (outer) well casing at MP well EPAMW16 consists of 4-inch-inner-diameter mild and stainless (Type 304) steel and seven 10-foot screened intervals (0.015-, 0.02-, or 0.04-inch slot, Type 304 stainless steel) installed in a 12-inch-diameter borehole.

Table 2-1
Multiport Monitoring Well Construction Details
San Gabriel Valley NPL Area 3
Well Installation Report

Well	Casing			Annular Material		Multiport Casing	
	Depth (ft bgs)	Type (Slot Size and Zone)	Material	Depth (ft bgs)	Type	Depth (ft bgs)	Type
MW1-6	0-25	Blank	Conductor Casing	0 - 242	Cement Grout/Seal	--	Blank Casing
	0-245	Blank	Mild Steel	242 - 250	Bentonite/Sand (#3)	--	Blank Casing
	245-265	Blank	Stainless Steel	250 - 254.5	Transition Sand (#30)	253	QA Port
	265-275	0.015 Screen (Zone 7)	Stainless Steel	254.5 - 284.5	Gravel Pack (#2/16)	268	Measurement Port (Sampling)
	275-285	Blank	Stainless Steel	284.5 - 288.5	Transition Sand (#30)	283	QA Port
	285-315	Blank	Mild Steel	288.5 - 319.5	Bentonite/Sand (#3)	--	Blank Casing
	315-335	Blank	Stainless Steel	319.5 - 324	Transition Sand (#30)	323	QA Port
	335-345	0.040 Screen (Zone 6)	Stainless Steel	324 - 355	Gravel Pack (#3)	338	Measurement Port (Sampling)
	345-355	Blank	Stainless Steel	355 - 358	Transition Sand (#30)	353	QA Port
	355-385	Blank	Mild Steel	358 - 391.5	Bentonite/Sand (#3)	--	Blank Casing
	385-405	Blank	Stainless Steel	391.5 - 395	Transition Sand (#30)	393	QA Port
	405-415	0.020 Screen (Zone 5)	Stainless Steel	395 - 423.5	Gravel Pack (#3)	408	Measurement Port (Sampling)
	415-425	Blank	Stainless Steel	423.5 - 427	Transition Sand (#30)	423	QA Port
	425-485	Blank	Mild Steel	427 - 491	Bentonite/Sand (#3)	--	Blank Casing
	485-505	Blank	Stainless Steel	491 - 494	Transition Sand (#30)	493	QA Port
	505-515	0.020 Screen (Zone 4)	Stainless Steel	494 - 521	Gravel Pack (#3)	508	Measurement Port (Sampling)
	515-525	Blank	Stainless Steel	521 - 524	Transition Sand (#30)	523	QA Port
	525-565	Blank	Mild Steel	524 - 568.5	Bentonite/Sand (#3)	--	Blank Casing
	565-585	Blank	Stainless Steel	568.5 - 573	Transition Sand (#30)	573	QA Port
	585-595	0.015 Screen (Zone 3)	Stainless Steel	573 - 603	Gravel Pack (#2/16)	588	Measurement Port (Sampling)
	595-605	Blank	Stainless Steel	603 - 609	Transition Sand (#30)	603	QA Port
	605-630	Blank	Mild Steel	609 - 627.5	Bentonite/Sand (#3)	--	Blank Casing
	630-650	Blank	Stainless Steel	627.5 - 630.5	Transition Sand (#30)	538	QA Port
	650-660	0.020 Screen (Zone 2)	Stainless Steel	630.5 - 669	Gravel Pack (#3)	653	Measurement Port (Sampling)
	660-670	Blank	Stainless Steel	669 - 673	Transition Sand (#30)	668	QA Port
	670-770	Blank	Mild Steel	673 - 774	Bentonite/Sand (#3)	--	Blank Casing
	770-790	Blank	Stainless Steel	774 - 778	Transition Sand (#30)	778	QA Port
	790-800	0.015 Screen (Zone 1)	Stainless Steel	778 - 830	Gravel Pack (#2/16)	793	Measurement Port (Sampling)
	800-820	Blank (with end cap)	Stainless Steel			808	QA Port

Notes:
ft bgs = feet below ground surface
QA = Quality Assurance
-- = continuous blank multiport casing between each port

Table 2-2
Conventional Monitoring Well Construction Details
San Gabriel Valley NPL Area 3
Well Installation Report

Well	Casing			Annular Material		Pump Depth (ft bgs)
	Depth (ft bgs)	Type	Material	Depth (ft bgs)	Type	
MW1-7	0 - 25	Conductor	Mild Steel	0 - 238	Cement Grout/Seal	317
	0 - 260	Blank	Mild Steel	238 - 259	Bentonite/Sand (#3)	
	260 - 270	Blank	Stainless Steel			
	270 - 320	Screen	0.020 Stainless Steel	259 - 338	Gravel Pack (#3)	
	320 - 330	Blank (with end cap)	Stainless Steel	338 - 410	Bentonite/Sand (#3)	
MW1-8	0 - 26	Conductor	Mild Steel	0 - 168	Cement Grout/Seal	216
	0 - 186	Blank	Mild Steel	168 - 184	Bentonite/Sand (#3)	
	186 - 196	Blank	Stainless Steel	184 - 187	Transition Sand (#60)	
	196 - 226	Screen	0.010 Stainless Steel	187 - 241	Gravel Pack (#2/16)	
	226 - 236	Blank (with end cap)	Stainless Steel	241 - 300	Bentonite/Sand (#3)	

Notes:
ft bgs = feet below ground surface
Pump Depth refers to the depth of the pump intake screen.

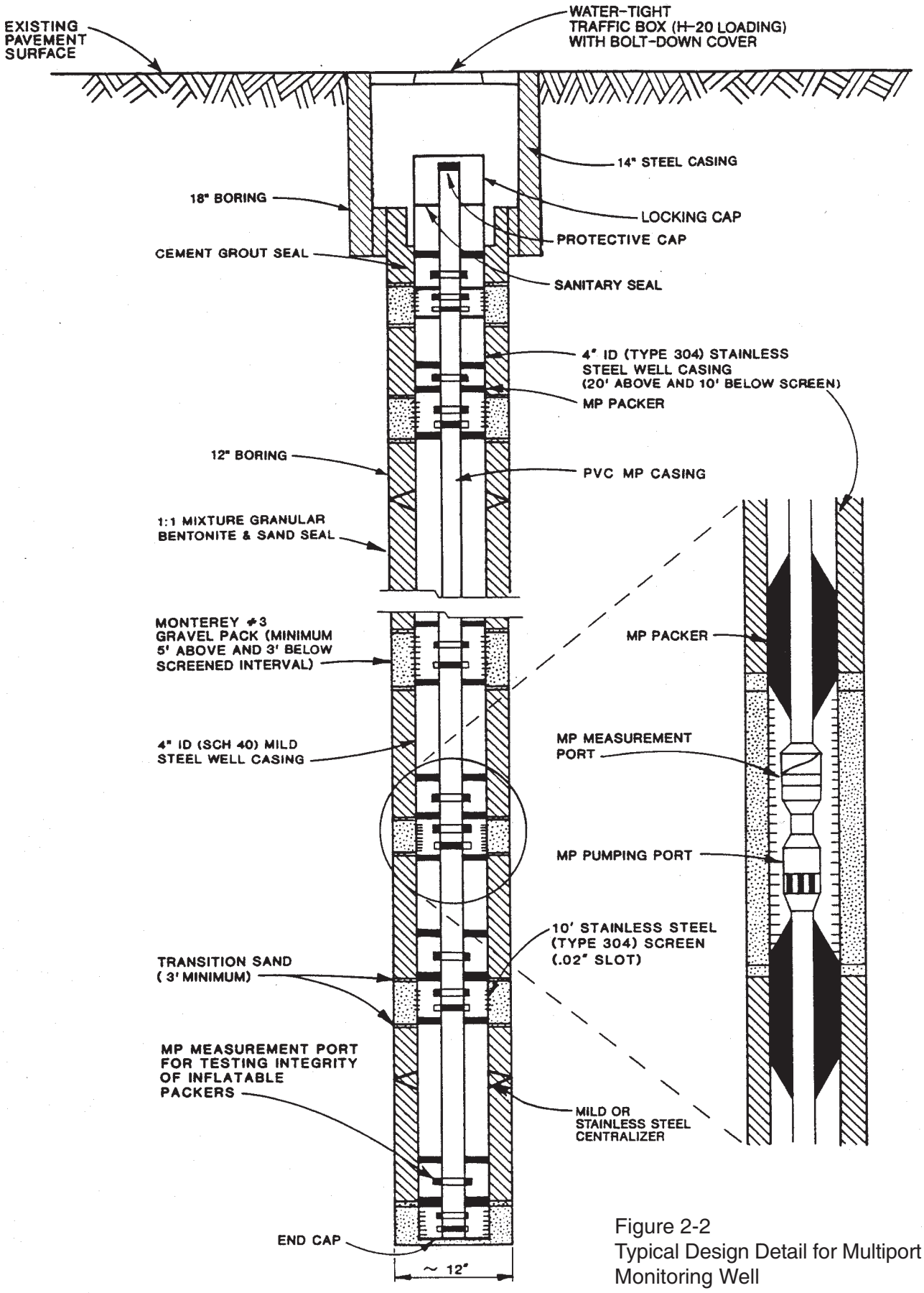


Figure 2-2
Typical Design Detail for Multiport Monitoring Well
Well Installation Report

Westbay technicians installed the MP system into the 4-inch-diameter steel casing. Three packers were placed against the inside of the blank stainless steel casing below and above each screen interval to provide additional protection against downward or upward groundwater flow between the intervals. Two of the packers were installed in a 20-foot-long section of stainless steel casing immediately above each screen interval, and one packer was installed immediately below the screen interval. The packers were inflated with water to isolate the screen intervals in the cased well. The three packers also provide a means of quantitatively documenting that no hydraulic communication exists in the 4-inch casing between screen intervals. A detailed completion report on the installation of the Westbay system in the new well is presented in Appendix D.

2.4.2 Conventional Monitoring Well Construction

Typical conventional monitoring well construction is shown in Figure 2-3. Construction of conventional monitoring wells includes installation of a 4-inch-diameter mild and stainless steel (Type 304) blank casing and stainless steel (Type 304) screen in a 12-inch-diameter borehole. Following well development, a dedicated bladder pump was set at a depth in the screen interval.

2.5 Well Development

Primary development for the conventional and MP wells consisted of bailing residual drilling mud from each well. Subsequent well development methods differed for the conventional and MP wells. Upon completion of the MP and conventional monitoring well development, a flush-mounted, traffic-rated steel vault was installed to protect the well.

2.5.1 Multiport Monitoring Well Development

After bailing out residual drilling mud, a process similar to pumping then was used in each well zone. Instead of pumping, however, water from each zone was removed by airlifting using a dual-swab assembly to isolate the airlift intake in each screen interval. At times during airlifting, the dual swab assembly was raised and lowered in the well to create a simultaneous surging action of water adjacent to the well screen. Following airlifting, a submersible pump was lowered to the screen interval, and the interval was pumped until it was clean. At this point, the pump was turned off, and the water in the pump and tubing was allowed to surge back into the formation. This process was repeated until the water was clean (see below) immediately following the surging. Straddle packers were placed immediately above and below the screen interval being pumped, which ensured isolation of well development benefits to one screen interval.

Field parameters (i.e., turbidity, pH, electrical conductivity [EC], and temperature) were measured during well development to determine the state of development. Well screen development generally was considered complete when turbidity measured between 5 and 20 nephelometric turbidity units (NTU), and all other field parameters indicated a stable trend. If well video surveys indicated the presence of fines or drilling mud in the screen(s) of MP wells, additional well development was performed until subsequent video surveys showed the well screen(s) to be free of fines and/or drilling mud.

2.5.2 Conventional Monitoring Well Development

Due to the low permeability, and consequently low yield of water to the wells, of the formations screened at EPAMW17 and EPAMW18, development methods involving airlifting and/or pumping could not be used. Instead, well development consisted of adding potable water to the well casing until the screen was submerged fully, swabbing the entire screen interval and then bailing the well dry. In each case, the amount of water removed by bailing was equal to or greater than the amount of water introduced to the well. This process was then repeated until all residual drilling mud was removed, and the turbidity was below 100 NTUs.

2.6 Well Location Survey

An engineering survey of new well locations and elevations was conducted on May 17, 2005, by Dulin and Boynton Licensed Surveyors, a subcontractor to CH2M HILL. Well coordinates (UTM meters, NAD 83, Zone 11) and wellhead reference point elevations (NGVD29 to the nearest 0.01 foot) from this survey were entered into the EPA San Gabriel Basin database.

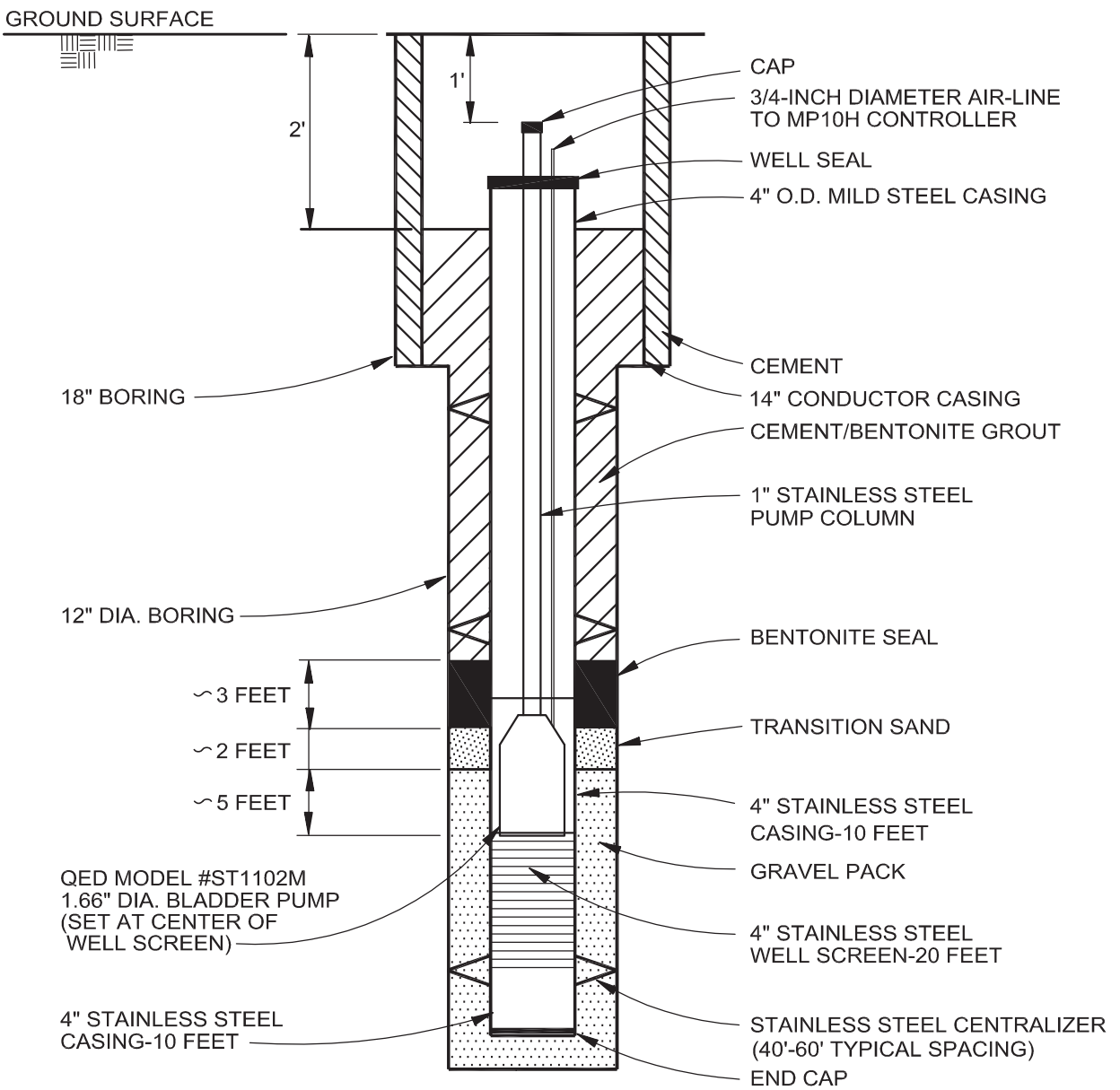


Figure 2-3
Typical Design Detail for
Conventional Monitoring Well
Well Installation Report

NOT TO SCALE

NDM:WALKUP:Alhambra:Figure 2-3.dwg 9/10/03

2.7 Disposal of Drilling and Well Development Waste

The installation and development of monitoring wells produced both solid and liquid wastes. The solids consisted of drill cuttings removed from the drilling mud by means of a sand shaker. The liquid waste consisted of drilling mud (bentonite and water) and well development water. All solid waste was containerized in California Department of Transportation (Caltrans)-certified bins. In general, the drill cuttings and drilling mud were segregated at each well location and stored in plastic-lined, 20-cubic-yard, roll-off bins; and the development water was stored in 21,000-gallon, steel, bi-level Rain-for-Rent tank(s)™ or plastic-lined, 20-cubic-yard, roll-off bins. The cuttings and drilling mud samples were analyzed for the parameters shown in Table 3-1 in Section 3, as specified in the FSP (EPA, 2003a) and FSP Addendum (EPA, 2004). A summary of laboratory results for the solid and liquid wastes is presented in Tables 3-1a and 3-1b in Section 3, respectively.

Samples of drill cuttings and drilling mud for VOC and total petroleum hydrocarbon-gasoline (TPHg) analyses were collected using unpreserved 40-milliliter (mL) volatile organic analytic (VOA) vials. Samples of drill cuttings and drilling mud for additional analyses were collected in 1-liter amber glass jars and 4-ounce clear glass jars and placed in a sealed bag, and cooled to 4 degrees Celsius (°C).

Well development water from monitoring well EPAMW16 was stored onsite in a 21,000-gallon, steel, bi-level Rain-for-Rent tank™. Well development water from monitoring wells EPAMW17 and EPAMW18 was stored onsite in steel roll-off bins lined with plastic sheeting. Each well development water sample was collected using a new, disposable polyethylene bailer and inert rope to fill the appropriate sample containers (e.g., acidified, 40-mL glass vials for VOC analysis). After collecting water from mid-depth in the temporary storage container, the water slowly was poured from the bailer into the sample containers to minimize agitation and to prevent overfilling the containers. Packing and shipping the sample followed procedures described in the FSP (EPA, 2003a) and FSP Addendum (EPA, 2004).

For monitoring wells EPAMW16 and EPAMW17, drill cuttings and drilling mud waste samples were shipped to the EPA Region IX laboratory in Richmond, California (VOCs, metals, pH, flashpoint, total threshold limit concentrations for metals [TTLC Metals], and total petroleum hydrocarbons [TPH]). Well development water samples were shipped to A4 Scientific Laboratory in Woodlands, Texas (VOCs), and to Datachem Laboratory in Salt Lake City, Utah (dissolved metals).

For monitoring well EPAMW18, drill cuttings and drilling mud waste samples were shipped to the EPA Region IX laboratory in Richmond, California (VOCs, metals, pH, flashpoint, and TPH). TTLC metals analyses were performed by Bonner Analytical Testing in Hattiesburg, Mississippi. Well development water samples were shipped to the EPA Region IX laboratory in Richmond, California (VOCs, dissolved metals).

2.8 Well Sampling

MP well EPAMW16 and conventional monitoring wells EPAMW17 and EPAMW18 were sampled for the first time on March 30, February 15, and May 25, 2005, respectively. Sample

collection procedures are discussed in detail in the FSP (EPA, 2003a) and FSP Addendum (EPA, 2004). The sampling results are discussed in Section 3.2.

2.8.1 Conventional Monitoring Wells

For conventional monitoring wells, a dedicated QED Model #ST1102M 1.66-inch-diameter, variable-speed, bladder pump (bladder pump) was placed in the screened zone of the wells after well construction. These pumps were used for the initial sampling event and will be used during future purging and sampling of the conventional monitoring wells. Purging and sampling will follow low-flow sampling technique procedures described in detail in the FSP (EPA, 2003a) and FSP Addendum (EPA, 2004).

2.8.2 Multiport Monitoring Well

The procedures for sampling MP wells differ from those for conventional monitoring wells and involve collecting water from isolated screen intervals at depth in the MP wells. Water retrieved at the surface using specialized equipment is then collected in appropriate sample containers. Sampling procedures used for the MP wells are described in the FSP (EPA, 2003a) and FSP Addendum (EPA, 2004).

3.0 Sampling Results

This section summarizes drilling waste (solid and liquid) and groundwater sampling analytical results.

3.1 Investigation-Derived Waste

The installation and development of the three monitoring wells produced both solid and liquid IDW. A summary of the IDW analytical results is presented in Tables 3-1a and 3-1b. All wastes from well installation (i.e., from borehole drilling, well construction, and well development) were nonhazardous and were disposed offsite at approved disposal facilities. All IDW solids (soil and mud) were disposed at the McKittrick (Class 3) Waste Treatment Site in McKittrick, California, and all IDW water was disposed at Remedy Environmental Services in Anaheim, California. Low-level VOCs and dissolved metals were detected in the IDW solids and water. In addition, TPHs were detected in the IDW solids (Tables 3-1a and 3-1b).

3.2 Groundwater Quality and Level Data

Monitoring wells EPAMW16, EPAMW17, and EPAMW18 were sampled for the first time on March 30, February 15, and May 25, 2005, respectively. The results from sampling these wells, including the depth to water at each location, are shown in Table 3-2 and are summarized below.

- Well EPAMW16 (Walnut Grove Avenue, south of Las Tunas Drive, San Gabriel, California): Depth to groundwater is approximately 242 feet bgs. VOCs were detected in the groundwater at concentrations below the maximum contaminant levels (MCLs) for drinking water.
- Well EPAMW17 (Olive Avenue, north of Main Street, Alhambra, California): Depth to groundwater is approximately 311 feet bgs. Volatile organic compounds were detected in the groundwater at concentrations below the MCLs for drinking water.
- Well EPAMW18 (Marguerita Avenue, south of Commonwealth Avenue, Alhambra, California): Depth to groundwater is approximately 181 feet bgs. VOCs were detected in the groundwater at concentrations below the MCLs for drinking water.

Concentrations of VOCs are variable with time and could increase or decrease depending on a variety of factors. In addition, groundwater levels will fluctuate depending on a variety of factors and are anticipated to rise unless drought conditions persist. The effects of introducing potable water into wells EPAMW17 and EPAMW18 during the development process possibly could persist for a few quarterly sampling events. Quarterly sampling results will need to be carefully reviewed to assess whether this is the case (e.g., if groundwater quality data in the area suggest that VOCs significantly exceeding MCLs should be observed at EPAMW18, continued VOC concentrations below MCLs may be an artifact of well development given VOC contamination detected in nearby monitoring wells).

Table 3-1a
Analytical Results - Soil and Mud Samples
San Gabriel Valley NPL Area 3
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COMPOUND/ANALYTE and METHOD	Hazardous Waste TCLP Regulatory Level	Hazardous Waste TTLC Regulatory Level	SAMPLE ID			SAMPLE ID				SAMPLE ID	
			MW1-6-C1	MW1-6-C2	MW1-6-M1	MW1-7-C1	MW1-7-M1	MW1-7-M2**	MW1-7-M3	Y1X89	Y1X90
			12/22/2004			1/18/2004				5/17/2005	
VOCs (EPA 8260)	µg/L TCLP	µg/kg WET	µg/kg WET			µg/kg WET				µg/kg WET	
1,1,1-Trichloroethane	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
1,1,2,2-Tetrachloroethane	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21J	<11	<12
1,1,2-Trichloroethane	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
1,1,2-Trichloro-1,2,2-trifluoroethane	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11J	<12J
1,1-Dichloroethane	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
1,1-Dichloroethene	700	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
1,1-Dichloropropene	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
1,2,3-Trichloropropane	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
1,2-Dibromo-3-chloropropane	--	--	<15	<16	<45	<88	<81	<83	<100J	<45	<46
1,2-Dibromoethane (EDB)	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
1,2-Dichlorobenzene [o-Dichlorobenzene]	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
1,2-Dichloroethane	500	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
1,2-Dichloropropane	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
1,3-Dichlorobenzene [m-Dichlorobenzene]	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
1,3-Dichloropropane	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
1,4-Dichlorobenzene [p-Dichlorobenzene]	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
2-Butanone [Methyl ethyl ketone]	--	--	<15	<16	<45	<88	<81	<83	<100	<90	<92
2-Hexanone [Methyl butyl ketone]	--	--	<15	<16	<45	<88	<81	<83	<100	<90	<92
4-Methyl-2-pentanone [Methyl isobutyl ketone]	--	--	<15	<16	<45	<88	<81	<83	<100	<90	<92
Acetone	--	--	<15J	<16J	<45J	<88J	<81J	<83J	81J	<90J	<92J
Benzene	500	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
Bromodichloromethane	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
Bromoform [Tribromomethane]	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
Bromomethane	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
Carbon disulfide	--	--	<2.9	<3.2	<8.9	<18	9.6J	<17	<21	<11	<12
Carbon tetrachloride	500	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
Chlorobenzene	100,000	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
Chloroethane	--	--	<2.9	<3.2	<8.9	<18J	<16J	<17J	<21J	<11J	<12J
Chloroform	6,000	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
Chloromethane	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
cis-1,2-Dichloroethene	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
cis-1,3-Dichloropropene	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
Dibromochloromethane [Chlorodibromomethane]	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
Dichlorodifluoromethane	--	--	<2.9J	<3.2J	<8.9J	<18	<16	<17	<21	<11	<12
Dichloromethane	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
Diisopropyl ether	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	--	--
Ethylbenzene	--	--	<2.9	<3.2	44J	<18	<16	<17	<21	<11	<12
Ethyl-t-butyl ether	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<45	<46
m,p-Xylene	--	--	<5.9	<6.3	42	<35	<33	<33	<42	<23	<23
Methyl t-butyl ether (MTBE)	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<45	<46
o-Xylene	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
Styrene	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
Tert-butyl alcohol	--	--	<15	<16	<45	<88	<81	<83	<100	<230	<230
Tert-amyl-methyl ether	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<45	<46
Tetrachloroethene	700	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
Toluene	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	5.7J	14
trans-1,2-Dichloroethene	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
trans-1,3-Dichloropropene	--	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
Trichloroethene	500	2,040,000	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
Trichlorofluoromethane [Trichloromonofluoromethane]	--	--	<2.9	<3.2	<8.9	<18J	<16J	<17J	<21J	<11	<12
Vinyl chloride	200	--	<2.9	<3.2	<8.9	<18	<16	<17	<21	<11	<12
CA TITLE 22 METALS (EPA 6010/7471/7010)	mg/l TCLP	mg/kg WET	mg/kg WET			mg/kg WET				mg/kg WET	
Aluminum	--	--	7,300J	5,800	28,000	10,000	27,000	27,000	31,000	22,400	21,700
Antimony	--	500	<24J	<25	<71	<57J	<14	<13	<16	<41.7J	<27.9J
Arsenic	5	500	<47	<51	<140	<110	24J	30	31J	<6.9	<4.7
Barium	100	10,000	39	43	150	110	180	180	190	225J	235
Beryllium	--	75	0.3	0.2J	1.1	1.3	1	1	1.1	<1.2J	<1.1J
Cadmium	1	100	<1.2	<1.3	<3.6	<2.9	2	2.1	1.5	<3.5	0.33J
Calcium	--	--	2,700	3,100	11,000	9,400J	13,000	13,000	14,000	11,800	8,890
Chromium	5	2,500	8.8	7.4	28	3J	41	41	39	32.7	31.5
Cobalt	--	8,000	3.5J	3.3J	13J	<11	12	12	13	11.9J	12.1J
Copper	--	2,500	12	16	33	15J	35	35	37	<27.5J	25.6
Iron	--	--	12,000	11,000	33,000	9,400	32,000	32,000	34,000	33,100	32,500
Lead	5	1,000	<24	<25	<71	38J	12J	13	13J	<12J	12.9
Magnesium	--	--	2,400	2,200	9,200	3,100	9,400	9,400	10,000	8,520	8,500
Manganese	--	--	190J	170	700	660J	530	530	620	533	498
Mercury	0.2	20	0.110J	0.16	0.33	<0.071	0.4	0.19	0.34	<0.69	<0.47
Molybdenum	--	3,500	<12	<13	<36	<29	4.7J	4.4J	<8.2	4.4J	2.9J
Nickel	--	2,000	<12	<13	18J	<29	37	37	34	24.6J	23.7J
Potassium	--	--	1,500	1,500	5,900	1,700J	6,200	6,300	6,700	5,190	4,990
Selenium	1[#]	100	<47	<51	<140	<110	<29	<27	<33	<24.3J (<3.5J) {0.048J}	<16.3J (<3.5J) {0.052J}
Silver	5	500	<2.4	<2.5	7.1	<5.7	<1.4	<1.3	<1.6	<6.9	<4.7
Sodium	--	--	320	450	1,500	19,000	2,200	2,100	2,000	3,300J	2,150J
Thallium	--	700	<82	<89	<250	<200	<50	<47	<57	6.4J	5.2J
Vanadium	--	2,400	23	22	64	6.7J	93	93	94	64.7J	60
Zinc	--	5,000	28	33	99	75	110	110	120	88.8	82.6
OTHER ANALYSES											
pH (EPA 9040B)	--	--	7.9	8	8.4	9.5	8.2	8.3	9.2	9.9	7.8
% Solids	--	--	85	79	28	35	14	15	12	22	20
Flashpoint (EPA 1010)	--	--	>140 F	>140 F	>140 F	>140 F	>140 F	>140 F	>140 F	>60 C	>60 C
8015B TPH gas (mg/kg)	Disposal facility-specific	Disposal facility-specific	<7.5	<7.0	<18J	<28	<0.36J	<0.33J	<0.42J	<31	<34
8015B TPH diesel (mg/kg)	Disposal facility-specific	Disposal facility-specific	<5.9J	<6.3	<8.5J	<83J	<16J	<14	<17	35J	19J
8015B TPH oil (mg/kg)	Disposal facility-specific	Disposal facility-specific	21J	<25	<34	<330J	<63	<56	34J	150J	78J
Roll-Off Bin or Tank Where Sample Collected			Bin HMT209L	Bin HMT206L	Bin 274529	Bin HMT208L	Bin 274504	Bin 274504	Bin HMT204L	Bins (HMT148, HMT134, 274518) (composite)	Bins (274509, 274507, HMT157, HMT148) (composite)
Matrix			soil	soil	mud	soil	mud	mud	mud	mud	mud
Well Name			MW1-6			MW1-7				MW 1-8	

Notes:

Land Disposal Restrictions are based on 22 CCR 268.48 and 40 CFR 268.48 Universal Treatment Standards. Metals concentrations are 22 CCR 268.48 and 22 CCR 66268.107 (WET concentrations). CA rules state that the lower of the CA or the Federal Standard shall be used if the waste is a RCRA waste.

Note that the soil LDR standards are not included in the table (since the drilling mud will probably preclude their use).

TCLP = EPA Toxicity Characteristics Leaching Procedure; TTLC = California Total Threshold Limit Concentration

-- = No applicable regulatory level

< = Compound or analyte not detected above value shown

J = Value is estimated

Selenium value in parentheses represents equivalent wet weight concentration; value in bracket represents STLC level in mg/L

NA = Not analyzed or observed

[#]The Federal TCLP level is equal to the state of California STLC (Soluble Threshold Limit Concentration) level

** Duplicate sample of MW1-7-M1

composite = composite sample from more than one roll-off bin

Table 3-1b
Analytical Results - Wastewater Samples
San Gabriel Valley NPL Area 3
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COMPOUND/ANALYTE and METHOD	Hazardous Waste TCLP Regulatory Level	Hazardous Waste STLC Regulatory Level	SAMPLE ID			
			Y1NY3	Y1NY1	Y1NY2**	Y1X92
			2/10/2005	2/10/2005		5/16/2005
VOCs (EPA 8260)	µg/L TCLP	µg/L STLC	µg/L	µg/L		µg/L
1,1,1-Trichloroethane	--	--	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	--	--	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	--	--	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloro-1,2,2-trifluoroethane	--	--	<0.5	<0.5	<0.5	<0.5
1,2,3-Trichlorobenzene	--	--	<0.5	<0.5	<0.5	<0.5
1,2,4-Trichlorobenzene	--	--	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	--	--	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethene	700	--	<0.5	<0.5	<0.5	<0.5
1,2-Dibromo-3-chloropropane	--	--	<0.5	<0.5	<0.5	<2
1,2-Dibromoethane (EDB)	--	--	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene [o-Dichlorobenzene]	--	--	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	500	--	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	--	--	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene [m-Dichlorobenzene]	--	--	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene [p-Dichlorobenzene]	7500	--	<0.5	<0.5	<0.5	<0.5
2-Butanone [Methyl ethyl ketone]	200,000	--	<5.0	<5.0	<5.0	<4
2-Hexanone [Methyl butyl ketone]	--	--	<5.0	<5.0	<5.0	--
4-Methyl-2-pentanone [Methyl isobutyl ketone]	--	--	<5.0	<5.0	<5.0	<4
Acetone	--	--	<5.0	<5.0	1.3J	<4
Benzene	500	--	<0.5	<0.5	<0.5	<0.5
Bromochloromethane	--	--	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	--	--	<0.5	1.4	1.4	0.4J
Bromoform [Tribromomethane]	--	--	<0.5	1.1	1.2	<0.5
Bromomethane	--	--	<0.5	<0.5	<0.5	<0.5
Carbon disulfide	--	--	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	500	--	<0.5	<0.5	<0.5	<0.5
Chlorobenzene	100,000	--	<0.5	<0.5	<0.5	<0.5
Chloroethane	--	--	<0.5	<0.5	<0.5	<0.5
Chloroform	6,000	--	<0.5	0.98	1	0.3J
Chloromethane	--	--	<0.5	<0.5	<0.5	<0.5
Cyclohexane	--	--	<0.5	<0.5	<0.5	--
cis-1,2-Dichloroethene	--	--	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene	--	--	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane [Chlorodibromomethane]	--	--	<0.5	1.6	1.6	0.4J
Dichlorodifluoromethane	--	--	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	--	--	<0.5	<0.5	<0.5	<0.5
Isopropylbenzene	--	--	<0.5	<0.5	<0.5	<0.5
Methyl Acetate	--	--	<0.5	<0.5	<0.5	--
Methylcyclohexane	--	--	<0.5	<0.5	<0.5	--
Methyl t-butyl ether (MTBE)	--	--	<0.5	<0.5	<0.5	<2
Methylene Chloride	--	--	<0.5J	<0.5J	<0.5J	--
Styrene	--	--	<0.5	<0.5	<0.5	<0.5
Tetrachloroethene	700	--	<0.5	<0.5	<0.5	<0.5
Toluene	--	--	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethene	--	--	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	--	--	<0.5	<0.5	<0.5	<0.5
Trichloroethene	500	204,000	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane [Trichloromonofluoromethane]	--	--	<0.5	<0.5	<0.5	<0.5
Vinyl chloride	200	--	<0.5	<0.5	<0.5	<0.5
Xylenes	--	--	<0.5	<0.5	<0.5	<1
CA TITLE 22 METALS (EPA 6010/7471/7010)	µg/L TCLP	µg/L STLC	µg/L	µg/L		µg/L
Aluminum	--	--	NA	NA	NA	<20
Antimony	--	15,000	<2.0	<0.9J	<0.7J	0.95J
Arsenic	5,000	5,000	0.56J	0.43J	0.46J	2.7
Barium	100,000	100,000	39	17.5	18.2	16
Beryllium	--	750	<1.0	<1.0	<1.0	<0.50
Cadmium	1,000	1,000	0.16J	<1.0	<1.0	<1
Chromium	5,000	5,000	<1.4J	<0.67J	<0.71J	0.65J
Cobalt	--	80,000	<0.41J	<0.18J	<0.20J	<0.50
Copper	--	25,000	<2.0	<2.0	<2.0	6.6
Lead	5,000	5,000	<1.0	<1.0	<1.0	<2
Manganese	--	--	94.9	54.5	56.5	1J
Mercury	200	200	<0.2	<0.2	<0.2	<0.030
Molybdenum	--	350,000	8.6	16.2	16.2	29
Nickel	--	20,000	1.3	1.6	1.9	2.1
Selenium	1,000	1,000	2.0J	1.5J	1.6J	1.3
Silver	5,000	5,000	<1.0	<1.0	<1.0	<0.50
Thallium	--	7,000	<1.0	<1.0	<1.0	<2
Vanadium	--	24,000	1.9	<0.71J	<0.54J	2.6J
Zinc	--	250,000	646	2.0	2.3	29
Roll-Off Bin/Tank, Where Sample Collected			Tank 254525	Bins 94520/274529	Bins 94520/274529	Bin 274518
Matrix			water	water (composite)	water (composite)	water
Well Name			MW1-6	MW1-7		MW1-8

Notes:
TCLP = EPA Toxicity Characteristics Leaching Procedure
STLC = Soluble Threshold Limit Concentration
-- = No applicable regulatory level
< = Compound or analyte not detected above value shown
J = Value is estimated
NA = Not Analyzed
** Duplicate sample of Y1NY1

Table 3-2
Groundwater Sampling Results - VOCs
San Gabriel Valley NPL Area 3
Well Installation Report

							Volatile Organic Compounds													
						Units	µg/L													
Well Name	Well/ Station ID	Well Depth (ft bgs)	Screened Interval(s) (ft bgs)	Casing Diam. (in.)	Date Sampled	Depth to Water (feet bgs)	TCE	PCE	1,1-DCE	cis-1,2-DCE	CCL	1,2-DCA	Acetone	Chloroform	Carbon Disulfide	Benzene	Toluene	Chloromethane	2-Butanone	DFM
MW1-6	EPAMW16_07	820	265-275	4	03/30/05	242.60	0.23J	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5J	<0.5	<5J	<0.5
					05/20/05	241.86	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.7J	<0.5	<0.5	<0.5	0.25J	<0.5	<5	<0.5
	EPAMW16_06		335-345		03/31/05	256.48	<0.5/<0.5	0.14J/0.2J	<0.5/<0.5	<0.5/<0.5	<0.5/<0.5	<0.5/<0.5	<5/2.4J	<0.5/<0.5	<0.5/<0.5	<0.5/<0.5	<0.5/<0.5	<0.5/<0.5	<5J/<5J	<0.5/<0.5
					05/20/05	256.15	<0.5	0.2J	<0.5	<0.5	<0.5	<0.5	4.3J	<0.5	<0.5	<0.5	0.28J	<0.5	<5	<0.5
	EPAMW16_05		405-415		03/31/05	260.20	0.14J	0.23J	<0.5	<0.5	<0.5	<0.5	2.5J	<0.5	<0.5	0.16J	<0.5	0.24J	<5J	<0.5
					05/20/05	259.79	<0.5	0.19J	<0.5	<0.5	<0.5	<0.5	2.5J	<0.5	0.11J	<0.5	0.29J	<0.5	<5	<0.5
	EPAMW16_04		505-515		03/31/05	261.06	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.6J	<0.5	<0.5	<0.5	<0.5	0.12J	<5J	<0.5
					05/20/05	259.63	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.3J	<0.5	0.16J	<0.5	0.23J	<0.5	<5	<0.5
	EPAMW16_03		585-595		03/30/05	265.35	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<5J	<0.5	<0.5	0.17J	<0.5	0.4J	<5J	<0.5
					05/20/05	264.33	0.1J	<0.5	<0.5	<0.5	<0.5	<0.5	2.6J	<0.5	0.42J	<0.5	0.25J	0.19J	<5	<0.5
	EPAMW16_02		650-660		03/30/05	266.70	0.13J	<0.5	<0.5	<0.5	<0.5	<0.5	<5J	<0.5	0.1J	0.18J	<0.5J	0.3J	<5J	<0.5
					05/19/05	266.15	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.3J	<0.5	0.24J	<0.5	0.24J	0.24J	<5	<0.5
	EPAMW16_01		790-800		03/30/05	275.21	0.26J	<0.5	<0.5	<0.5	<0.5	<0.5	<5J	0.11J	<0.5	0.19J	<0.5J	<0.5	<5J	<0.5
					05/19/05	278.44	0.12J	<0.5	0.1J	<0.5	<0.5	<0.5	3.1J	<0.5	0.24J	<0.5	0.44J	0.28J	<5	<0.5
MW1-7	EPAMW17	330	270-320	4	02/15/05	306.65	<0.5	<0.5	<0.5J	<0.5	<0.5	<0.5	<5J	4.5	<0.5	<0.5	<0.5	<0.5J	<5	<0.5
					05/26/05	311.31	0.14J	0.31J	<0.5	<0.5	<0.5	<0.5	2.2J	3.1	0.17J	<0.5	<0.5J	<0.5	<5	0.27J
MW1-8	EPAMW18	236	196-226	4	05/25/05	180.91	0.23J/0.24J	<0.5/<0.5	<0.5/<0.5	<0.5J/<0.5J	<0.5/<0.5	<0.5/<0.5	<5/<5	2.7/3	<0.5/<0.5	0.12J/0.14J	<0.5J/<0.5J	<0.5/0.82	<5/<5	<0.5/<0.5
MCL(µg/L; mg/L for nitrate)							5 [1]	5 [1]	6 [1]	6 [1]	0.5 [1]	0.5 [1]	None	None	160 [3]	1 [1]	150 [1]	None	None	1 [3]

NOTES: TCE=Trichloroethene, PCE=Tetrachloroethene, 1,1,-DCE=1,1-Dichloroethene, cis-1,2-DCE=cis-1,2-Dichloroethene, CCL=Carbon Tetrachloride, 1,2-DCA=1,2-Dichloroethane, NDMA=N-Nitrosodimethylamine.
DFM=Dichlorodifluoromethane.
-- = Not sampled.
Only selected, most common, VOCs area presented.
MCL=EPA or California Maximum Contaminant Level (whichever is lower).
[1] = California
[2] = EPA
[3] = California Notification Limit
J-indicates results that are considered estimates because they fall between the instrument detection limit and the contract required quantitation limit.
All other reported VOCs were not detected above laboratory detection limits (generally 1 ug/L).
Not all analytes are sampled for each quarter. The analyses performed each quarter are based on rationales provided in EPA's FSP.
Shading=not detected or not analyzed.

4.0 Project Deviations and Complications

4.1 Unanticipated Project Deviations and Justifications

This section summarizes unanticipated deviations from the planned well installation activities as described in the FSP (EPA, 2003a) and FSP Addendum (EPA, 2004). These deviations were due primarily to varying site conditions (e.g., lithology and hydrogeology).

- **IDW Sample Containers** - The FSP Addendum identified the use of Encore™ sampling containers and 6-inch brass sleeves for the collection of IDW solids (soil and mud). Due to the low percent solids of the IDW solids (average of 66 percent for soil and 19 percent for mud), the EPA Region IX lab approved the use of 40-mL VOA vials, 1-liter amber jars, and 4-ounce glass jars for sample collection as described in Section 2.7.

- **Depth of EPAMW17** - The expected depth to groundwater at EPAMW17 was approximately 180 to 200 feet bgs, based on groundwater elevations at other wells in this portion of Area 3. However, the borehole was drilled to a depth of 300 feet bgs, and no groundwater was encountered. The borehole subsequently was drilled to a depth of 410 feet bgs, at which time groundwater was encountered at about 310 feet bgs based on the sonic geophysical logging results.

- **Development Method for EPAMW17 and EPAMW18 -** Pumping was identified as a development method for conventional wells in the FSP Addendum (EPA, 2004). However, wells EPAMW17 and EPAMW18 were screened in relatively low permeability materials that did not yield much groundwater. Therefore, pumping of groundwater could not be performed. These wells instead were developed, in part, by adding potable water to the well casing to fully submerge the well screens to allow for swabbing and bailing, as described in Section 2.5.2. The amount of water removed during the bailing process was estimated to be roughly equal to the amount of potable water introduced to the wells, thereby minimizing the potential for dilution of subsequent groundwater samples.

- **Location of EPAMW18 -** Wells EPAMW17 and EPAMW18 were to be installed west of the Whittier Fault Zone. However, the depth to groundwater at EPAMW17 was encountered much deeper than expected, indicating that the well was installed east of the Whittier Fault Zone. Therefore, EPAMW18 was installed northeast of the planned location to ensure that the well was installed west of the fault and to provide information on subsurface conditions and groundwater in the Mission Triangle area (Figure 2-1). The relocation of EPAMW18 delayed drilling activities while the new location was approved by the City of Alhambra.

4.2 Unanticipated Complications and Resolutions

One unanticipated complication for this project involved the IDW solids results for EPAMW18. Some of the results for the TTLC metals analyses performed by CLP-Bonner

Analytical Testing Laboratory were qualified by the laboratory as rejected. To resolve this issue, EPA Region IX performed a Tier II review of the metals results, rather than the Tier 1 review identified in the FSP Addendum. The Tier II review indicated that the data were acceptable for waste disposal requirements.

5.0 References

U.S. Environmental Protection Agency (EPA). 2003a. *Field Sampling Plan For San Gabriel Valley NPL Area 3 Remedial Investigation Field Activities.* Prepared by CH2M HILL. February.

_____. 2003b. *Draft Well Installation Report for San Gabriel Valley NPL Area 3 Remedial Investigation/Feasibility Study.* Prepared by CH2M HILL. October.

_____. 2004. *Field Sampling Plan Addendum No. 1 for San Gabriel Valley NPL Area 3 Remedial Investigation Field Activities.* Prepared by CH2M HILL. October.

Appendix A
Lithologic Boring Logs

CH2MHILL

Boring Number: MW1-6

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Walnut Grove Ave and Las Tunas Dr
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 12.06.04/12.16.04

Depth (ft)	Borehole Information / Soil Type	Lithologic Description	MW Construction	Comments
		Ground Surface		
0		**ASPHALT AND ROAD BASE MATERIAL**		Borehole location cleared to 7 feet using air knife method. 18 inch borehole drilled using bucket auger and 14 inch conductor casing installed to 25 feet
5		**SANDY SILT/CLAY (ML/CL)** same as above, trace fine gravel		
10				
15				
20				
25				Logger B. Lechler 12/09/04
30		**SILTY SAND (SM)** brown, moist, soft fine to medium grained, some gravel, cobbles		0940 hrs
35				
40		**WELL GRADED SAND W/ SILT AND GRAVEL (SW-SM)** dark yellowish brown (10YR 4/6), 30% medium sand, 20% coarse sand, 20% fine gravel, 20% fine sand, 10% silt		
45				rig chatter
50				1000 hrs

CH2MHILL

Boring Number: MW1-6

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Walnut Grove Ave and Las Tunas Dr
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 12.06.04/12.16.04

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
55		**SILTY SAND (SM)** dark yellowish brown (10YR 3/6), 50% very fine to fine sand, 30% medium sand, 15% silt, 5% coarse sand and gravel. Interbeds of clay (CH), very dark grayish brown (10YR 3/2), 100% fines		rig chatter
60		**SILTY SAND W/ GRAVEL (SM)** dark yellowish brown (10YR 3/6), 50% fine sand, 20% medium to coarse sand, 15% gravel, 15% silt		
65				
70				1035 hrs
75				
80		**SILTY SAND (SM) & POORLY GRADED GRAVEL (GP)** SM: same as 40-50 feet. GP: 70% gravel (10-20 mm), 30% coarse sand to fine gravel, more gravel 60-70 feet		
85				
90		**POORLY GRADED GRAVEL (GP)** yellowish brown (10YR 5/4), 80% fine gravel (10-20 mm), 10% fine gravel (<10 mm), 5% coarse sand, 5% fine to medium sand		1050 hrs
95				rig chatter
100				

CH2MHILL

Boring Number: MW1-6

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Walnut Grove Ave and Las Tunas Dr
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 12.06.04/12.16.04

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
105				
110		**POORLY GRADED GRAVEL W/ SAND (GP)** yellowish brown (10YR 5/4), 75% fine gravel (2-10 mm), 20% coarse to very coarse sand, 5% fine to medium sand		1120 hrs
115				
120		**POORLY GRADED GRAVEL W/ SILT AND SAND (GP-GM)** dark yellowish brown (10YR 4/4), 60% fine gravel (2-10 mm); 20% coarse sand, 10% fine to medium sand, 10% fines		
125				
130				1155 hrs, stop for lunch, resume drilling at 1300 hrs
135				
140				rig chatter
		SILT W/ SAND (ML) dark yellowish brown (10YR 4/4), 80% fines, 15% very fine to fine sand, 5% medium sand, trace coarse sand, gravel lenses 130-140 feet		rig chatter
145				
150				1325 hrs

CH2MHILL

Boring Number: MW1-6

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Walnut Grove Ave and Las Tunas Dr
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 12.06.04/12.16.04

Depth (ft)	Borehole Information / Soil Type	Lithologic Description	MW Construction	Comments
155		**SILT W/ SAND (ML)** dark yellowish brown (10YR 3/6), same as above, but more dense (silt came up in larger balls)		
160		**SILTY GRAVEL (GM)** yellowish brown (10YR 5/4), 60% fine gravel, 20% fines (as lenses or thin beds), 10% coarse sand, 10% fine to medium sand		
165				rig chatter
170				1435 hrs
175				
180		**POORLY GRADED GRAVEL W/ SILT AND SAND (GP-GM)** yellowish brown (10YR 5/4), 70% fine gravel, 10% coarse sand, 10% fine to medium sand, 10% fines		
185				
190		**SANDY SILT/CLAY (ML/CL)** yellowish brown (10YR 4/4), 80% fines, 15% very fine to fine sand, 5% medium to coarse sand, trace fine gravel 200-220 feet		1510 hrs
195				
200				

CH2MHILL

Boring Number: MW1-6

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Walnut Grove Ave and Las Tunas Dr
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 12.06.04/12.16.04

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
205		**SANDY SILT/CLAY (ML/CL)** yellowish brown (10YR 5/4), 65% fines, 15% very fine to fine sand, 10% fine gravel, 10% medium to coarse sand		
210				1540 hrs
215				
220		**SILT/CLAY(ML/CL)** dark yellowish brown (10YR 4/4), 90% fines, 10% fine to coarse sand, more clay than above		
225				
230		**SILTY SAND (SM)** dark yellowish brown (10YR 4/4), 50% very fine to fine sand, 30% fines, 10% coarse sand, 10% medium sand		1615 hrs
235				
240		**SILTY SAND (SM)** dark yellowish brown (10YR 4/4), 40% very fine to fine sand, 30% fines, 20% medium sand, 10% coarse sand to fine gravel		
245				
250				1645 hrs

CH2MHILL

Boring Number: MW1-6

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Walnut Grove Ave and Las Tunas Dr
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 12.06.04/12.16.04

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
255		**SANDY SILT (ML)** yellowish brown (10YR 5/4), 50% fines, 30% very fine to fine sand, 15% medium to coarse sand, 5% fine gravel		
260		**SANDY SILT (ML)** yellowish brown (10YR 5/4), 60% fines, 30% very fine to fine sand, 10% medium sand to fine gravel		
265				
270		**SILTY GRAVEL W/ SAND (GM)** dark yellowish brown (10YR 4/6), 40% fine gravel, 20% coarse sand, 20% fine to medium sand, 20% silt		1715 hrs
275				rig chatter
280		**POORLY GRADED GRAVEL W/ SILT (GP-GM)** yellowish brown (10YR 5/6), 80% fine gravel (could be pieces of larger clasts), 10% silt, 5% coarse sand, 5% fine to medium sand		
285				
290		**SANDY SILT/CLAY (ML/CL) & SILTY GRAVEL (GM)** ML/CL: yellowish brown (10YR 5/6), 80% fines, 15% fine sand, 5% medium to coarse sand GM: 70% coarse sand to fine gravel, 15% fine to medium sand, 15% fines		1810 hrs, done drilling for day Resume drilling 12/10/04 at 0800 hrs
295				
300				0815 hrs, Pickup pump not working, stop to repair

CH2MHILL

Boring Number: MW1-6

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Walnut Grove Ave and Las Tunas Dr
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 12.06.04/12.16.04

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
305		**SANDY SILT/CLAY (ML/CL) & SILTY SAND (SM)** (ML/CL): same as 290-300 feet (SM): 60% coarse sand, 15% medium sand, 15% silt, 10% very fine to fine sand		
310				
315				
320		**SANDY SILT (ML) & POORLY GRADED GRAVEL W/ SAND (GP)** ML: yellowish brown (10YR 5/4), 70% fines, 15% medium to coarse sand, 15% very fine to fine sand GP: 70% fine gravel, 20% coarse sand, 10% fine to medium sand		rig chatter
325				rig chatter
330		**POORLY GRADED GRAVEL W/ SAND (GP)** 80% fine gravel (could be fragments of larger gravel), 15% coarse sand, 5% fine to medium sand, some sandy silt (ML) interbeds		0950 hrs rig chatter 331-334 feet
335				
340		**POORLY GRADED GRAVEL W/ SILT AND SAND (GP-GM)** brown (10YR 5/3), 70% fine gravel, 10% coarse sand, 10% fine to medium sand, 10% silt		
345				rig chatter
350				1130 hrs

CH2MHILL

Boring Number: MW1-6

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Walnut Grove Ave and Las Tunas Dr
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 12.06.04/12.16.04

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
355		**SANDY SILT/CLAY (ML/CL)** yellowish brown (10YR 5/4), 60% fines, 30% very fine to fine sand, 10% medium to coarse sand, trace gravel		
360				
365				
370		**SANDY SILT (ML)** dark yellowish brown (10YR 4/6), 65% fines, 25% very fine to fine sand, 10% medium to coarse sand		1200 hrs
375				
380		**SILTY SAND (SM)** dark yellowish brown (10 YR 4/6), 40% very fine to fine sand, 30% fines, 30% medium to coarse sand		
385				
390		**SANDY SILT (ML)** yellowish brown (10YR 5/4), 60% fines, 30% very fine to fine sand, 10% medium to coarse sand		1240 hrs
395				
400				

CH2MHILL

Boring Number: MW1-6

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Walnut Grove Ave and Las Tunas Dr
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 12.06.04/12.16.04

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
405		**SILTY SAND (SM)** yellowish brown (10YR 5/4), 50% very fine to fine sand, 25% fines, 15% medium sand, 10% coarse sand, trace gravel		rig chatter rig chatter
410		**POORLY GRADED SAND W/ GRAVEL (SP)** 60% coarse sand, 30% fine gravel (< 5 mm), 10% fine to medium sand, gravel subangular to rounded, some silty sand (SM) interbeds as above		1330 hrs
415				
420				rig chatter
425				
430		**CLAY (CL)** yellowish brown (10YR 5/4), medium plasticity, 90% fines, 10% fine to medium sand, some sand interbeds		1410 hrs
435				
440		**SILT (ML) & POORLY GRADED SAND (SP)** ML: yellowish brown (10YR 5/4), 80% fines, 15% fine to medium sand, 5% coarse sand SP: 70% coarse sand to fine gravel, 30% fine to medium sand		
445				rig chatter
450				1450 hrs

CH2MHILL

Boring Number: MW1-6

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Walnut Grove Ave and Las Tunas Dr
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 12.06.04/12.16.04

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
455		**SILTY SAND (SM)** yellowish brown (10YR 5/4), 40% very fine to fine sand, 40% fines, 20% medium to coarse sand		rig chatter
460		**WELL GRADED SAND W/ SILT (SW-SM)** yellowish brown (10YR 5/6), 35% coarse sand, 35% medium sand, 15% very fine to fine sand, 10% fines, 5% fine gravel		
465				rig chatter
470		**WELL GRADED SAND W/ SILT AND GRAVEL (SW-SM) & SANDY SILT (ML)** SW-SM: yellowish brown (10YR 5/6), 30% coarse sand, 20% medium sand, 20% fine sand, 20% fine gravel, 10% silt ML: 60% fines, 30% fine to medium sand, 10% coarse sand		1550 hrs, stop drilling to repair pump, resume drilling at 1735 hrs rig chatter
475				
480		**SANDY SILT (ML) & POORLY GRADED GRAVEL (GP)** ML: 60% fines, 30% very fine to fine sand, 10% medium sand GP: 70% fine gravel, 20% coarse sand, 10% fine to medium sand		rig chatter
485				rig chatter 1815 hrs, done drilling for day
490		**CLAY (CL) & WELL GRADED SAND W/ SILT AND GRAVEL (SW-SM)** CL: brown (10YR 5/3), 90% fines, 10% very fine to fine sand SW-SM: 30% medium sand, 30% very fine to fine sand, 15% coarse sand, 15% fine gravel, 10% silt		Resume drilling 12/11/04 0830 hrs, change bit to tricone for harder formations
495				
500				

CH2MHILL

Boring Number: MW1-6

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Walnut Grove Ave and Las Tunas Dr
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 12.06.04/12.16.04

Depth (ft)	Borehole Information / Soil Type	Lithologic Description	MW Construction	Comments
505		**SILTY SAND (SM)** brown (10YR 5/3), 30% coarse sand, 30% fine to medium sand, 30% fines, 10% fine gravel		Driller says it feels like hard sand
510		**POORLY GRADED SAND W/ SILT (SP-SM)** 50% coarse sand, 20% medium sand, 20% fine sand, 10% fines		0910 hrs, stop to clean shaker screens, resume drilling at 0930 hrs
515				
520		**POORLY GRADED SAND (SP)** 60% coarse sand, 20% medium sand, 15% fine sand, 5% fines		
525				
530		**SANDY SILT (ML)** yellowish brown (10YR 5/4), 60% fines, 20% coarse sand, 10% medium sand, 10% fine sand		0950 hrs
535				
540		**SANDY SILT (ML)** yellowish brown (10YR 5/4), 60% fines, 15% fine sand, 15% medium sand, 10% coarse sand		
545				
550				1030 hrs

CH2MHILL

Boring Number: MW1-6

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Walnut Grove Ave and Las Tunas Dr
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 12.06.04/12.16.04

Depth (ft)	Borehole Information / Soil Type	Lithologic Description	MW Construction	Comments
555		**SILTY SAND (SM)** yellowish brown (10YR 5/6), 25% coarse sand, 25% medium sand, 25% very fine to fine sand, 25% fines		
560		**SILT (ML)** yellowish brown (10YR 5/6), 60% fines, 20% fine sand, 10% medium sand, 10% coarse sand		
565				hard drilling
570		**SANDY SILT (ML)** yellowish brown (10YR 5/6), 50% fines, 20% coarse sand, 15% fine sand, 15% medium sand		1110 hrs
575				
580				rig chatter
585				rig chatter
590		**WELL GRADED SAND W/ SILT (SW-SM)** yellowish brown (10YR 5/6), 30% coarse sand, 30% medium sand, 30% fine sand, 10% silt		1210 hrs
595				560-600 feet, drilling has been slow/hard, recovery is poor
600				

CH2MHILL

Boring Number: MW1-6

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Walnut Grove Ave and Las Tunas Dr
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 12.06.04/12.16.04

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
605		**SANDY SILT (ML)** yellowish brown (10YR 5/6), 80% fines, 20% very fine to medium sand		
610		**SILT W/ SAND (ML)** 80% fines, 15% fine sand, 5% medium to coarse sand		1300 hrs Driller says silt probably started around 605 feet
615				
620				
625		**SILTY SAND (SM)** 30% fine sand, 30% silt, 20% medium sand, 20% coarse sand		hard drilling
630		**SILTY SAND (SM)** dark yellowish brown (10YR 4/6), 30% very fine to fine sand, 30% fines, 30% medium sand, 10% coarse sand, silt/clay (ML/CL) interbeds 640-650 feet		1350 hrs
635				
640				
645				
650				1425 hrs

CH2MHILL

Boring Number: MW1-6

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Walnut Grove Ave and Las Tunas Dr
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 12.06.04/12.16.04

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
655		**SILT/CLAY (ML/CL)** Very hard to retrieve sample while drilling. Not much material coming out on the shaker, so likely fine grained		
660				
665				
670		**SANDY SILT (ML)** yellowish brown (10YR 5/4), 50% fines, 30% very fine to fine sand, 15% medium sand, 5% coarse sand		1530 hrs
675				
680		**SANDY SILT/CLAY (ML/CL)** yellowish brown (10YR 5/4), 70% fines, 20% very fine to fine sand, 10% medium to coarse sand		
685				
690		**CLAY (CL)** 90% fines, 10% very fine to fine sand, trace medium to coarse sand		1615 hrs, done drilling for day Resume drilling 12/13/04 1010 hrs, changed back to bit for softer formations
695				
700				

CH2MHILL

Boring Number: MW1-6

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Walnut Grove Ave and Las Tunas Dr
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 12.06.04/12.16.04

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
705		**SANDY CLAY (CL)** brown (10YR 4/3), 70% fines, 15% fine sand, 10% medium sand, 5% coarse sand		rig chatter
710		**SANDY CLAY (CL)** brown (10YR 4/3), 60% fines, 20% fine sand, 10% medium sand, 10% coarse sand		1045 hrs
715				
720		**SILTY SAND (SM)** brown (10YR 4/3), 40% fines, 25% coarse sand, 25% medium sand, 10% fine sand		slow/hard drilling
725				
730		**SANDY SILT/CLAY (ML/CL)** brown (10YR 4/3), 70% fines, 25% fine sand, 5% medium to coarse sand		1145 hrs
735				
740		**SILT W/ SAND (ML)** dark yellowish brown (10 YR 4/6), 80% fines, 15% fine sand, 5% medium to coarse sand		
745				
750				1220 hrs

CH2MHILL

Boring Number: MW1-6

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Walnut Grove Ave and Las Tunas Dr
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 12.06.04/12.16.04

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
755		**SILT (ML)** yellowish brown (10YR 5/4), 90% fines, 10% fine sand		
760		**SANDY SILT (ML)** yellowish brown (10YR 5/4), 60% fines, 30% fine sand, 10% medium to coarse sand, trace fine gravel		
765				
770		**SANDY SILT (ML)** yellowish brown (10YR 5/4), 70% fines, 15% fine sand, 10% medium sand, 5% coarse sand		1300 hrs
775				
780				rig chatter 783-788 feet
785				
790		**SILTY SAND (SM)** 40% fines, 25% fine sand, 20% medium sand, 15% coarse sand		1405 hrs
795				rig chatter rig chatter
800				rig chatter 1440 hrs, done drilling, run geophysics

CH2MHILL

Boring Number: MW1-6

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Walnut Grove Ave and Las Tunas Dr
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 12.06.04/12.16.04

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
805		**WELL GRADED SAND W/ SILT (SW-SM)** 35% medium sand, 30% fine sand, 25% coarse sand, 10% fines		Resume drilling 12/16/04 1420 hrs
810		**SILTY SAND (SM)** 30% medium sand, 30% fine sand, 20% coarse sand, 20% fines		1445
815				
820				rig chatter
825				rig chatter
830		End of Log		
835				
840				
845				
850				

CH2MHILL

Boring Number: MW1-7

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: N. Olive Ave and Main St
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 01.03.05/01.06.05

Depth (ft)	Borehole Information / Soil Type	Lithologic Description	MW Construction	Comments
		Ground Surface		
0		**ASPHALT AND ROAD BASE MATERIAL**		Borehole location cleared to 7 feet using air knife method. 18 inch borehole drilled using bucket auger and 14 inch conductor casing installed to 25 feet
5		**SANDY SILT (ML)** brown, cobbles up to 10 inches in diameter, fewer and smaller cobbles 10-12 feet		
10				
15		**SILTY SAND (SM)** brown		
20				
25		**POORLY GRADED GRAVEL W/ SAND (GP)** 70% fine gravel (<10 mm), 20% coarse sand, 10% silt to medium sand		Logger B. Lechler 01/04/05 1555 hrs
30				1605 hrs
35				rig chatter
40		**SANDY SILT (ML)** dark yellowish brown (10YR 4/6), 70% fines, 10% coarse sand, 10% medium sand, 10% fine sand		
45				
50				1630 hrs

CH2MHILL

Boring Number: MW1-7

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: N. Olive Ave and Main St
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 01.03.05/01.06.05

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
55–60–65–70–75		**SANDY SILT (ML)** dark yellowish brown (10YR 4/6), 60% fines, 30% very fine to fine sand, 10% medium sand, trace coarse sand		1655 hrs
80–85		**SILTY SAND (SM)** dark yellowish brown (10YR 4/6), 40% fine sand, 40% fines, 20% medium sand		
90–95–100		**SILTY SAND (SM)** dark yellowish brown (10YR 4/6), 30% medium sand, 30% fine sand, 30% fines, 10% coarse sand, trace gravel		1730 hrs rig chatter

CH2MHILL

Boring Number: MW1-7

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: N. Olive Ave and Main St
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 01.03.05/01.06.05

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
105				
110		**SILTY SAND (SM)** dark yellowish brown (10YR 4/6), 60% fine sand, 30% fines, 10% medium to coarse sand		1805 hrs
115				
120		**SILTY SAND (SM)** dark yellowish brown (10YR 4/6), 40% fine sand, 30% fines, 20% medium sand, 10% coarse sand, trace gravel		rig chatter 123-126 feet
125				
130		**WELL GRADED GRAVEL W/ SAND (GW)** 70% fine gravel (<10 mm, could be from larger clasts), 20% coarse sand, 10% fine to medium sand		1830 hrs, done drilling for day Resume drilling 01/05/05 0810 hrs rig chatter 132-139 feet
135				
140		**WELL GRADED SAND W/ SILT AND GRAVEL (SW-SM)** yellowish brown (10YR 5/6), 30% coarse sand, 20% medium sand, 20% fine sand, 20% fine gravel, 10% fines, less gravel (more coarse sand) 150-160 feet		
145				slow/hard drilling
150				0915 hrs

CH2MHILL

Boring Number: MW1-7

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: N. Olive Ave and Main St
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 01.03.05/01.06.05

Depth (ft)	Borehole Information / Soil Type	Lithologic Description	MW Construction	Comments
155				rig chatter 150-155 feet
160		**SANDY SILT (ML)** dark yellowish brown (10YR 4/6), 50% fines, 20% coarse sand, 20% fine sand, 10% medium sand		
165				rig chatter
170		**SILTY SAND (SM)** dark yellowish brown (10YR 4/6), 30% coarse sand, 30% medium sand, 20% fine sand, 20% fines		1000 hrs
175				
180				
185				
190		**SILTY SAND (SM)** yellowish brown (10YR 5/6), 30% medium sand, 30% fine sand, 30% fines, 10% coarse sand		1050 hrs
195				
200				

CH2MHILL

Boring Number: MW1-7

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: N. Olive Ave and Main St
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 01.03.05/01.06.05

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
205				
210		**SILTY SAND (SM)** yellowish brown (10YR 5/6), 25% coarse sand, 25% medium sand, 25% fine sand, 25% fines,		1120 hrs rig chatter
215				
220		**SILTY SAND (SM) & POORLY GRADED GRAVEL W/ SAND (GP)** SM: same as above GP: 50% fine gravel, 30% coarse sand, 20% fine to medium sand		rig chatter
225				rig chatter rig chatter
230		**WELL GRADED SAND W/ SILT AND GRAVEL (SW-SM)** yellowish brown (10YR 5/6), 25% fine gravel (<5 mm), 25% coarse sand, 20% medium sand, 20% fine sand, 10% fines		1215 hrs rig chatter
235				rig chatter
240		**WELL GRADED SAND W/ SILT AND GRAVEL (SW-SM)** yellowish brown (10YR 5/6), 40% coarse sand, 20% fine gravel, 20% medium sand, 10% fine sand, 10% fines		rig chatter
245				1330 hrs, stop drilling for 20 minutes
250				1415 hrs

CH2MHILL

Boring Number: MW1-7

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: N. Olive Ave and Main St
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 01.03.05/01.06.05

Depth (ft)	Borehole Information / Soil Type	Lithologic Description	MW Construction	Comments
255		**WELL GRADED SAND (SW)** yellowish brown (10YR 5/6), 35% coarse sand, 35% medium sand, 30% fine sand		
260		**SILTY SAND (SM)** yellowish brown (10YR 5/6), 30% coarse sand, 25% medium sand, 25% fine sand, 20% fines		rig chatter 250-267 feet
265				
270				1510 hrs rig chatter
275				
280		**WELL GRADED SAND (SW)** yellowish brown (10YR 5/6), 40% coarse sand, 30% medium sand, 20% fine sand, 5% fine gravel, 5% fines		
285				bedrock contact at 284 feet based on geophysical logs
290		**SANDY SILT (ML)** dark yellowish brown (10YR 5/6), 70% fines, 20% fine sand, 10% medium to coarse sand		1600 hrs
295				
300				1625 hrs, done drilling, run geophysics

CH2MHILL

Boring Number: MW1-7

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: N. Olive Ave and Main St
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 01.03.05/01.06.05

Depth (ft)	Borehole Information / Soil Type	Lithologic Description	MW Construction	Comments
305		**LEAN CLAY (CL)** yellowish brown (10YR 5/4), 85% fines, 15% fine sand, trace medium to coarse sand		Resume drilling 01/06/05 0805
310				0830 hrs
315		**LEAN CLAY (CL)** olive gray (5Y 5/2), medium plasticity, 95% fines, 5% fine sand		
320				
325				
330		**LEAN CLAY (CL)** olive (5Y 4/3), medium plasticity, firm, 95% fines, 5% fine sand		0855 hrs
335				
340				
345				
350				0920 hrs

CH2MHILL

Boring Number: MW1-7

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: N. Olive Ave and Main St
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 01.03.05/01.06.05

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
355				
360				
365				
370				0945 hrs
375				
380				slow drilling 375-385 feet
385				
390		**LEAN CLAY (CL)** black (2.5Y 2.5/1), medium plasticity, 95% fines, 5% fine sand		1030 hrs
395				slow drilling
400				

CH2MHILL

Boring Number: MW1-7

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: N. Olive Ave and Main St
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: V. Mathur and B. Lechler
Start/Finish Date: 01.03.05/01.06.05

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
405				
410		End of Log		1135 hrs, done drilling, run geophysics
415				
420				
425				
430				
435				
440				
445				
450				

CH2MHILL

Boring Number: MW1-8

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Marguerita and Commonwealth Ave.
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: B. Lechler
Start/Finish Date: 04.11.05/04.19.05

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
		Ground Surface		
0		**ASPHALT AND ROAD BASE MATERIAL**		Borehole location cleared to 7.5 feet using air knife method. 18 inch borehole drilled using bucket auger and 14 inch conductor casing installed to 26 feet
5		**SANDY SILT (ML)**		
10				
15				
20		**POORLY GRADED GRAVEL (GP)** large gravel up to 60 mm		
25				0945 hrs, drilled to 28 feet 04/18/05 0840 hrs, resume drilling
30		**WELL GRADED SAND (SW)** dark yellowish brown (10YR 4/4), 35% medium sand, 30% coarse sand, 30% fine sand, 5% silt		
35		**POORLY GRADED GRAVEL (GP) & SANDY SILT (ML)** GP: 80% fine gravel (<5 mm), 10% coarse sand, 10% fine to medium sand ML: dark yellowish brown (10YR 4/6), soft, medium plasticity, 70% fines, 30% very fine to fine sand		
40				rig chatter
45		**SANDY SILT (ML)** same as above		0900 hrs
50				

CH2MHILL

Boring Number: MW1-8

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Marguerita and Commonwealth Ave.
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: B. Lechler
Start/Finish Date: 04.11.05/04.19.05

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
55				
60		**LEAN CLAY (CL)** brown (10YR 4/3), medium to high plasticity, 90% fines, 10% very fine sand		
65				0945 hrs
70		**LEAN CLAY (CL) & WELL GRADED GRAVEL (GW)** CL: same as above GW: 70% fine gravel (5 - 10 mm), 20% medium to coarse sand, 10% fine sand to silt		
75				rig chatter
80		**SILTY SAND (SM)** dark yellowish brown (10YR 4/4), 40% medium sand, 20% coarse sand, 20% fine sand, 20% fines		
85				1025 hrs
90		**SILTY SAND (SM)** same as above		
95				rig chatter
100		**SILTY GRAVEL W/ SAND (GM)** light olive brown (2.5Y 5/4), 50% fine gravel (<10 mm), 20% fines, 15% coarse sand, 15% fine to medium sand, gravels mostly quartz and granites, some weathered mafics		rig chatter, slow drilling

CH2MHILL

Boring Number: MW1-8

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Marguerita and Commonwealth Ave.
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: B. Lechler
Start/Finish Date: 04.11.05/04.19.05

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
				rig chatter
105				1140 hrs
		SILTY SAND (SM) yellowish brown (10YR 5/6), 30% coarse sand, 30% medium sand, 20% very fine to fine sand, 20% fines		
110				
115		**POORLY GRADED SAND W/ SILT AND GRAVEL (SP-SM)** 50% coarse sand, 15% fine gravel, 15% medium sand, 10% very fine to fine sand, 10% fines		
120				
125		**SILT (ML)** light olive brown (2.5Y 5/4), soft, low plasticity, 90% fines, 10% very fine to medium sand		1240 hrs
130				
135		**SILT (ML)** same as above, some sand and gravel interbeds		
140				
145		**SILT (ML)** yellowish brown (10YR 5/4), soft, 90% fines, 10% very fine to medium sand		1355 hrs bedrock contact at 146 feet based on geophysical logs
150				

CH2MHILL

Boring Number: MW1-8

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Marguerita and Commonwealth Ave.
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: B. Lechler
Start/Finish Date: 04.11.05/04.19.05

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
155				
		LEAN CLAY W/ SAND (CL) dark yellowish brown (10YR 4/4), soft, medium plasticity, 85% fines, 10% very fine to medium sand, 5% coarse sand		
160				
165		**FAT CLAY (CH)** dark yellowish brown (10YR 3/6), firm, high plasticity, 95% fines, 5% very fine to fine sand		1500 hrs
170				
175		**SILT W/ SAND (ML)** yellowish brown (10YR 5/4), 85% fines, 10% medium to coarse sand, 5% very fine to fine sand		
180				
185		**FAT CLAY (CH)** dark yellowish brown (10YR 3/6), firm, high plasticity, 100% fines		1600 hrs
190				
195		**FAT CLAY (CH)** same as above		slow drilling 197-203 feet
200				

CH2MHILL

Boring Number: MW1-8

Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Marguerita and Commonwealth Ave.
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: B. Lechler
Start/Finish Date: 04.11.05/04.19.05

Depth (ft)	Borehole Information: Soil Type	Lithologic Description	MW Construction	Comments
205				1705 hrs
210		**FAT CLAY (CH)** light olive brown (2.5Y 5/6), soft, high plasticity, 100% fines		
215				
220				
225		**FAT CLAY (CH)** light olive brown (2.5Y 5/4), soft, high plasticity, 100% fines		1745 hrs, done for day 04/19/05 0935 hrs, resume drilling
230				
235		**FAT CLAY (CH)** same as above		
240				
245		**LEAN CLAY (CL)** olive (5Y 4/3), soft to firm, medium plasticity, 95% fines, 5% fine sand		1005 hrs
250				

CH2MHILL

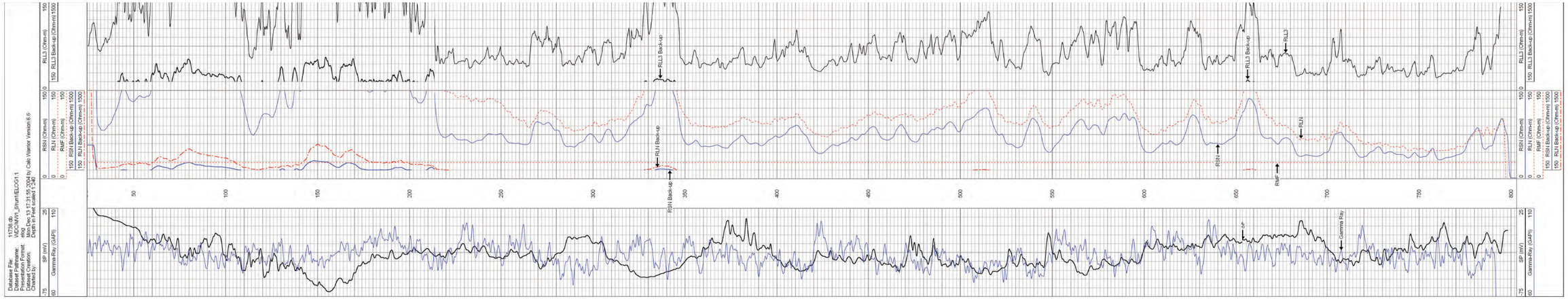
Boring Number: MW1-8

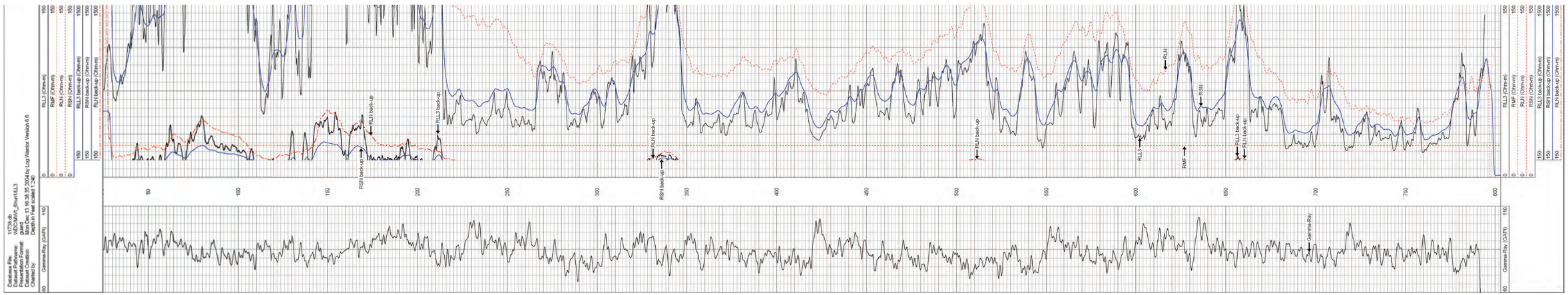
Client: US EPA
Project: San Gabriel Valley NPL Area 3
Location: Marguerita and Commonwealth Ave.
Project Number: 175859.FI.03

Driller: WDC Exploration & Wells
Drilling Method: Direct Mud Rotary
Sampling Method: N/A
Logged by: B. Lechler
Start/Finish Date: 04.11.05/04.19.05

Depth (ft)	Borehole Information / Soil Type	Lithologic Description	MW Construction	Comments
255		**LEAN CLAY (CL)** same as above		
260				
265		**LEAN CLAY (CL)** same as above		1050 hrs
270				
275		**LEAN CLAY (CL)** same as above		
280				
285		**LEAN CLAY (CL)** dark olive gray (5Y 3/2), soft, medium plasticity, 100% fines		1130 hrs
290		**LEAN CLAY (CL)** black (5Y 2.5/2), soft, medium plasticity, 100% fines		
295				
300				1200 hrs

Appendix B
Geophysical Logs





Geophysical Logs
MW1-6
San Gabriel Valley
Superfund Site - Area 3

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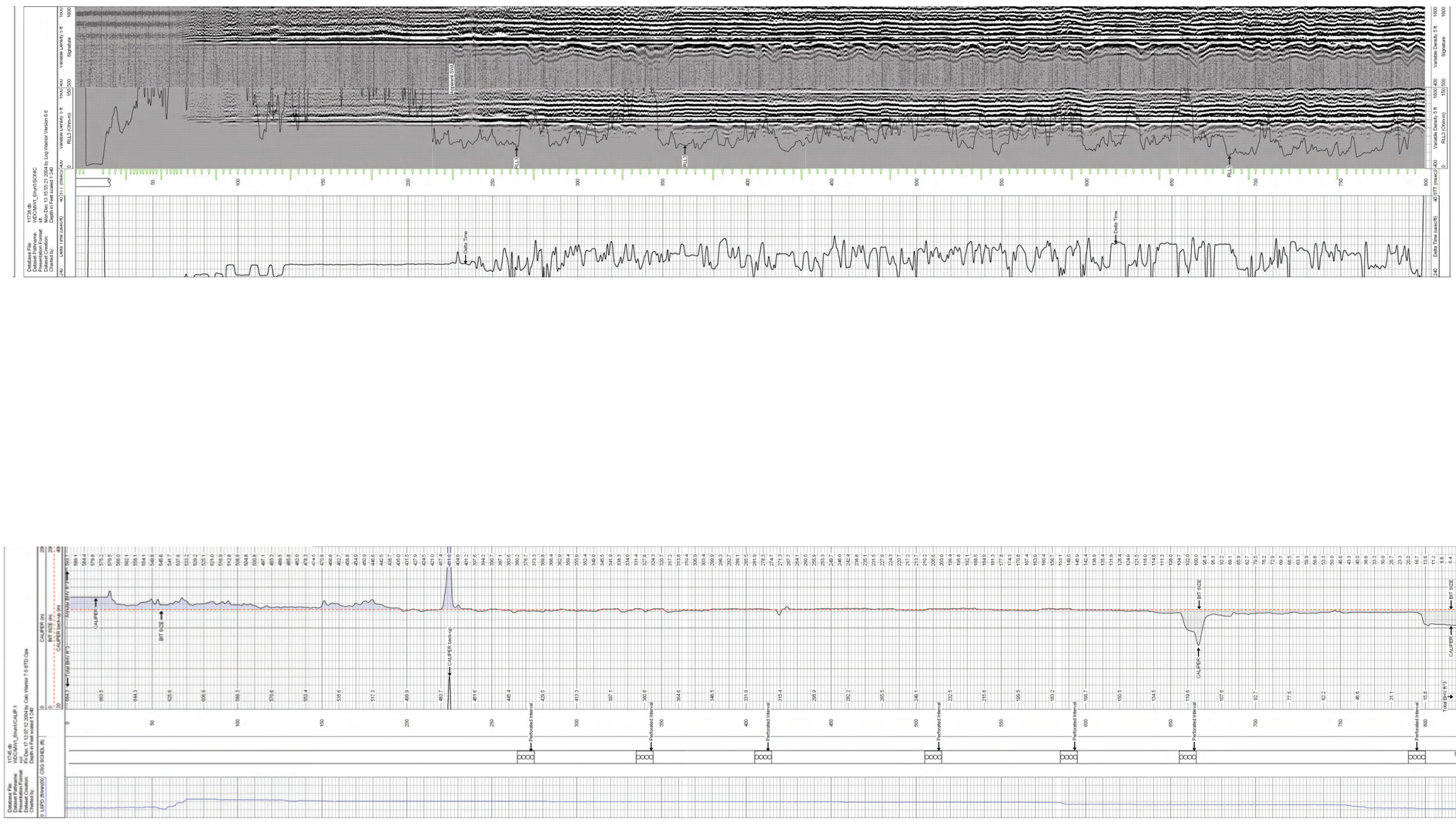

Geophysical Logs
MW1-6
San Gabriel Valley
Superfund Site - Area 3

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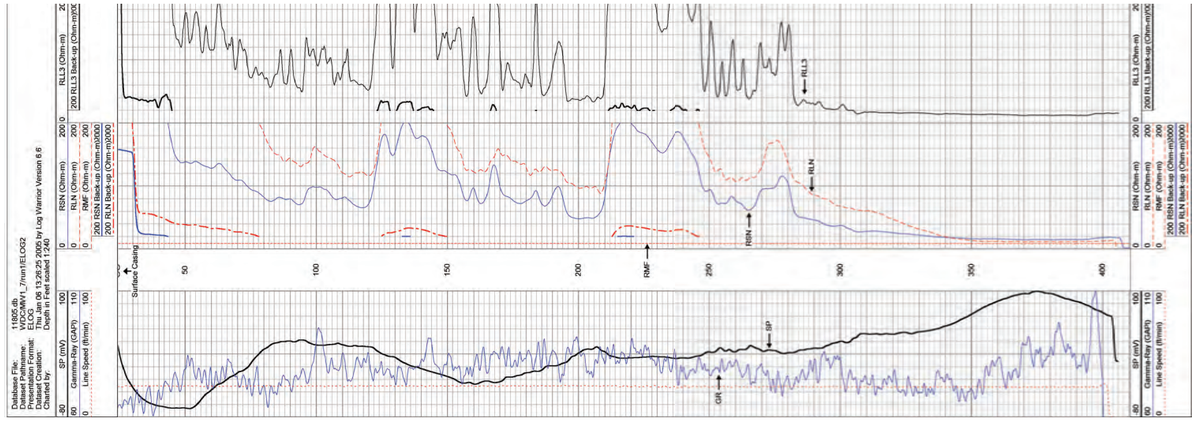
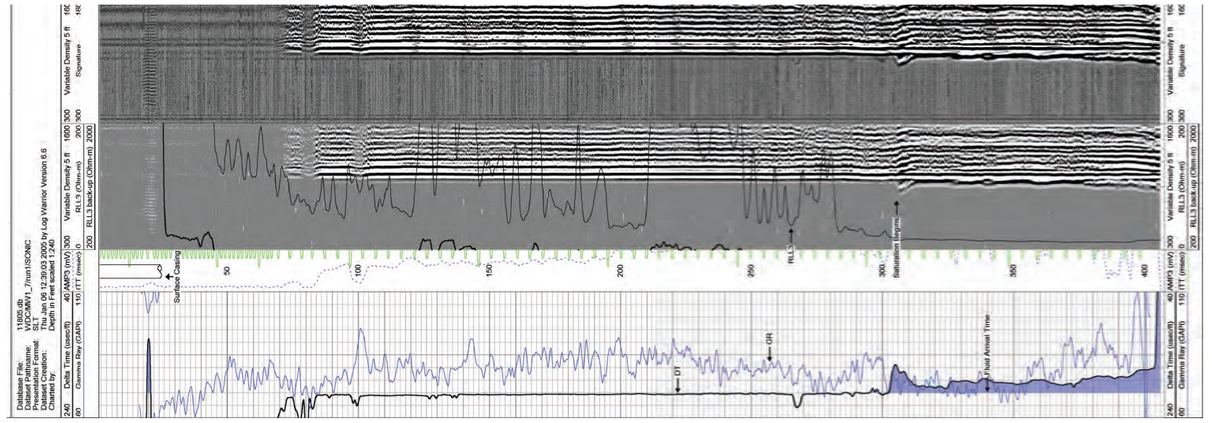
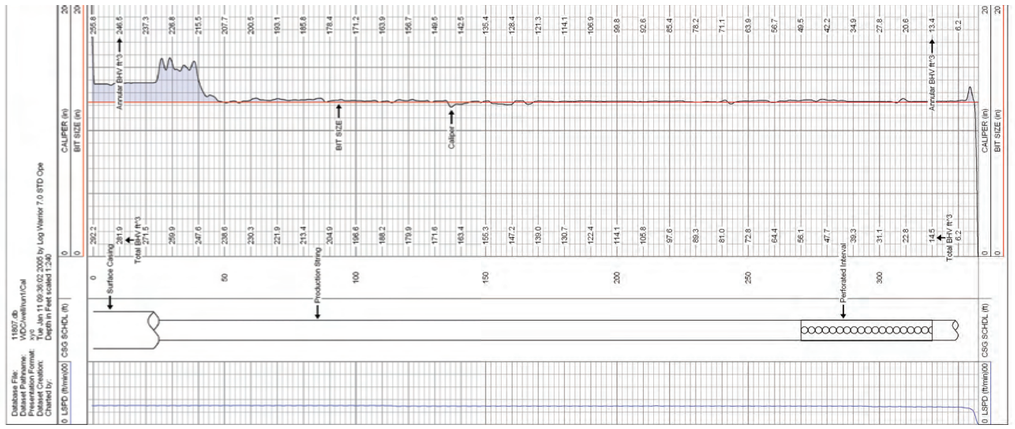
SCO175859.FI.03 08-05 MW1-6b.ai 08-05

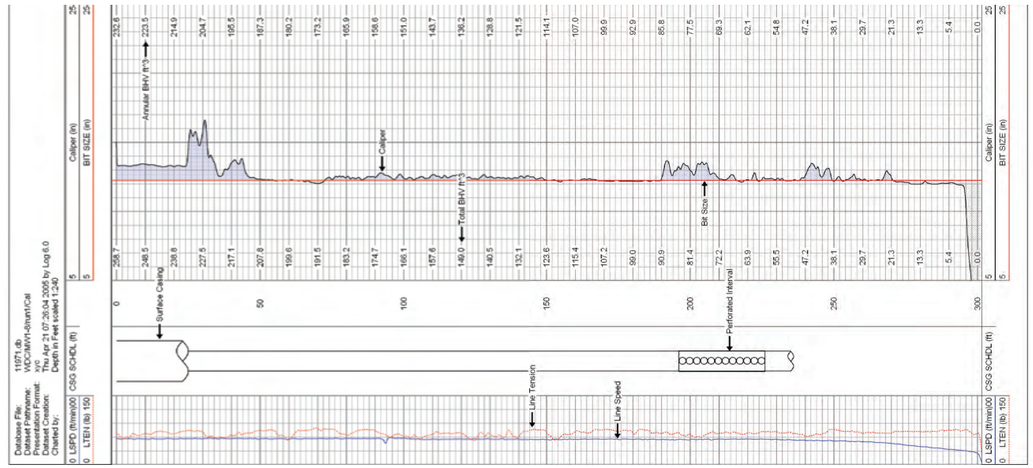


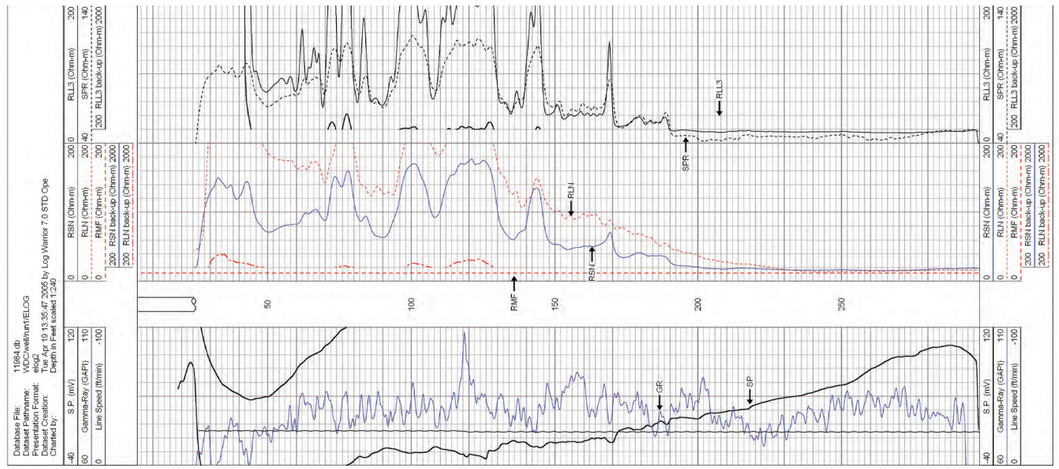


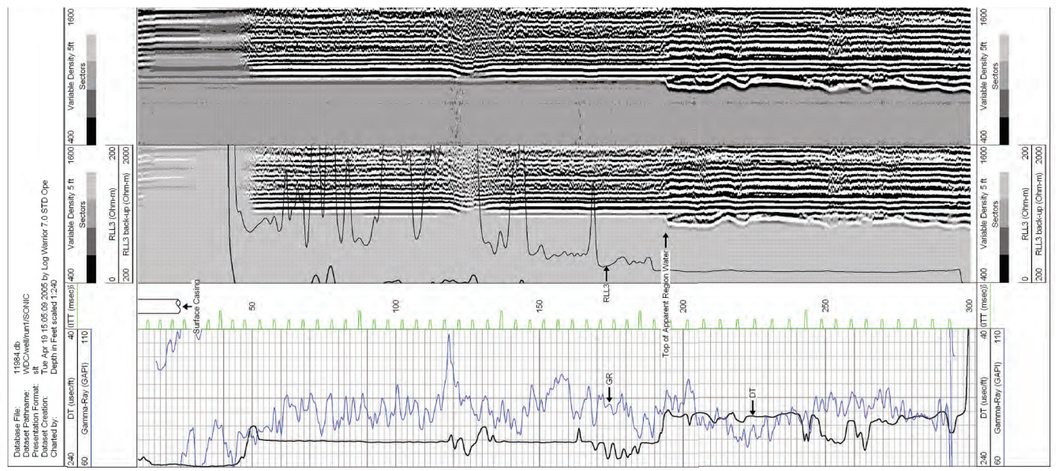


Geophysical Logs
MW1-7
San Gabriel Valley
Superfund Site - Area 3

CH2MHILL







Geophysical Logs
MW1-8
San Gabriel Valley
Superfund Site - Area 3

CH2MHILL

Appendix C
Video Survey Reports

Pacific Surveys

a full service geophysical well logging company

Video Survey Report

Company:	WDC EXPLORATION & WELLS	**Date:**	31-Jan-05
Well:	MW1-6	**Run No.**	One **Truck** PS-3
Field:	San Gabriel	**Job Ticket:**	11840
State:	California	**Total Depth:**	820 ft
		Water Level:	263 ft
Location:	Las Tunas at Walnut Grove	**Operator:**	T. Howard

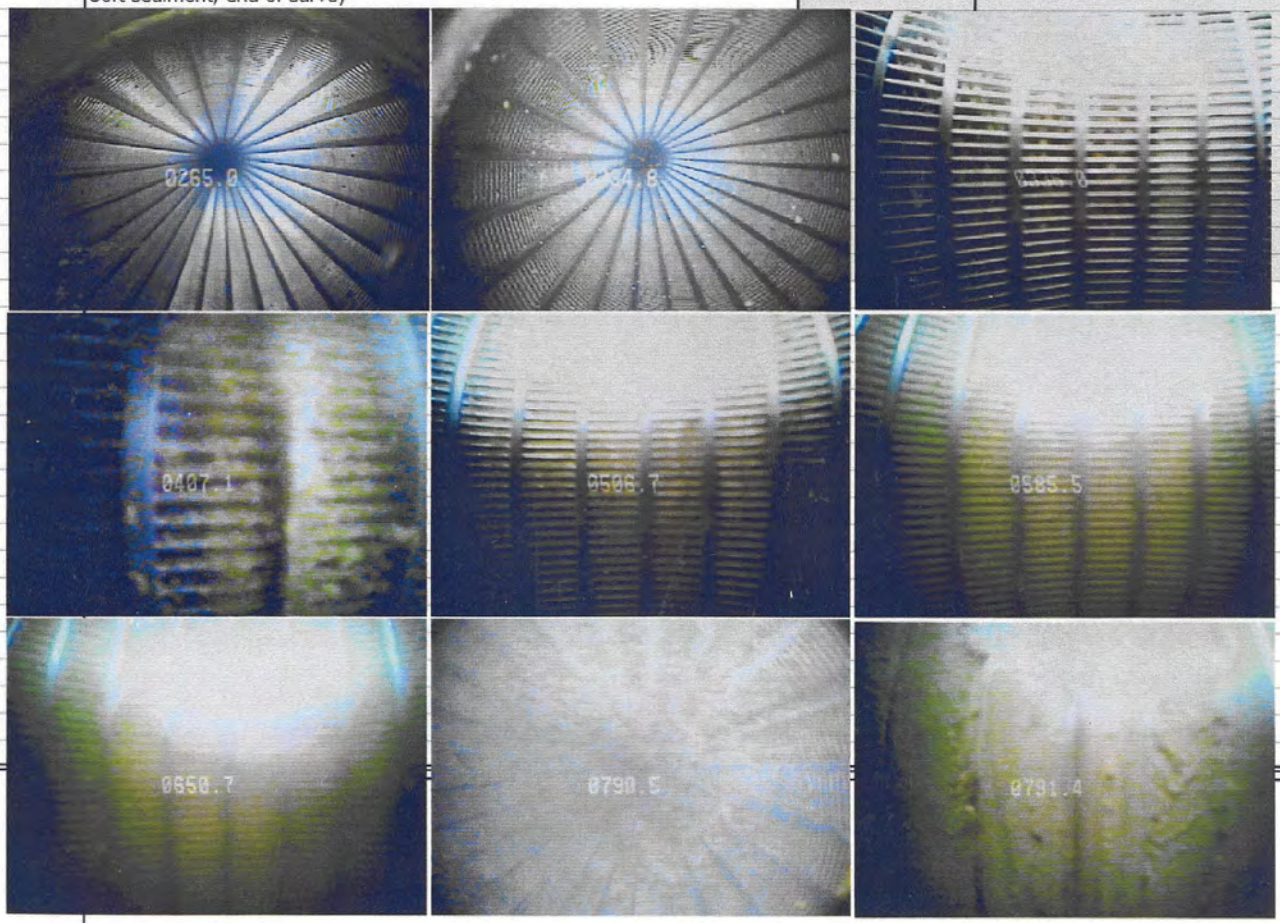
Zero Datum: Top of CSG **Tool Zero:** Side-Scan

Reason for Survey: General Inspection

Depth	Remarks
0.0 ft	Zero side-scan at top of casing, begin recording
263.0 ft	Static water level, water clear
265.0 ft	Top of wire wrap interval, clear slots, some air bubbles
335.0 ft	Top of wire wrap interval, clear slots
405.0 ft	Top of wire wrap interval, clear slots
505.0 ft	Top of wire wrap interval, light dusting in slots
585.0 ft	Top of wire wrap interval, light dusting in slots
650.0 ft	Top of wire wrap interval, light dusting in slots, poor visibility
790.0 ft	Top of wire wrap interval, mud in slots, visibility improved
808.0 ft	Soft sediment, end of survey

Perforation:	265.00 ft to 275.00ft
stainless	335.00 ft to 345.00ft
wirewarp	405.00 ft to 415.00ft
	505.00 ft to 515.00ft
	585.00 ft to 595.00ft
	650.00 ft to 660.00ft
	790.00 ft to 800.00ft
Casing Size	
4.5 "	0.00 ft to 820.00ft

336



Notes: All depths are referenced to side-scan lens. Downview lens is 5" below side-scan.

800.919.7555
909.625.6262

4456 via st. ambrose
claremont ca 91711
www.pacificsurveys.com

fax: 909.399.3180

Pacific Surveys

a full service geophysical well logging company

Video Survey Report

Company:	WDC EXPLORATION & WELLS	**Date:**	07-Feb-05
Well:	MW1-6	**Run No.**	Two **Truck** PS-3
Field:	San Gabriel	**Job Ticket:**	11846
State:	California	**Total Depth:**	820 ft
		Water Level:	261 ft
Location:	Las Tunas at Walnut Grove	**Operator:**	T. Howard

Zero Datum: Top of CSG **Tool Zero:** Side-Scan

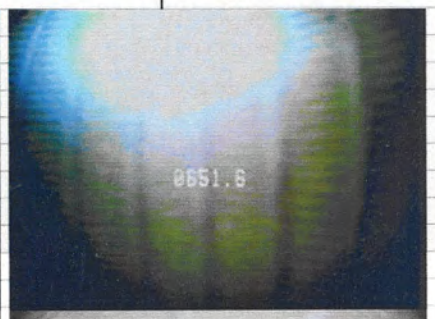
Reason for Survey: General Inspection

Depth	Remarks
0.0 ft	Zero side-scan at top of casing, begin recording
261.0 ft	Static water level, water clear
265.0 ft	Top of wire wrap interval, clear slots, some air bubbles
335.0 ft	Top of wire wrap interval, clear slots
405.0 ft	Top of wire wrap interval, clear slots
505.0 ft	Top of wire wrap interval,very light dusting in slots
585.0 ft	Top of wire wrap interval, light dusting in slots, poor visibility
650.0 ft	Top of wire wrap interval, light dusting in slots, poor visibility
790.0 ft	Top of wire wrap interval, mud in slots, blocked in some areas clear in other areas (approx 50/50)
817.0 ft	Soft sediment, end of survey

Perforation:	265.00 ft to 275.00ft
stainless	335.00 ft to 345.00ft
wirewarp	405.00 ft to 415.00ft
	505.00 ft to 515.00ft
	585.00 ft to 595.00ft
	650.00 ft to 660.00ft
	790.00 ft to 800.00ft
Casing Size	
4.5 "	0.00 ft to 820.00ft

Run One

Run Two

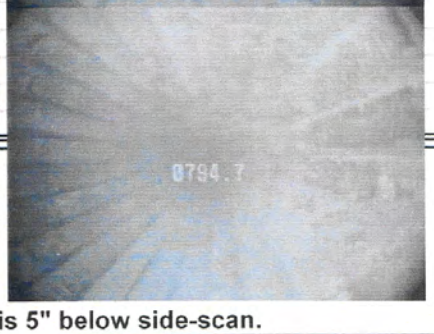


Run One

Run Two

Run One

Run Two



Notes: All depths are referenced to side-scan lens. Downview lens is 5" below side-scan.

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Video Survey Report

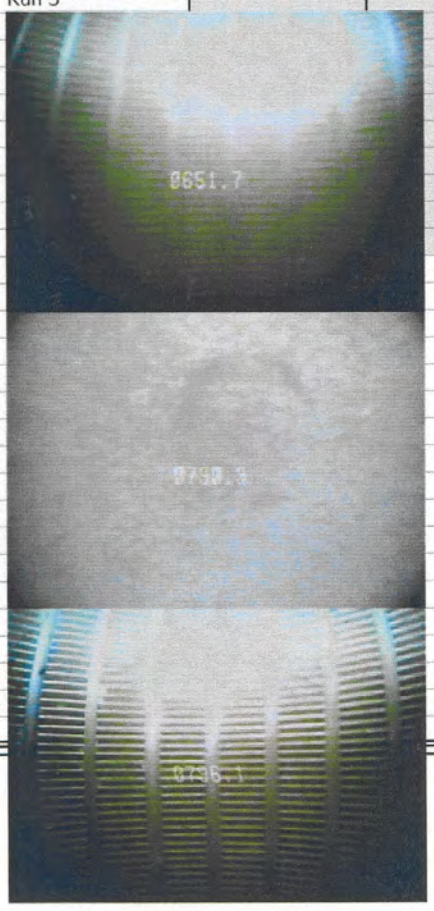
Company:	WDC EXPLORATION & WELLS		**Date:**	17-Feb-05	
Well:	MW1-6		**Run No.**	Three	**Truck** PS-3
Field:	San Gabriel		**Job Ticket:**	11879	
State:	California		**Total Depth:**	820 ft	
			Water Level:	261 ft	
Location:	Las Tunas at Walnut Grove		**Operator:**	T. Howard	
Zero Datum:	Top of CSG	**Tool Zero:**	Side-Scan		
Reason for Survey:	General Inspection				

Depth	Remarks
0.0 ft	Zero side-scan at top of casing, begin recording
261.0 ft	Static water level, water clear
265.0 ft	Top of wire wrap interval, clear slots, some air bubbles
335.0 ft	Top of wire wrap interval, clear slots
405.0 ft	Top of wire wrap interval, clear slots
505.0 ft	Top of wire wrap interval, very light dusting in slots
585.0 ft	Top of wire wrap interval, light dusting in slots, poor visibility
650.0 ft	Top of wire wrap interval, light dusting in slots, poor visibility
790.0 ft	Top of wire wrap interval, slots clear, fair visibility
819.0 ft	Soft sediment, end of survey

Perforation:	265.00 ft to 275.00ft
stainless	335.00 ft to 345.00ft
wirewarp	405.00 ft to 415.00ft
	505.00 ft to 515.00ft
	585.00 ft to 595.00ft
	650.00 ft to 660.00ft
	790.00 ft to 800.00ft
Casing Size	
4.5 "	0.00 ft to 820.00ft

Run 2

Run 3



Notes: All depths are referenced to side-scan lens. Downview lens is 5" below side-scan.

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www.pacificsurveys.com

fax: 909.399.3180

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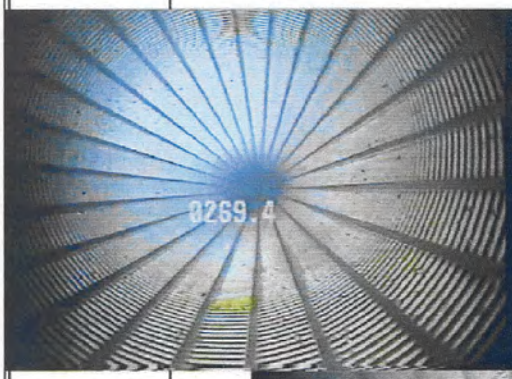
Video Survey Report

Company:	WDC EXPLORATION & WELLS	**Date:**	31-Jan-05
Well:	MW1-7	**Run No.**	One **Truck** PS-3
Field:	Alhambra	**Job Ticket:**	11840
State:	California	**Total Depth:**	330 ft
		Water Level:	308 ft
Location:	Olive and Main	**Operator:**	T. Howard

Zero Datum: Top of CSG **Tool Zero:** Side-Scan

Reason for Survey: General Inspection

Depth	Remarks		
0.0 ft	Zero side-scan at top of casing	**Perforation:**	
2.0 ft	Begin recording	**stainless**	270.00 ft to 320.00ft
260.0 ft	Ten foot stainless blank	**wirewarp**	
270.0 ft	Top of stainless wire wrap screen, slots clear		
320.0 ft	Blank, sump 320-330 ft, poor visibility		
329.0 ft	Soft sediment, end of survey		
		Casing Size	
		4.5 "	0.00 ft to 330.00ft



Notes: All depths are referenced to side-scan lens. Downview lens is 5" below side-scan.

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www.pacificsurveys.com

fax: 909.399.3180

Appendix D
Multiport Monitoring Well Completion Report

Water Services - Monitoring

Westbay Instruments Inc.
[illegible]
Tel: (604) 430-4272
Fax: (604) 430-3533

Schlumberger

COMPLETION REPORT

MP38 Monitoring Well: MW 1-6

Alhambra, California

Prepared for:

WDC Exploration & Wells
5566 Arrow Highway
Montclair, California, 91763
USA

Prepared by:

Westbay Instruments Inc.
WB824
March 2, 2005

CONTENTS:

APPENDIX:

1. Introduction

This report and the attached Appendix document the technical services carried out by Westbay Instruments Inc. under WDC Exploration & Wells (WDC) P.O. No. RQ20036. A Westbay MP 38 groundwater monitoring system was installed in borehole MW 1-6 in Alhambra, California.

Westbay technical services representative Mr. Mark Lessard was on site for the installation from February 18 to 21, 2005. This report documents the installation tasks and related QA checks.

2. Installation

The monitoring well was installed as indicated below.

(Note: all depths are with respect to ground surface. Monitoring well reference elevation was not available at the time of writing).

Table 1, Summary of MP Well Installation

Monitoring Well No.	Installation Date	Borehole Depth (ft)	Steel Casing Depth (ft)	MP38 Casing Length (ft)	No. Monitoring Zones
MW 1-6	Feb 18 – 21, 2005	830.0	820.0	818.2	7

The well was installed according to the procedures described below.

2.1 Previous Activities

A nominal 12-inch diameter borehole was drilled, using a mud-rotary drilling method. A multi-screened steel-cased 4-inch diameter (4.25 inch ID) well was installed in the borehole, using a 20-slot screen size and backfilled with #2 sand adjacent to the screen intervals, with a bentonite/sand seal between sand packs. All backfill material was installed through a tremmie pipe.

Each screen interval was developed to remove drilling fluids before installation of the MP casing. On February 17, 2005 WDC conducted a video log of the completed multi-screen cased well. All borehole activities were carried out under the supervision of CH2M Hill.

2.2 Preparation of Monitoring Well Design

Preliminary monitoring zone locations for the Westbay MP38 well were sent to Mr. Frank Magdich by Mr. Ray Quintero of WDC. The casing design was used to construct a preliminary MP Casing Log, which specifies the location of components in the well. The log was reviewed in the field by Mr. Mike Ladeau of CH2M Hill prior to installation of the well. The MP Casing Log as approved was used as an installation guide in the field. A field copy of the log is in the Appendix.

An MP measurement port coupling was included in each screened zone to provide the capability to measure fluid pressures and collect fluid samples. A pumping port coupling was also included in

each screened zone to provide purging and hydraulic conductivity testing capabilities. Measurement port couplings were also included in QA zones to provide QA testing capabilities and to permit operation of the squeeze relief venting capabilities of the MP38 packer inflation tool.

2.3 Layout of MP Casing Components

Prior to MP System installation, the MP System casing components were set out at the borehole according to the sequence indicated on the Casing Installation Log. Each casing length was numbered beginning with the lowermost as an aid to confirming the proper sequence of components. The appropriate MP System couplings were attached to the casing sections. Magnetic location collars were attached 2 feet below the center of the MP measurement port in each sampling zone. The location of each magnetic collar is 3 feet above the respective pumping port.

Each casing component was visually inspected. Serial numbers for each MP packer, MP pumping port and MP measurement port coupling were recorded on the MP Casing Log. The well component layout was confirmed with the log before the components were lowered into the borehole.

2.4 Lowering of MP Components

The MP casing components were lowered into the well using a hoist operated by WDC. Each casing joint was tested with a minimum internal hydraulic pressure of 150 psi for one minute to confirm hydraulic seals. A record of each successful joint test and the placement of each casing component are noted on the MP Casing Log by check marks.

Clean water supplied by WDC was added to the MP casing when necessary to counter buoyancy effects while components were lowered into the borehole and for testing of joint seals during lowering.

2.5 Hydraulic Integrity Testing

After the MP casing was lowered into the borehole, the water inside the MP casing was monitored at a depth different from the open borehole water level for a minimum period of thirty minutes to confirm hydraulic integrity of the casing. The data from the hydraulic integrity test is shown on the last page of the MP Casing Log in the Appendix. Westbay personnel measured the borehole water level prior to the lowering of the Westbay casing. The borehole water level for MW 1-6 was 262.0 feet below ground surface (bgs). The MP casing water level was 580.05 feet (bgs). The test indicated that the MP casing was water tight prior to packer inflation.

2.6 Positioning of MP Components

After the components were lowered into the well, the MP casing string was positioned as indicated on the cover page of the Summary Casing Log. Ground surface was used as the borehole datum. The MP casing string was supported in this position while packer inflation was carried out. The Summary Casing Log, which shows the final "as-built" locations of the components in the well, is included in the Appendix. The depths of key items in the well are shown on Table 2.

2.7 Pre-inflation Profile

A pre-inflation pressure profile was carried out at the well prior to inflating the packers to confirm the proper operation and position of measurement ports and magnetic collars. The data confirmed

that the ports operated properly and are positioned correctly. The data for the pre-inflation profile is located in the Appendix (Figure 1) and on the Field Data and Calculation Sheet.

2.8 Inflation of MP System Packers

The MP packers were inflated sequentially beginning at the bottom of the well using clean water provided by WDC. Westbay's model No. 6055 vented inflation tool was used for packer inflation. All of the packers appear to have inflated normally. The data for inflation of each packer are provided on the MP Packer Inflation Records included in the Appendix.

3. Fluid Pressure Measurements

After packer inflation was completed, fluid pressures were measured at each measurement port. At that time, the in-situ formation pressures may not have recovered from the pre-installation activities. Longer term monitoring may be required to establish representative fluid pressures.

A plot of the Piezometric levels in all zones in the well is shown on Figure 2 in the Appendix. Figure 3 in the Appendix is a plot of the Piezometric levels in monitoring zones only. The data were examined to confirm proper operation of the measurement ports and as a check on the presence of annulus seals between monitoring zones. The calculation sheets for the pressure profile of the MP monitoring well are also enclosed in the Appendix.

Table 2, Depths of Key Items for MP monitoring well MW 1-6.

Zone No.	Screen Interval*	MP Casing No. (from MP Log)	Packer No.	Packer Serial No.	Nominal Packer Position ***	Magnetic Collar Depth	Measurement Port Depth**	Pumping Port Depth**	Port Name
LQA-1	----	2	1		803	----	808	----	LQA-1
1	790 - 800	----	----	----	----	795	793	798	Zone 1
----	----	6	2		783	----	----	----	----
SQA-1	----	8	3		773	----	778	----	SQA-1
LQA-2	----	20	4		663	----	668	----	LQA-2
2	650 - 660	----	----	----	----	655	653	658	Zone 2
----	----	24	5		643	----	----	----	----
SQA-2	----	26	6		633	----	638	----	SQA-2
LQA-3	----	30	7		598	----	603	----	LQA-3
3	585 - 595	----	----	----	----	590	588	593	Zone 3
----	----	34	8		578	----	----	----	----
SQA-3	----	36	9		568	----	573	----	SQA-3
LQA-4	----	42	10		518	----	523	----	LQA-4
4	505 - 515	----	----	----	----	510	508	513	Zone 4
----	----	46	11		498	----	----	----	----
SQA-4	----	48	12		488	----	493	----	SQA-4
LQA-5	----	56	13		418	----	423	----	LQA-5
5	405 - 415	----	----	----	----	410	408	413	Zone 5
----	----	60	14		398	----	----	----	----
SQA-5	----	62	15		388	---	393	----	SQA-5
LQA-6	----	67	16		348	----	353	----	LQA-6
6	335 – 345	----	----	----	----	340	338	343	Zone 6
----	----	71	17		328	----	----	----	----
SQA-6	----	73	18		318	---	323	----	SQA-6
LQA-7	----	78	19		278	----	283	----	LQA-7
7	265 - 275	----	----	----	----	270	268	273	Zone 7
----	----	82	20		258	----	----	----	----
SQA-7	----	84	21		248	---	253	----	SQA-7

* Depths are with respect to ground level.

** Component positions are referenced to the top of the subject MP System coupling.

*** Packer positions are referenced to the top MP System coupling on the packer.

APPENDIX 1

Monitoring Well MW 1-6

Summary Casing Log	- 5 pages
Figure 1, Pre-Inflation Pressure Profile	- 1 page
Pre-inflation Piezometric Pressure/Levels	
Field Data and Calculation Sheet (Feb 19, 2005)	- 1 page
Figures 2-3, Piezometric Pressure Profile	- 2 pages
Piezometric Pressure/Levels	
Field Data and Calculation Sheet (Feb 21, 2005)	- 4 pages
Casing Installation Log (field copy)	- 11 pages
MP Packer Inflation Records	- 23 pages

Summary Casing Log

Company: WDC
Well: MW 1-6
Site: Alhambra
Project: San Gabriel Valley Superfund Site

Job No: WB824
Author: DL/ML

Well Information

Reference Datum: Ground Surface
Elevation of Datum: 0.00 ft.
MP Casing Top: 0.00 ft.
MP Casing Length: 818.16 ft.

Borehole Depth: 820.00 ft.
Borehole Inclination:
Borehole Diameter: 4.00 in.

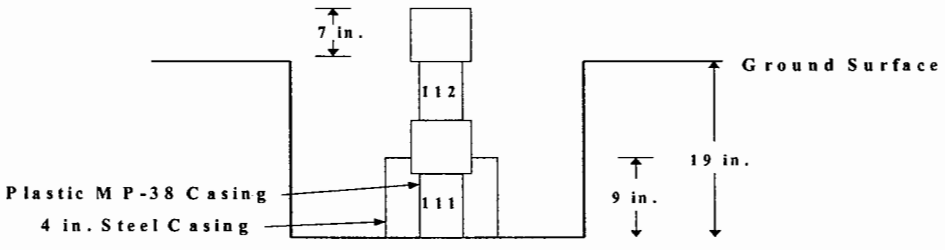
Well Description:
Plastic MP38
Other References:
Backfilled 4-inch SCH40 steel casing
wire wrap screens slot size 0.015
to 0.040 inches.

File Information

File Name: MW1_6DFT.WWD
Report Date: Wed Feb 23 09:17:44 2005

File Date: Feb 23 09:16:37 2005

Sketch of Wellhead Completion



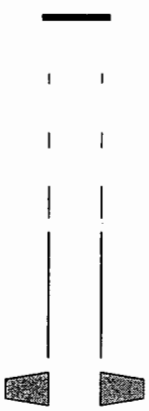
Summary Casing Log
WDC

Job No: WB824
Well: MW 1-6

Legend

(Qty) MP Components

(Library - WD Library 7/27/00)



(2) 0223 - MP38 End Cap

(2) 0225F01 - MP38 Casing, PVC, 1 ft.

(1) 0225F02 - MP38 Casing, PVC, 2 ft.

(34) 0225F05 - MP38 Casing, PVC, 5 ft.

(54) 0225F10 - MP38 Casing, PVC, 10 ft.

(21) 0239F05 - MP38 Packer, Stiffened

(84) 0202 - MP38 Regular Coupling

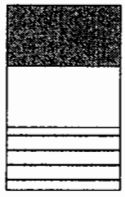
(21) 0205 - MP38 Measurement Port

(7) 0224 - MP38 Pumping Port

(7) 0216 - MP38 Magnetic Location Collar

Geology

Backfill/Casing



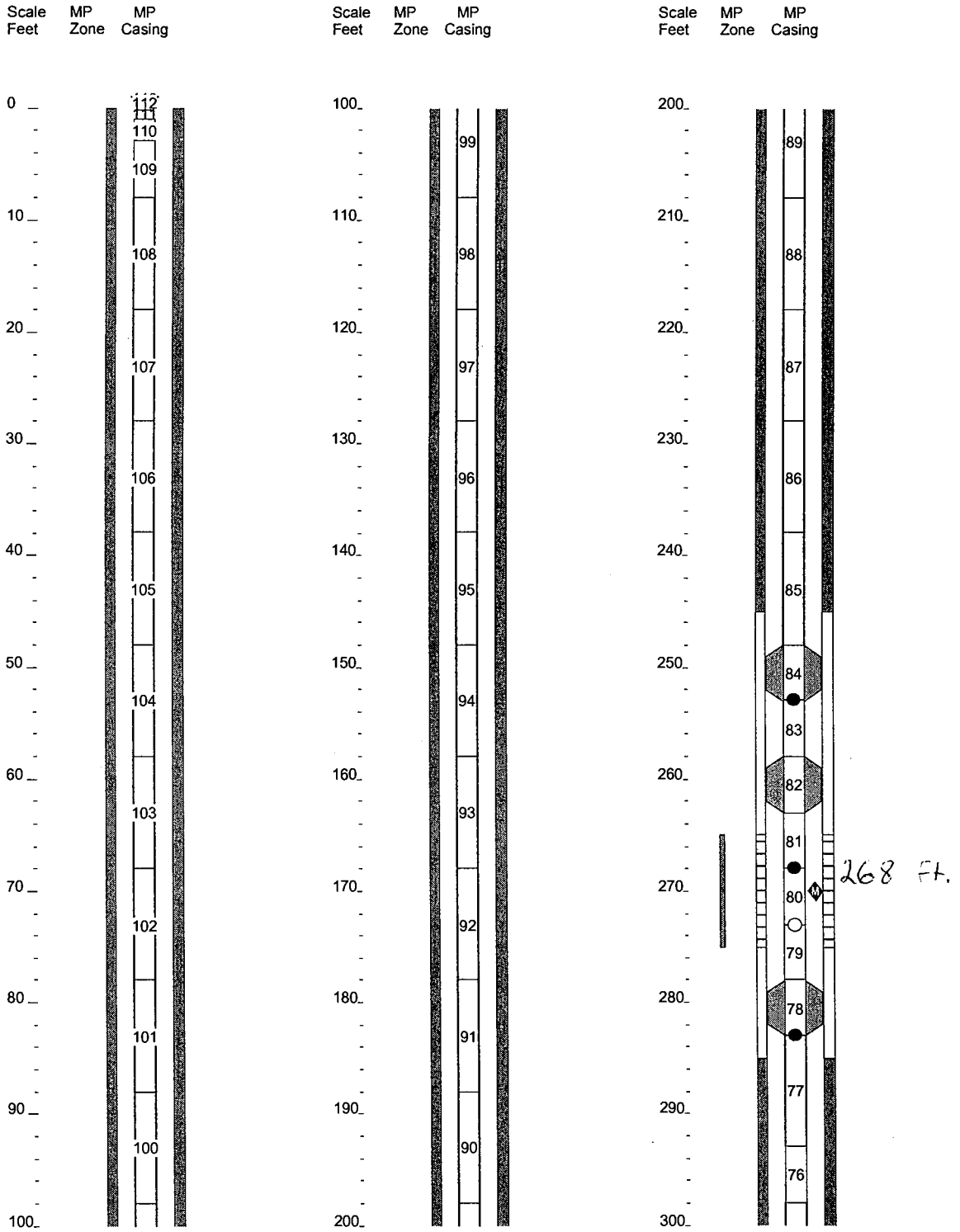
Mild Steel

Stainless Steel

Well Screen

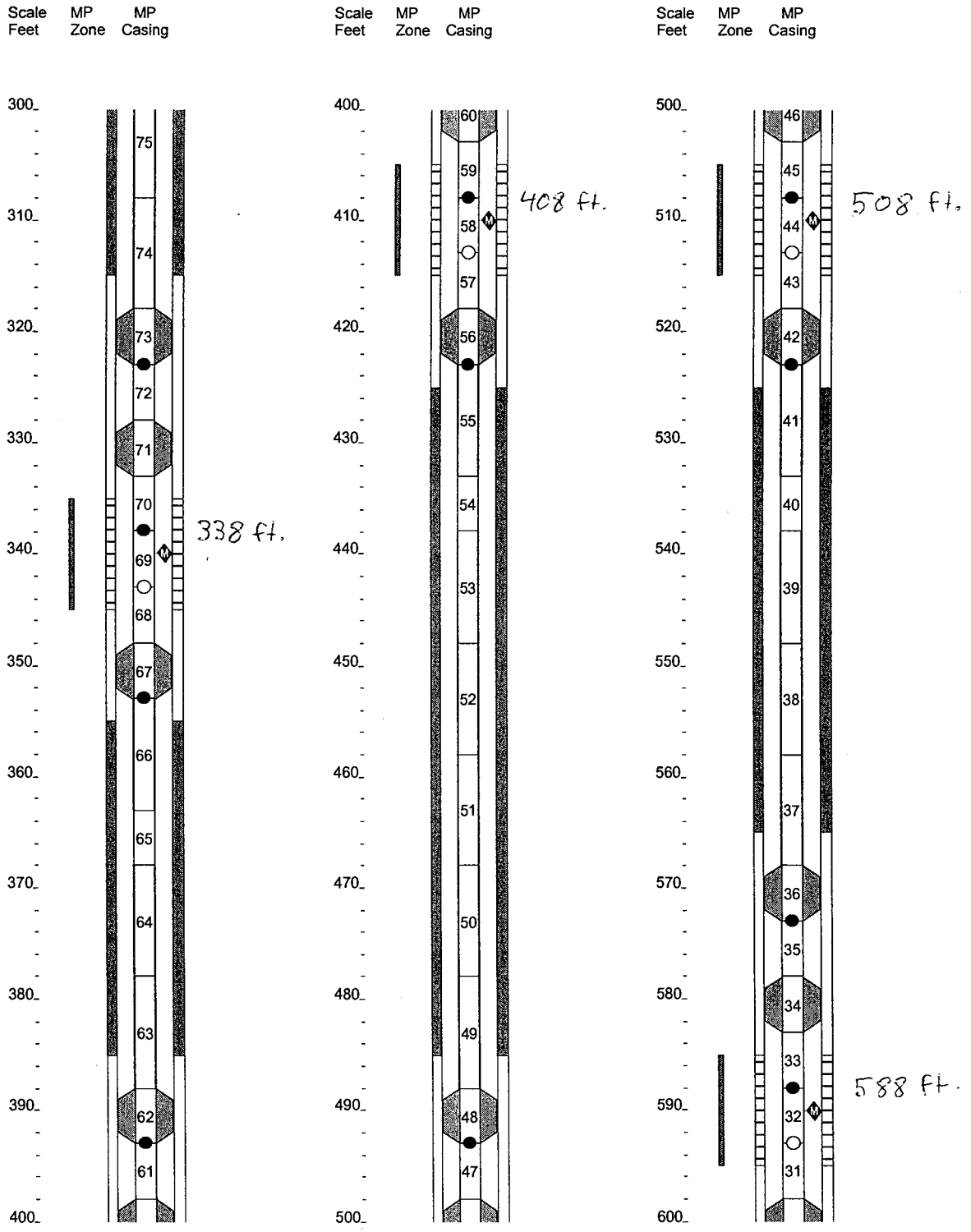
Summary Casing Log
WDC

Job No: WB824
Well: MW 1-6



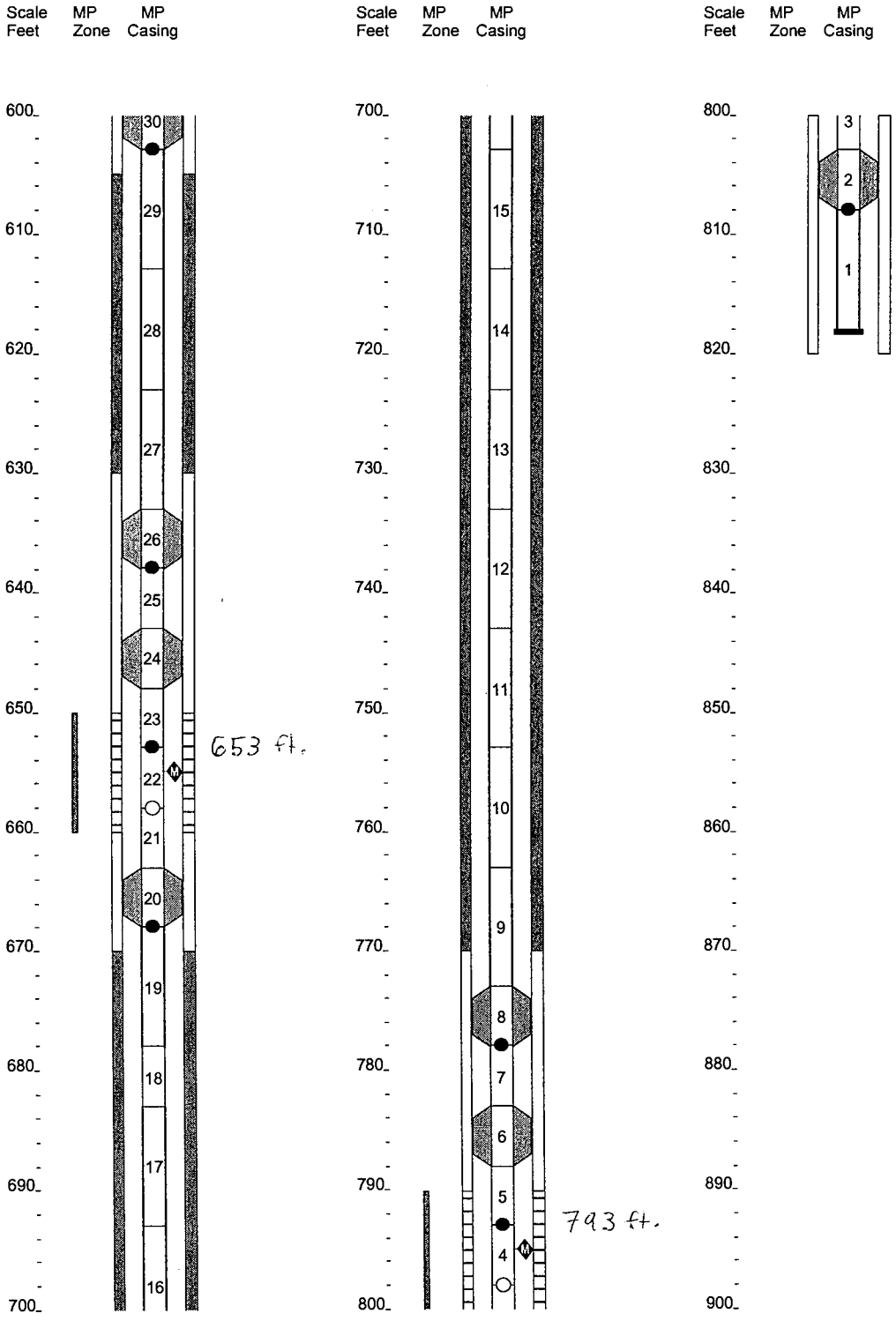
Summary Casing Log
WDC

Job No: WB824
Well: MW 1-6



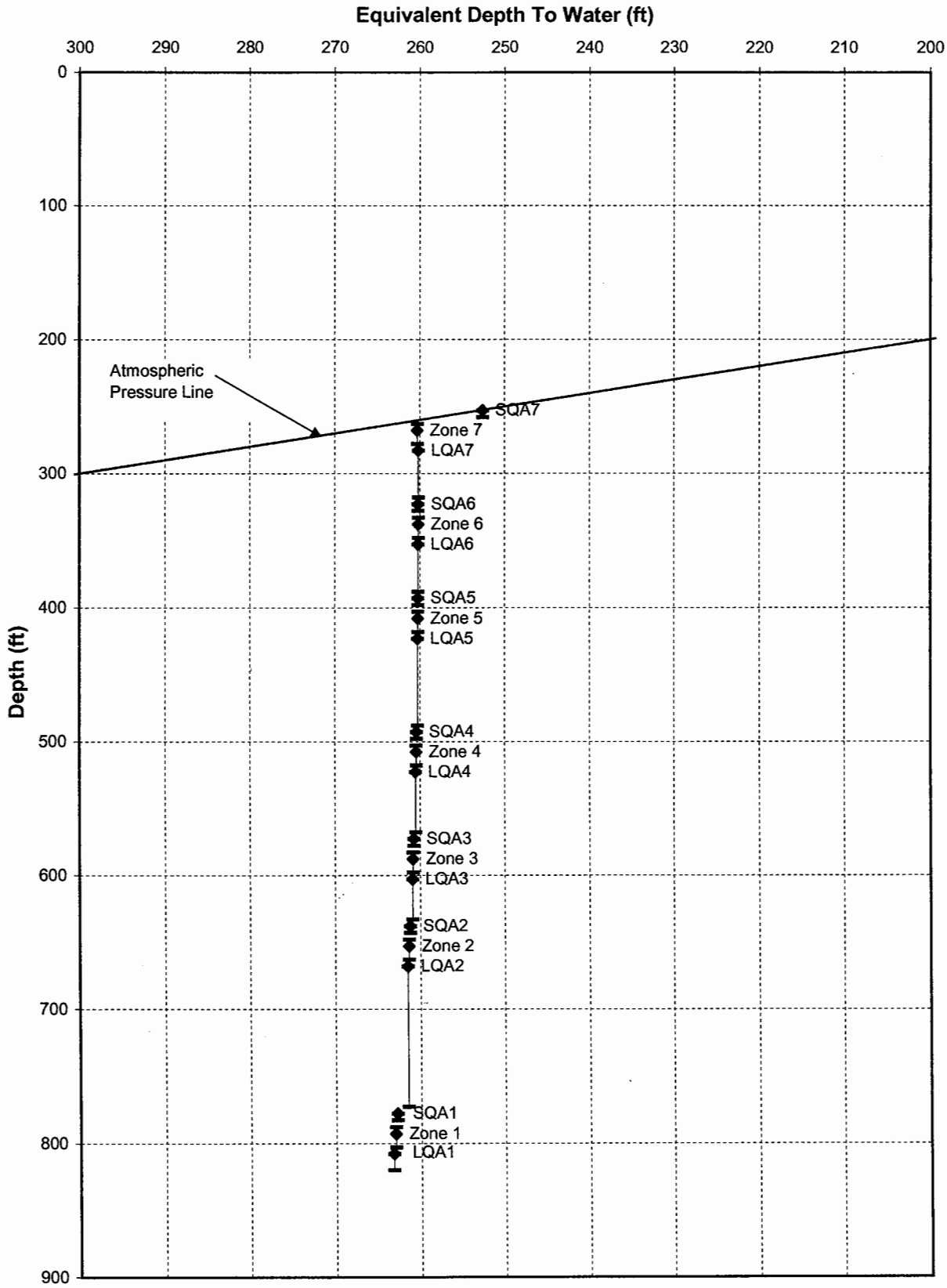
Summary Casing Log
WDC

Job No: WB824
Well: MW 1-6



Piezometric Profile
Monitoring Well: MW 1-6

Profile Date: February 19, 2005
Comments:Pre-Inflation



Client: WDC
Site: Alhambra, CA
Datum: GS

Figure 1

Plot By: MZ Date: 2/23/05
Checked By: AB Date: 2/25/05
Westbay Project: WB824
MW1-6.xls

Westbay Instruments Inc.
A Schlumberger Company

Piezometric Pressures/Levels
Field Data and Calculation Sheet
PRE-INFLATION

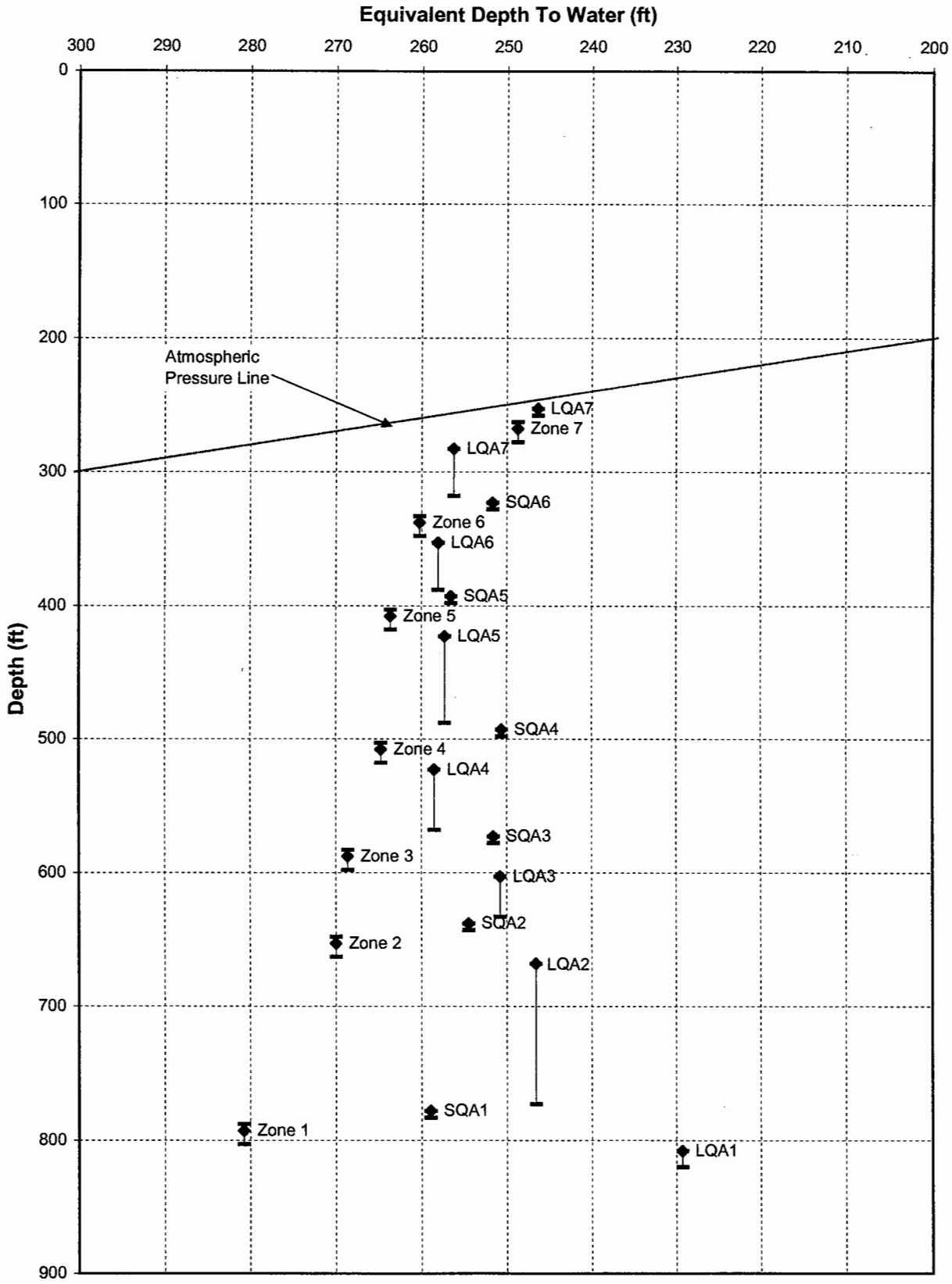
Datum: Ø Probe Type: Sampler Client: WDC Date: Feb 9/05
Elev. G.S.: Ø Serial No.: EMS1057 Job No.: WB824 Well No.: MW1-6
Height of MP above G.S.: 1 ft. Probe Range: 0 to 500 Location: Alhambra - Lac Tremblant - Walnut Grove
Elev. top of MP Casing: Ø Weather: Overcast, Raining (finished) clear spots, warm MP Casing Type: MP38
Reference Elevation: Ø Atm. Pressure: 1422 Operator: M. Lessard
Ambient Reading (Patm) (Pressure, Temperature, time) Start: 14.22 14.36° 1:26pm Finish: 14.26 18.13° 2:20pm

Port No.	Port Depth From Log (ft)	Port Depth From Cable (ft)	Port Elev. (+)	Fluid Pressure Readings: Inside Casing (P1)	Outside Casing (P2)	Inside Casing (P1)	Temp. (°C)	Time H:M:S	Pressure Head Outside Port (ft) H = (P2-Patm)/w	Piez. Level Outside Port (ft) Dz = Dp - H	Comments
1	808	803	-	232.61	250.38	232.61	18.4	1:33	544.8	263.2	
2	793	788	-	226.18	243.98	226.21	19.4	1:35	530.0	263.0	collar ✓
3	778	773	-	219.77	237.56	219.77	20.1	1:38	515.2	262.8	
4	668	663.5	-	172.42	190.44	172.43	20.2	1:41	406.5	261.5	
5	653	648.5	-	165.98	184.00	165.98	20.0	1:44	391.6	261.4	collar ✓
6	638	634	-	159.52	177.56	159.53	19.8	1:46	376.8	261.2	
7	603	599	-	144.40	162.52	144.41	19.7	1:48	342.1	260.9	
8	588	584	-	137.95	156.64	137.97	19.4	1:51	327.2	260.8	collar ✓
9	573	569	-	131.48	149.58	131.49	19.2	1:53	312.2	260.7	
10	523	519	-	109.82	128.00	109.83	18.0	1:55	262.5	260.5	
11	508	504	-	103.34	121.54	103.35	18.5	1:58	247.6	260.4	collar ✓
12	493	489	-	96.84	115.05	96.85	18.3	2:00	232.6	260.4	
13	423	420	-	66.42	84.77	66.43	17.9	2:03	162.7	260.3	
14	408	405	-	59.92	78.27	59.93	17.8	2:05	147.8	260.2	collar ✓
15	393	396	-	53.42	71.77	53.42	17.7	2:07	132.8	260.2	
16	353	350	-	36.04	54.44	36.03	17.7	2:10	92.8	260.2	
17	338	335	-	29.51	47.96	29.49	17.7	2:11	77.8	260.2	collar ✓
18	323	320	-	22.98	41.44	22.98	17.7	2:13	62.8	260.2	
19	283	280	-	14.45	24.11	14.42	17.7	2:15	22.8	260.2	
20	268	265	-	14.40	17.56	14.40	17.8	2:17	7.7	260.3	collar ✓
21	253	250 -2ft	-	14.40	14.40	14.40	17.9	2:18	atm	atm	

25/05/00 WHB

Piezometric Profile
Monitoring Well: MW 1-6

Profile Date: February 21, 2005
Comments: Post Inflation



Plot By: MJ Date: 2/23/05
Checked By: AB Date: 2/23/05

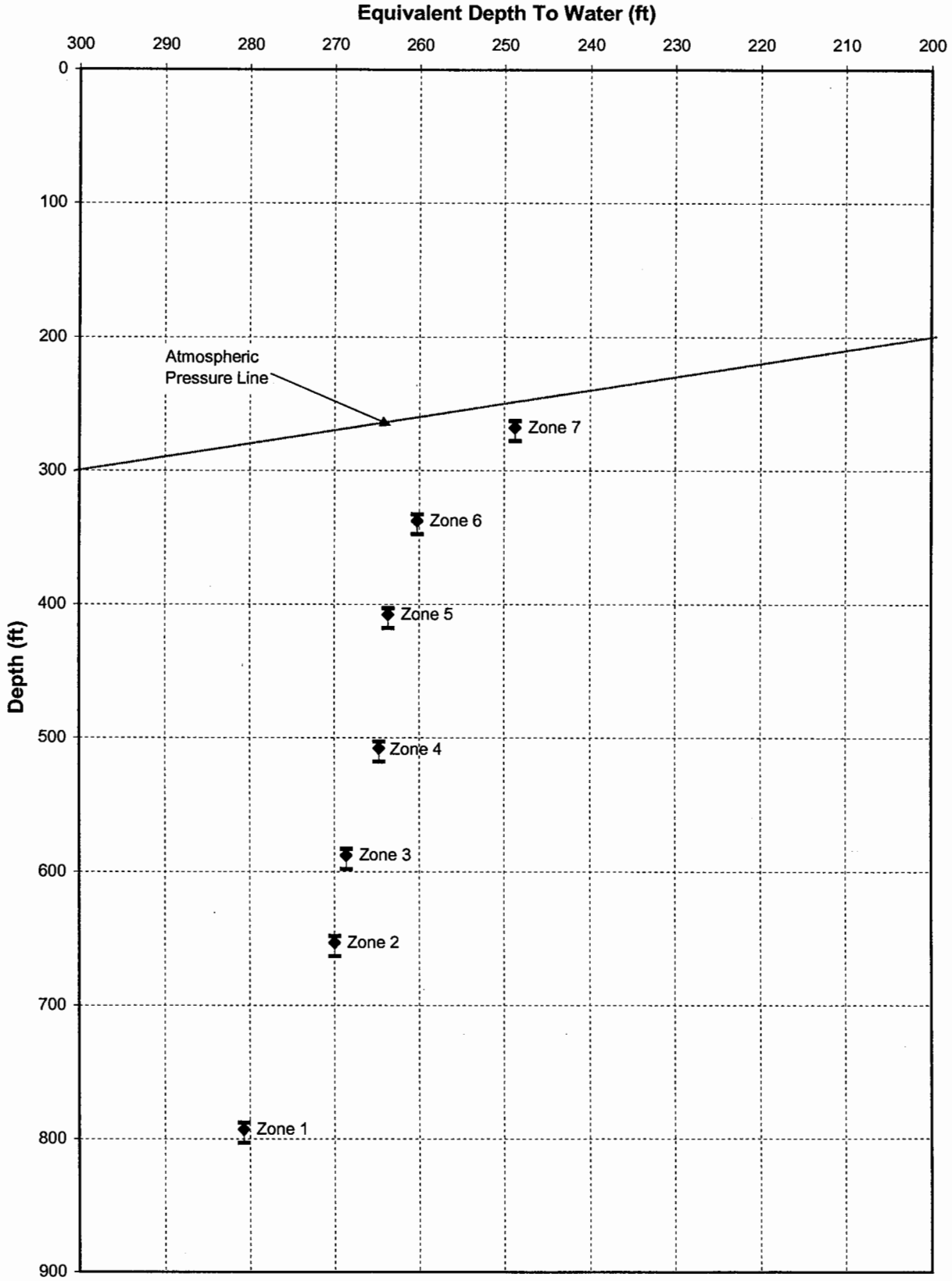
Client: WDC
Site: Alhambra, CA
Datum: GS

Figure 2

Westbay Project: WB824
MW1-6.xls

Piezometric Profile
Monitoring Well: MW 1-6

Profile Date: February 21, 2005
Comments: Monitoring Zones Only



Plot By: MJ Date: 2/23/05
Checked By: AB Date: 2/23/05

Client: WDC
Site: Alhambra, CA
Datum: GS

Figure 3

Westbay Project: WB824
MW 1-6.xls

Westbay Instruments Inc.
A Schlumberger Company

Piezometric Pressures/Levels
Field Data and Calculation Sheet

Datum: Ø Probe Type: Sampler Client: WDC Date: Feb 21/05

Elev. G.S.: Ø Serial No.: EMS1057 Job No.: WB824 Well No.: MW1-6

Height of MP above G.S.: 7 in. Probe Range: 0 to 500 Location: Alhambra

Elev. top of MP Casing: Ø Weather: Overcast, Cool MP Casing Type: MP38

Reference Elevation: Ø Atm. Pressure: 14.16 Operator: M. Lessard

Ambient Reading (Patm) (Pressure, Temperature, time) Start: 14.16 19.60 2:15pm Finish: 14.30 4:06pm 18.41°

Port No.	Port Depth From Log (ft)	Port Depth From Cable (ft)	Port Elev. (✓)	Fluid Pressure Readings: Inside Casing (P1)	Outside Casing (P2)	Inside Casing (P1)	Temp. (°C)	Time H:M:S	Pressure Head Outside Port (ft) H = (P2-Patm)/w	Piez. Level Outside Port (ft) Dz = Dp - H	Comments
1	808	803	—	257.51	265.04		19.6	2:23	578.7	229.3	LQA-1
	~~793~~				265.25		20.2	2:26			
	~~778~~				265.28		20.3	2:27			
					265.31	257.59	20.4	2:28			
2	793	788	-	251.12	236.23	251.10	20.6	2:30	512.3	280.7	Zone 1
3	778	773	-	244.66	259.16		20.9	2:33	519.0	259.0	SQA-1
					239.01		20.9	2:34			
					238.96		20.9	2:35			
					238.81	244.66	21.0	2:39			
4	668	663.5	—	197.28	196.85		20.8	2:47	421.4	246.6	LQA-2
					196.27		20.6	2:49			
					197.27	197.27	20.5	2:50	open valve		
5	653	648.5	—	190.81	180.21		20.3	2:52	383.0	270.0	Zone 2
					180.19		20.2	2:53			
					180.19	190.80	20.2	2:54			
6	638	634	—	184.32	180.41		20.0	2:55	382.5	254.5	SQA-2
				1	180.25		20.0	2:56			
					180.14		20.0	2:57			
					180.04		19.9	2:58			
					180.02	184.32	19.9	2:59			

Westbay Instruments Inc.
A Schlumberger Company

Piezometric Pressures/Levels
Field Data and Calculation Sheet

3/4

Datum: Ø Probe Type: Sampler Client: W.DC Date: Feb 21/05

Elev. G.S.: Ø Serial No.: EMS1057 Job No.: WB824 Well No.: mw1-6

Height of MP above G.S.: 7" Probe Range: 0 to 500 Location: Alhambra

Elev. top of MP Casing: Ø Weather: Overcast, cool MP Casing Type: MP38

Reference Elevation: Ø Atm. Pressure: 14.16 Operator: M. Lessard

Ambient Reading (Patm) (Pressure, Temperature, time) Start: — Finish: —

Port No.	Port Depth From Log (ft)	Port Depth From Cable (ft)	Port Elev. (—)	Fluid Pressure Readings: Inside Casing (P1)	Fluid Pressure Readings: Outside Casing (P2)	Fluid Pressure Readings: Inside Casing (P1)	Temp. (°C)	Time H:M:S	Pressure Head Outside Port (ft) H = (P2-Patm)/w	Piez. Level Outside Port (ft) Dz = Dp - H	Comments
7	603	599	—	169.15	166.85		19.7	3:01	352.2	250.8	LQA-3
					166.45		19.6	3:03			
					166.38		19.6	3:04			
					166.31	169.15	19.6	3:05			
8	588	584	—	162.65	152.63		19.5	3:06	319.4	268.6	Zone 3
					152.57		19.4	3:07			
					152.56	162.64	19.4	3:08			
9	573	569	—	156.11	153.51		19.3	3:09	321.4	251.5	SQA-3
				152.97	152.97		19.3	3:10			
				152.71	152.71		19.3	3:11			
				152.53	152.53		19.2	3:12			
				152.43	152.43	156.10	19.2	3:13			
10	523	519	—	134.43	128.81		19.0	3:15	204.5	258.5	LQA-4
					128.12		19.0	3:16			
					127.67		18.9	3:17			
					127.20		18.8	3:18			
					126.96	134.42	18.8	3:19			
11	508	504	—	127.91	119.63		18.7	3:20	243.3	264.7	Zone 4
					119.66	127.91	18.6	3:21			

Westbay Instruments Inc.
A Schlumberger Company

Piezometric Pressures/Levels
Field Data and Calculation Sheet

3/4

Datum: Ø Probe Type: Sampler Client: WDC Date: Feb 21/05

Elev. G.S.: Ø Serial No.: EMS 1057 Job No.: WB824 Well No.: mw1-6

Height of MP above G.S.: 7 in. Probe Range: 0 to 500 Location: Alhambra

Elev. top of MP Casing: Ø Weather: Overcast, cool MP Casing Type: MP38

Reference Elevation: Ø Atm. Pressure: 14.16 Operator: M. Lessard

Ambient Reading (Patm) (Pressure, Temperature, time) Start: — Finish: —

Port No.	Port Depth From Log (ft)	Port Depth From Cable (ft)	Port Elev. (−)	Fluid Pressure Readings			Temp. (°C)	Time H:M:S	Pressure Head Outside Port (ft) H = (P2-Patm)/w	Piez. Level Outside Port (ft) Dz = Dp - H	Comments
				Inside Casing (P1)	Outside Casing (P2)	Inside Casing (P1)					
12	493	489	—	121.36	119.25		18.4	3:25	242.4	250.6	SQA-4
					118.86		18.4	3:26			
					118.76		18.4	3:27			
					118.67		18.4	3:28			
					118.61	121.36	18.4	3:29			
13	423	420	—	90.95	86.00		18.3	3:31	165.7	257.3	LQA-5
					85.81		18.3	3:32			
					85.70		18.3	3:33			
					85.63	90.44	18.3	3:34			
14	408	405	—	84.41	76.75		18.2	3:37	144.4	263.6	Zone 5
					76.75	84.41	18.2	3:38			
15	393	390	—	77.88	73.30		18.2	3:40	136.4	256.6	SQA-5
					73.02		18.2	3:41			
					73.01	77.88	18.2	3:42			
16	353	350	—	60.48	55.31		18.2	3:43	94.9	258.1	LQA-6
					54.31		18.2	3:44			
					53.93		18.2	3:45			
					53.71		18.2	3:46			
					53.56	60.47	18.2	3:47			

Westbay Instruments Inc.
A Schlumberger Company

Piezometric Pressures/Levels
Field Data and Calculation Sheet

Datum: Ø Probe Type: Sampler Client: WDC Date: Feb 21/05

Elev. G.S.: Ø Serial No.: EMS1057 Job No.: WB824 Well No.: MW 1-6

Height of MP above G.S.: 7in Probe Range: 0 to 500 Location: Alhambra

Elev. top of MP Casing: Ø Weather: Overcast, cool MP Casing Type: MP38

Reference Elevation: Ø Atm. Pressure: 14.16 Operator: M. Lessard

Ambient Reading (Patm) (Pressure, Temperature, time) Start: – Finish: –

Port No.	Port Depth From Log (ft)	Port Depth From Cable (ft)	Port Elev. (–)	Fluid Pressure Readings			Temp. (°C)	Time H:M:S	Pressure Head Outside Port (ft) H = (P2-Patm)/w	Piez. Level Outside Port (ft) Dz = Dp - H	Comments
				Inside Casing (P1)	Outside Casing (P2)	Inside Casing (P1)					
17	338	335	–	53.93	47.86		18.2	3:49	77.7	260.3	Zone 6
					47.86	53.93	18.2	3:50			
18	323	320	–	47.42	45.09		18.2	3:51	71.3	251.6	SQA-6
					44.54		18.2	3:55			
					44.52	47.41	18.2	3:56			
19	283	280	–	29.99	25.75		18.2	3:57	26.7	256.3	LQA-7
					24.51		18.2	3:58			
					24.24		18.2	3:59			
					24.12	29.94	18.2	4:00			
20	268	265	–	23.46	22.52		18.2	4:01	19.3	248.7	Zone 7
					22.52	23.46	18.2	4:02			
21	253	250	–	16.90	17.05		18.2	4:03	6.7	246.3	SQA-7
					17.09		18.2	4:03			
					17.09	16.90	18.2	4:04			

Casing Installation Log

Company: WDC
Well: MW 1-6
Site: Alhambra
Project: San Gabriel Valley Superfund Site

Job No: WB824
Author: DL

Well Information

Reference Datum: Ground Surface
Elevation of Datum: 0.00 ft.
MP Casing Top: 0.00 ft.
MP Casing Length: 818.16 ft.

Borehole Depth: 820.00 ft.
Borehole Inclination:
Borehole Diameter: 4.00 in.

Well Description:
Plastic MP38
Other References:
Backfilled 4-inch SCH40 steel casing
wire wrap screens slot size 0.015
to 0.040 inches.

File Information

File Name: MW1_6DFT.WWD
Report Date: Tue Feb 01 15:28:29 2005

File Date: Feb 01 14:56:04 2005

Comments

Log Information

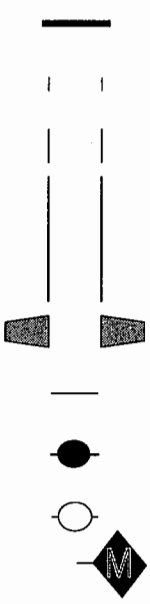
Borehole condition confirmed.	(method) Video	Date: Feb 17/05
MP well design & preparation.	By: Mark Legard	Date: Feb 18/05
MP well design checked.	By: MP	Date: 2/18/05
MP well and borehole approved to install.	By: MP	Date: 2/18/05

Casing Installation Log
WDC

Job No: WB824
Well: MW 1-6

Legend

(Qty) MP Components
(Library - WD Library 7/27/00)



(2) 0223 - MP38 End Cap

(2) 0225F02 - MP38 Casing, PVC, 2 ft.

(35) 0225F05 - MP38 Casing, PVC, 5 ft.

(54) 0225F10 - MP38 Casing, PVC, 10 ft.

(21) 0239F05 - MP38 Packer, Stiffened

(84) 0202 - MP38 Regular Coupling

(21) 0205 - MP38 Measurement Port

(7) 0224 - MP38 Pumping Port

(7) 0216 - MP38 Magnetic Location Collar

Geology

Backfill/Casing

Mild Steel

Stainless Steel

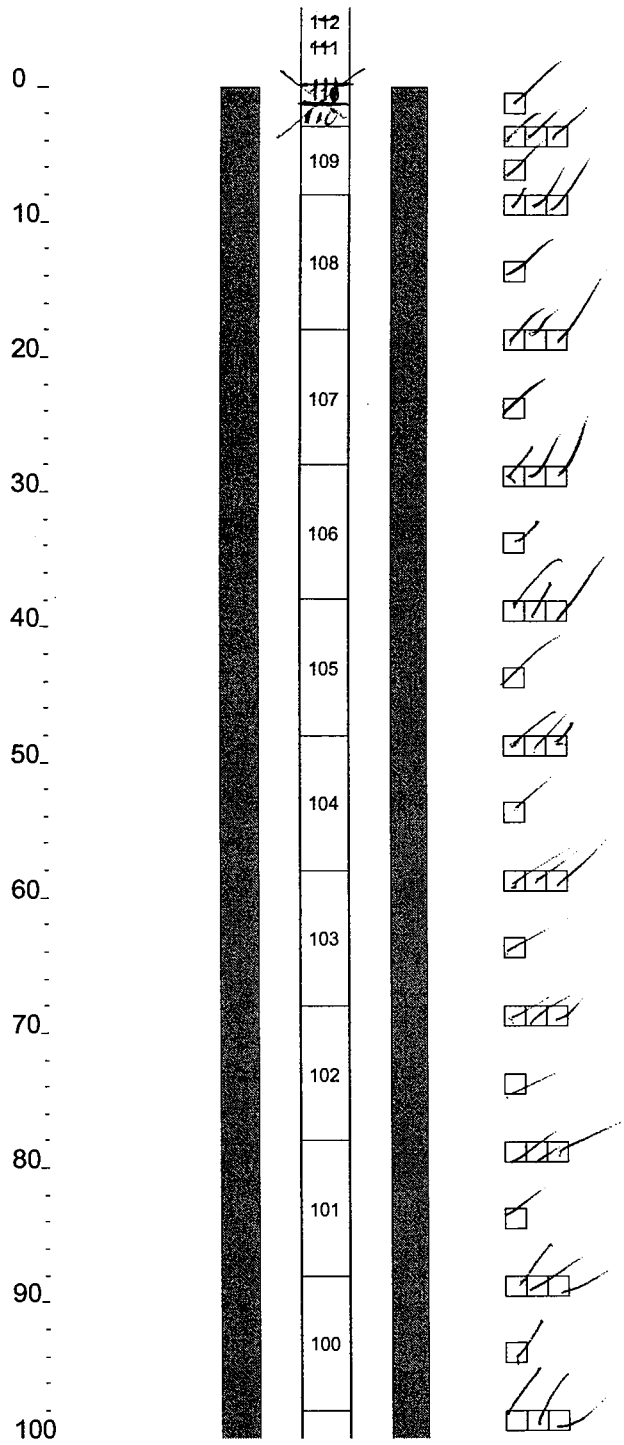
Well Screen

Casing Installation Log
WDC

Job No: WB824
Well: MW 1-6

End of lowering 12:05 pm Feb 14, 2005

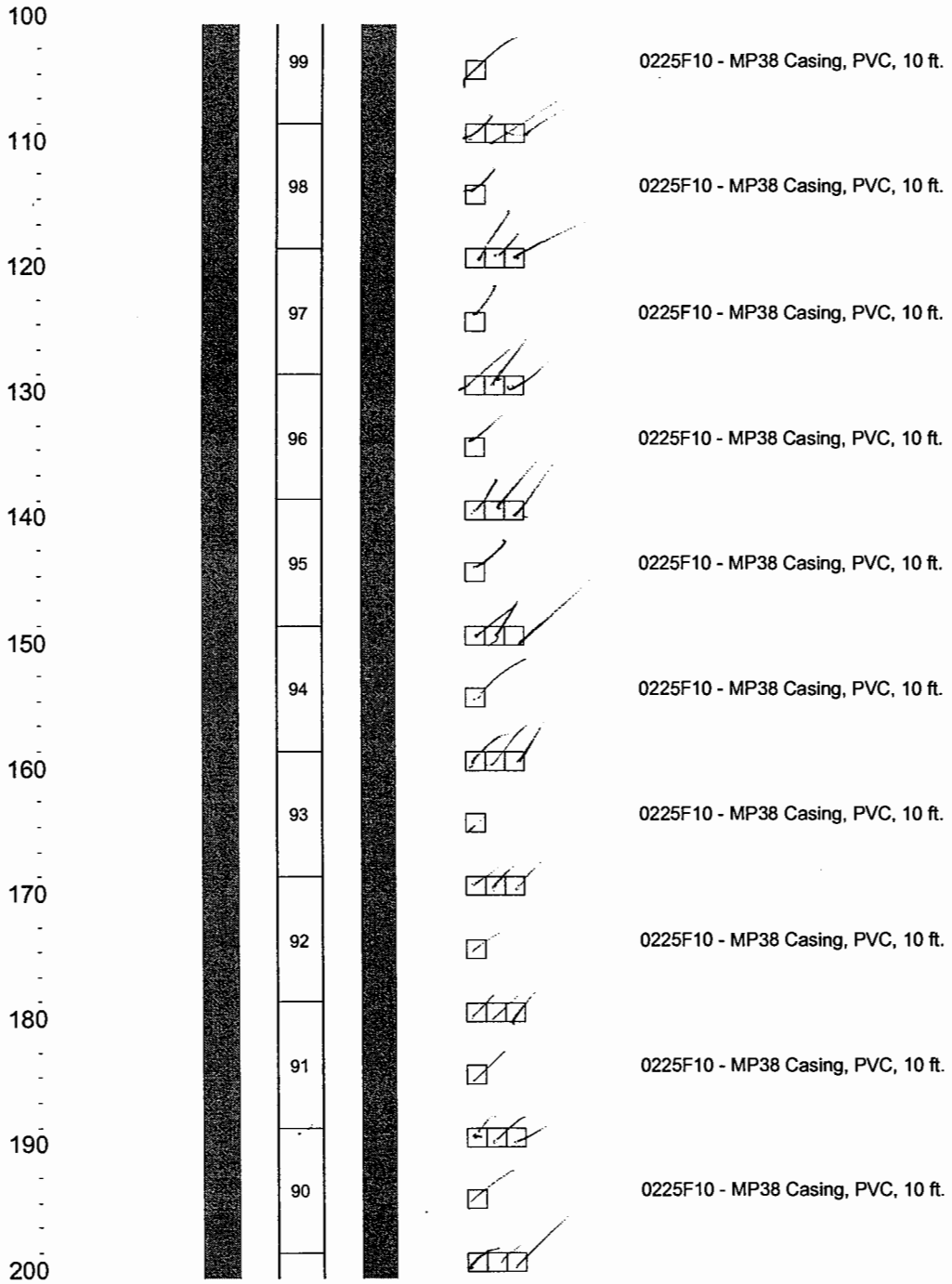
28 gal water



Tue Feb 01 15:31:17 2005

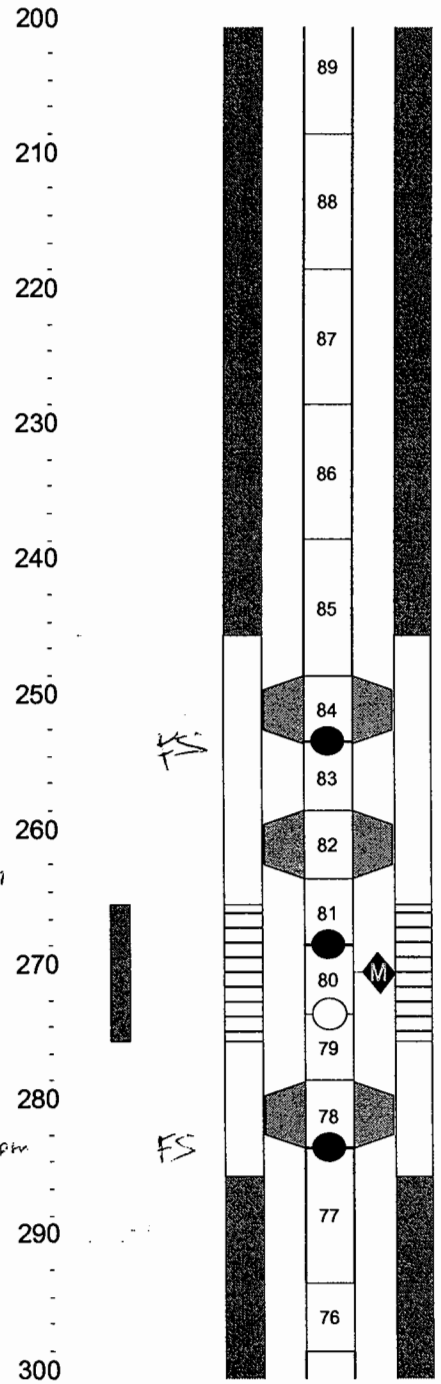
Casing Installation Log
WDC

Job No: WB824
Well: MW 1-6



Casing Installation Log
WDC

Job No: WB824
Well: MW 1-6



QA Test/OK

MP Casing Description

0225F10 - MP38 Casing, PVC, 10 ft.

0225F10 - MP38 Casing, PVC, 10 ft.

0225F10 - MP38 Casing, PVC, 10 ft.

0225F10 - MP38 Casing, PVC, 10 ft.

0225F10 - MP38 Casing, PVC, 10 ft.

0239F05 - MP38 Packer, Stiffened
0205 - MP38 Measurement Port
0225F05 - MP38 Casing, PVC, 5 ft.

0239F05 - MP38 Packer, Stiffened

0225F05 - MP38 Casing, PVC, 5 ft.
0205 - MP38 Measurement Port
0225F05 - MP38 Casing, PVC, 5 ft.
0224 - MP38 Pumping Port
0225F05 - MP38 Casing, PVC, 5 ft.

0239F05 - MP38 Packer, Stiffened
0205 - MP38 Measurement Port

0225F10 - MP38 Casing, PVC, 10 ft.

0225F05 - MP38 Casing, PVC, 5 ft.

2:01 pm

1:46 pm

start lowering 7:40 am Feb 14, 2005

1:23 pm

End of lowering 5:30 pm Feb 18, 2005

14271/150
2739

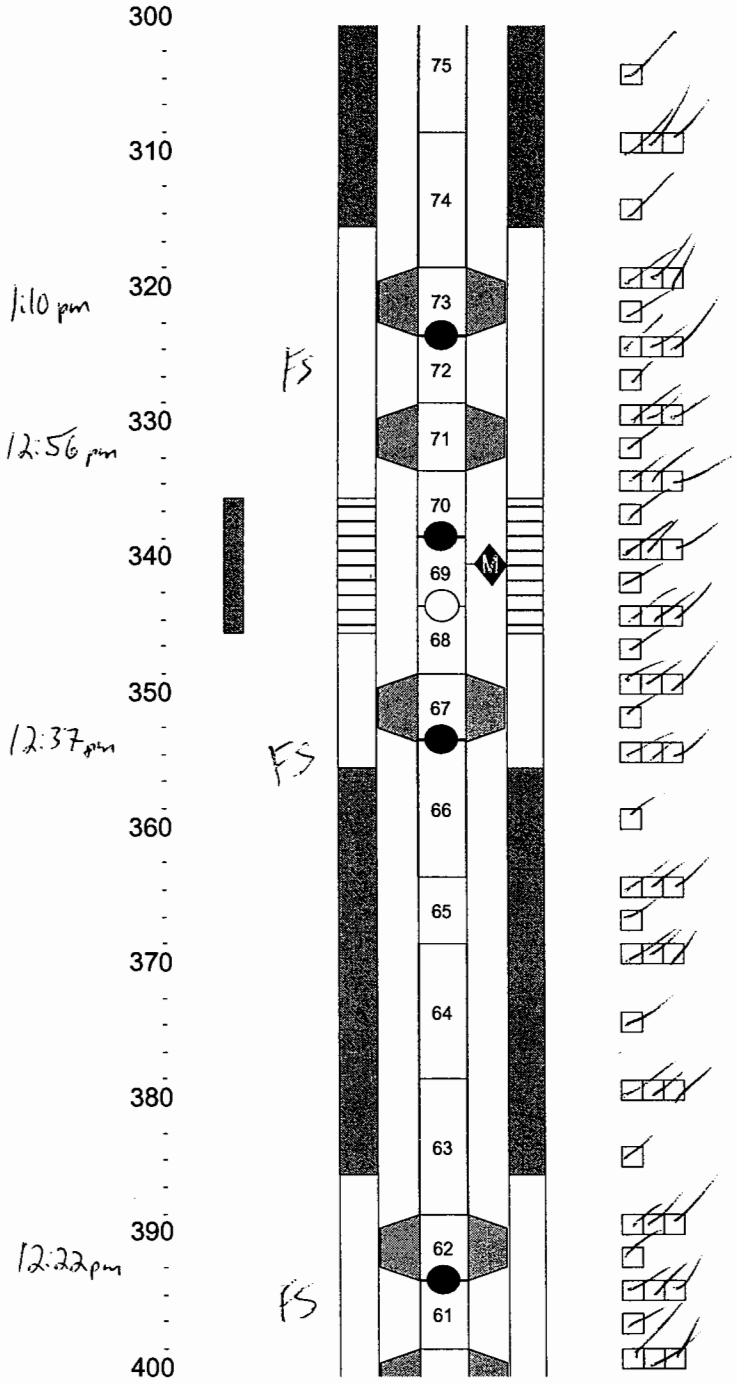
14273/140

2738
6705

14280/150
2736

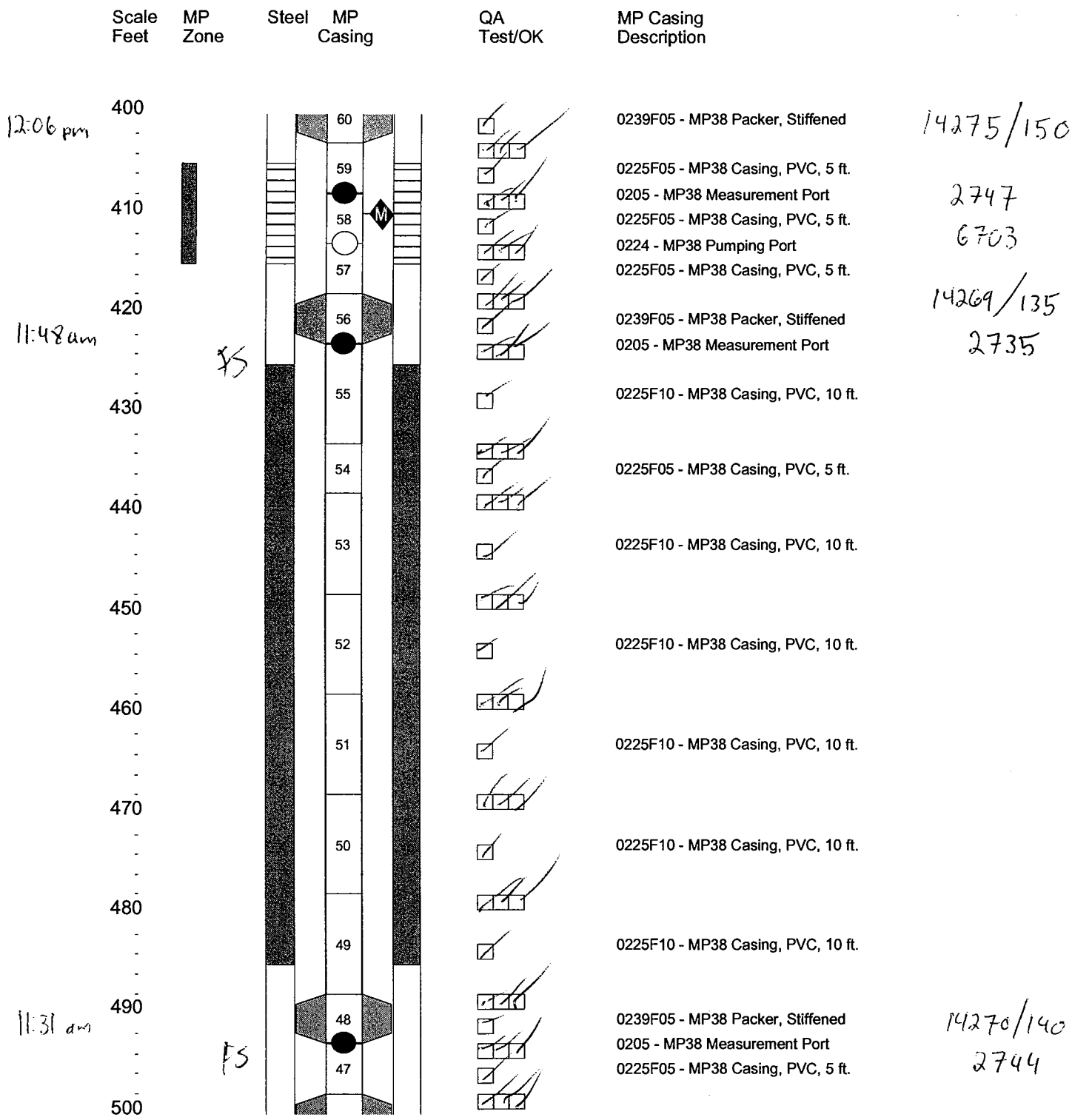
Casing Installation Log
WDC

Job No: WB824
Well: MW 1-6



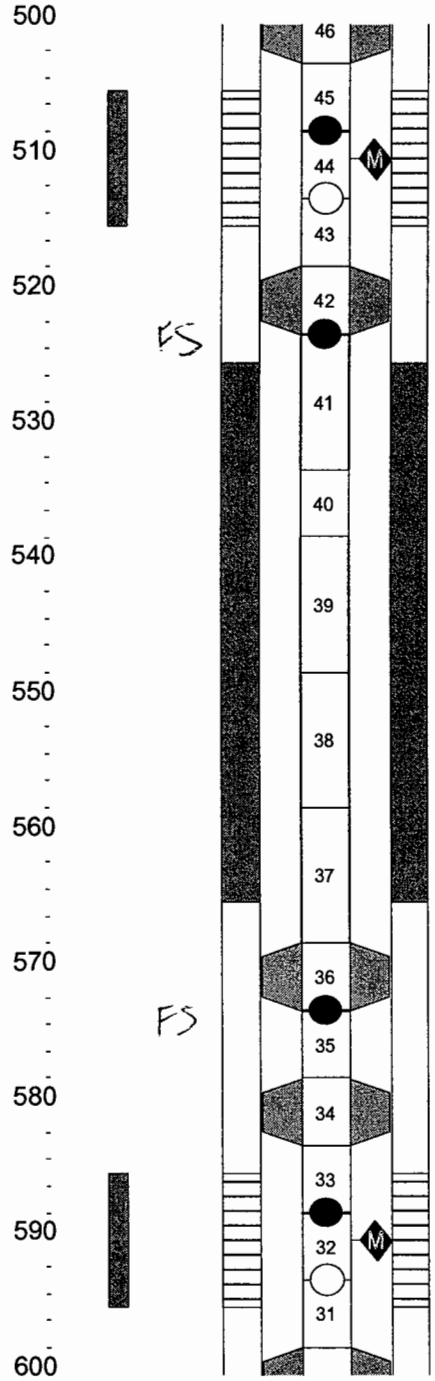
Casing Installation Log
WDC

Job No: WB824
Well: MW 1-6



Casing Installation Log
WDC

Job No: WB824
Well: MW 1-6



11:14 am

10:55 am

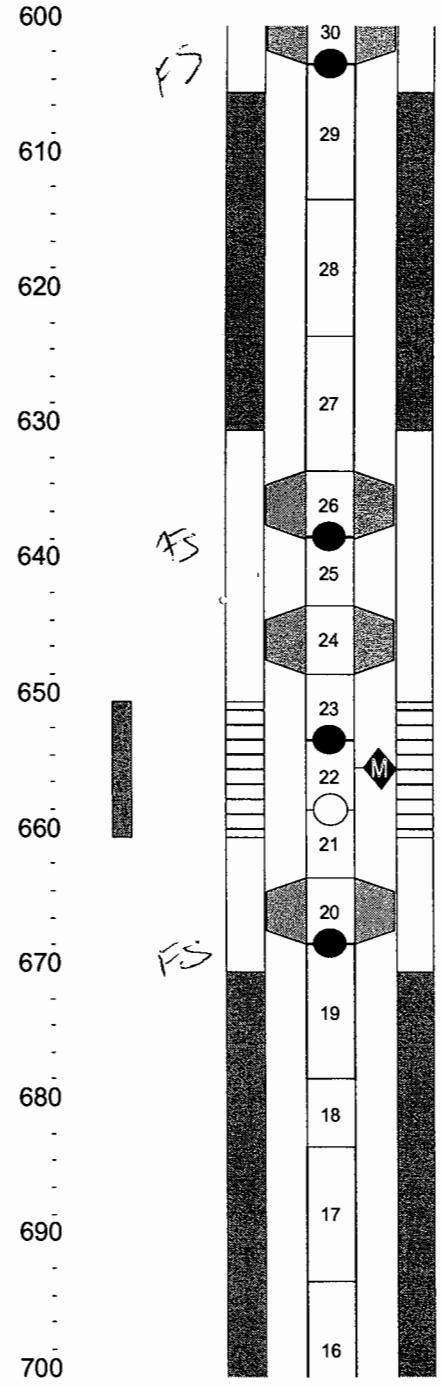
10:40 am

10:23 am

14271/150
2745
6702
14272/150
2733
14268/150
2743
14265/160
2742
6706

Casing Installation Log
WDC

Job No: WB824
Well: MW 1-6



QA Test/OK

MP Casing Description

- 0239F05 - MP38 Packer, Stiffened
- 0205 - MP38 Measurement Port
- 0225F10 - MP38 Casing, PVC, 10 ft.
- 0225F10 - MP38 Casing, PVC, 10 ft.
- 0225F10 - MP38 Casing, PVC, 10 ft.
- 0239F05 - MP38 Packer, Stiffened
- 0205 - MP38 Measurement Port
- 0225F05 - MP38 Casing, PVC, 5 ft.
- 0239F05 - MP38 Packer, Stiffened
- 0225F05 - MP38 Casing, PVC, 5 ft.
- 0205 - MP38 Measurement Port
- 0225F05 - MP38 Casing, PVC, 5 ft.
- 0224 - MP38 Pumping Port
- 0225F05 - MP38 Casing, PVC, 5 ft.
- 0239F05 - MP38 Packer, Stiffened
- 0205 - MP38 Measurement Port
- 0225F10 - MP38 Casing, PVC, 10 ft.
- 0225F05 - MP38 Casing, PVC, 5 ft.
- 0225F10 - MP38 Casing, PVC, 10 ft.
- 0225F10 - MP38 Casing, PVC, 10 ft.

10:05 am
9:48 am
9:37 am
9:10 am

14266/145
2740

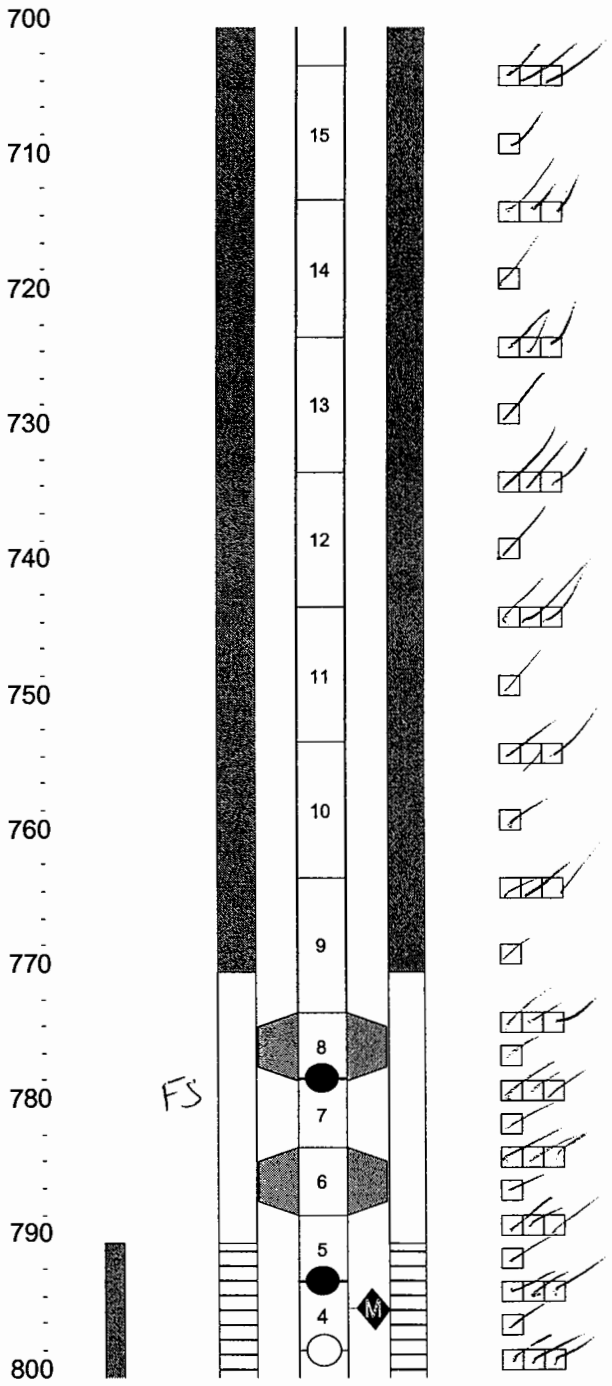
14267/160
2791 Replaced with 2574

14281/150
2748 Replaced with 1684
6701

14282/160
2731

Casing Installation Log
WDC

Job No: WB824
Well: MW 1-6



4:00 pm

3:40 pm

14283/150
2730

14284/140
2729
6700

Casing Installation Log
WDC

Job No: WB824
Well: MW 1-6

Scale Feet	MP Zone	Steel MP Casing	QA Test/OK	MP Casing Description
800				
810		FS 3 2 1		0225F05 - MP38 Casing, PVC, 5 ft. 0239F05 - MP38 Packer, Stiffened 0205 - MP38 Measurement Port 0225F10 - MP38 Casing, PVC, 10 ft.
820				0223 - MP38 End Cap
830				
840				
850				
860				
870				
880				
890				
900				

3:15 pm

14285/150
2728

Start lowering 12:35 pm - Feb 17, 2005

Borehole Water Depth - 261.2 ft. Top of 4" steel casing
Joint test tool pressure - 200 psi.
Inflation tool pressure - Feb 14 - 425 psi.
Feb 21 - 450 psi.

Hydraulic Integrity Test.
580.23 ft. at 12:10 pm
580.07 ft. at 12:20 pm
580.05 ft. at 12:30 pm
580.05 ft. at 12:40 pm
580.05 ft. at 12:50 pm
580.05 ft. at 1:00 pm

MP casing is water tight.
Mark Jessen

Sheet 1 of 23

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW 1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 19/05

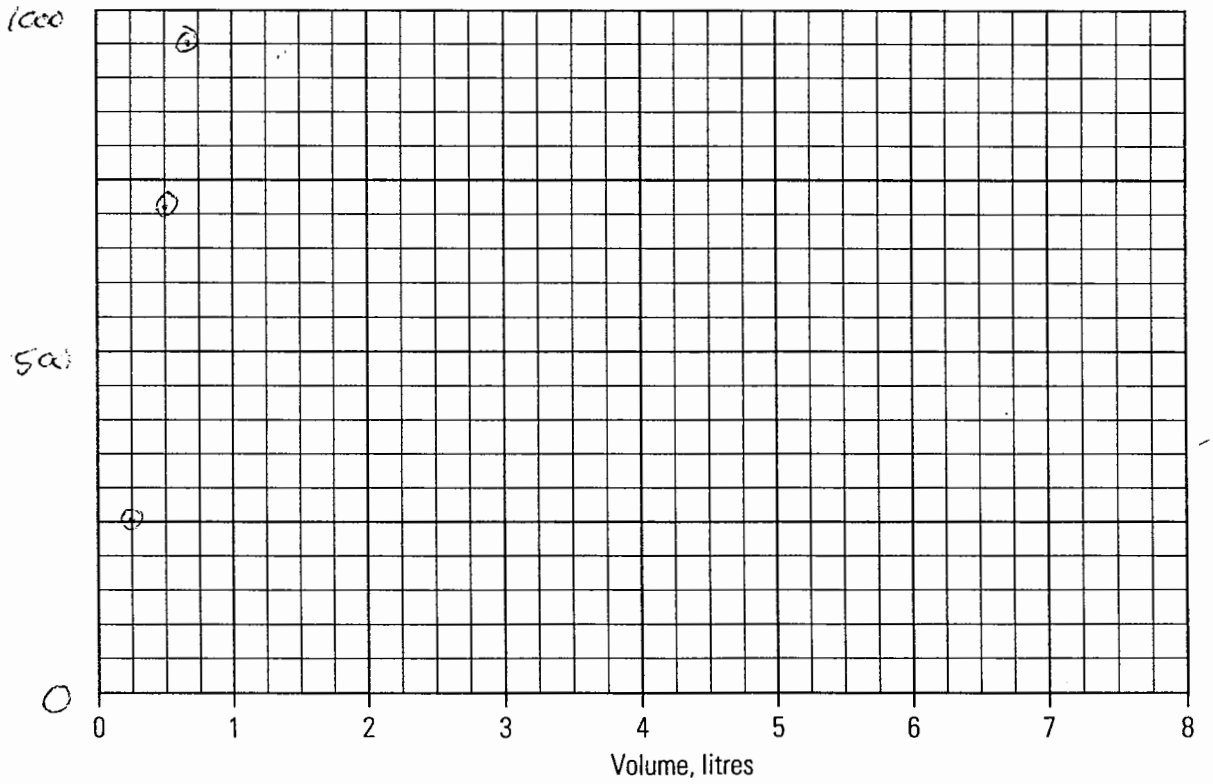
Packer No.: BWT | Serial No.: n/a | Depth (ft) m): 818 | Inflation Tool No.: TIW1088

Packer Valve Pressure, P_V: n/a psi | Final Line Pressure, P_L: 950 psi | Tool Pressure, P_T: 425 psi

Borehole Water Level: 261 (ft / m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = n/a psi

Volume, litres	0.25	0.5	0.7	0.25							
Pressure, psi	250	710	950	0							
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



Comments: Blank Wall Test | Time: 3:01 pm

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 19/05

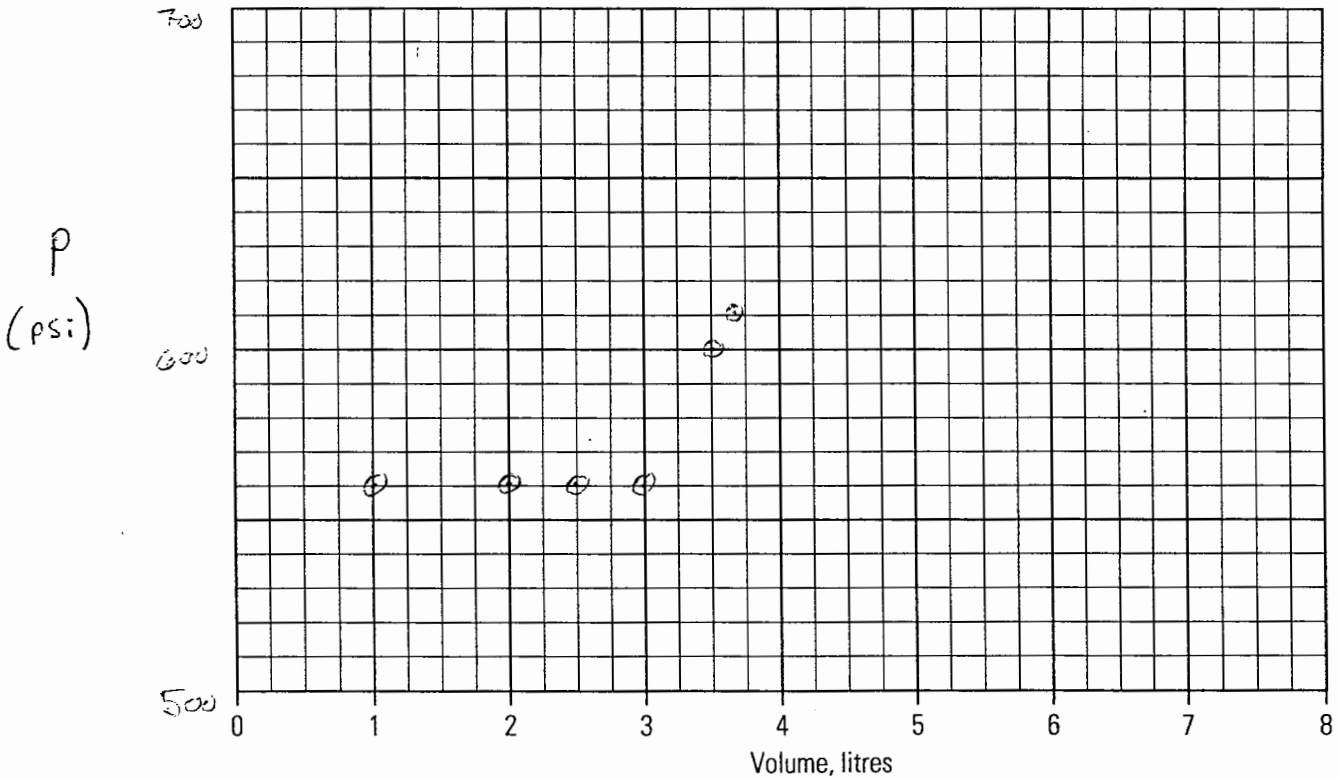
Packer No.: 1/comp 2 | Serial No.: 14285 | Depth (ft / m): 803 | Inflation Tool No.: TIm1088

Packer Valve Pressure, P_V: 150 psi | Final Line Pressure, P_L: 610 psi | Tool Pressure, P_T: 425 psi

Borehole Water Level: 261 (ft / m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = 150 psi

Volume, litres	1.0	2.0	2.5	3.0	3.5	3.65	3.35				
Pressure, psi	560	560	560	560	600	610	ø				
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



Comments Packer #1 Time: 3:15 pm

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW 1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 14/05

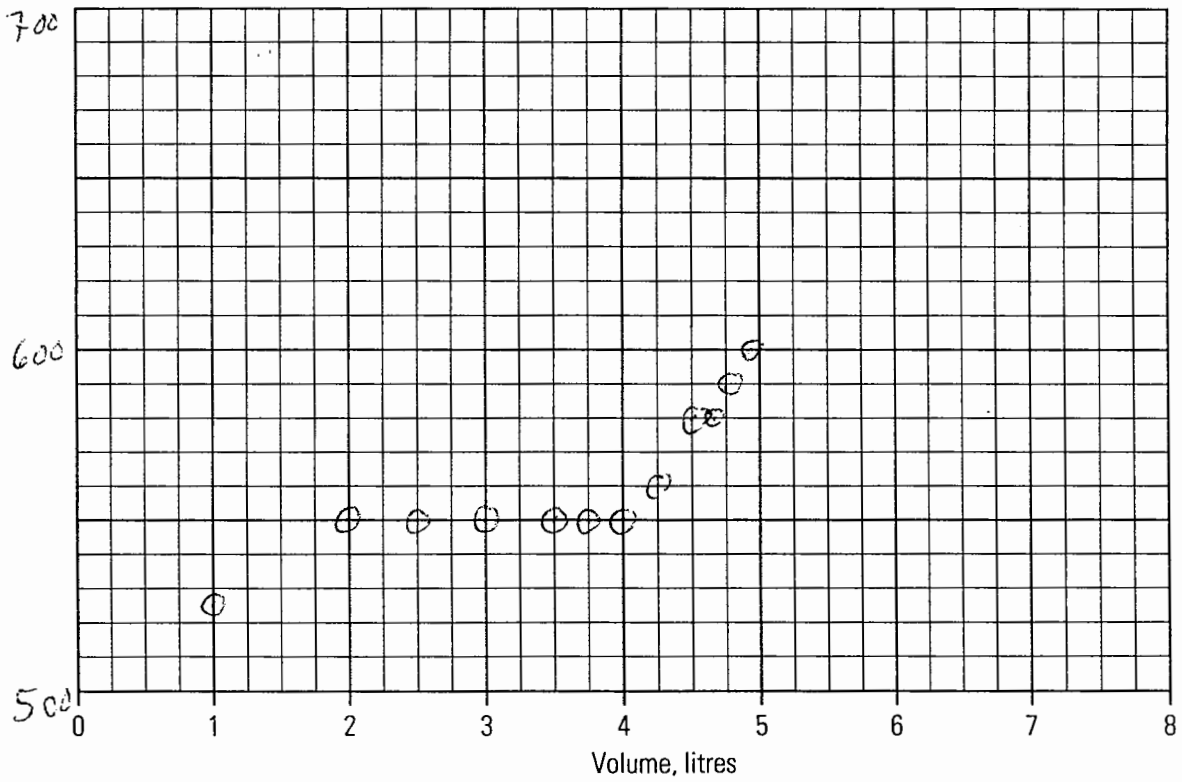
Packer No.: 2 comp 6 | Serial No.: 14284 | Depth (ft / m): 783 | Inflation Tool No.: IV 1038

Packer Valve Pressure, P_V: 140 psi | Final Line Pressure, P_L: 600 psi | Tool Pressure, P_T: 425 psi

Borehole Water Level: 261 (ft / m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = 150 psi

Volume, litres	1.0	2.0	2.5	3.0	3.5	3.75	4.0	4.25	4.5	4.7	4.75
Pressure, psi	525	550	550	550	550	550	550	560	580	580	590
Volume, litres	4.9	4.6									
Pressure, psi	600	ϕ									

Plot of Gauge Pressure (psi) vs. Volume (litres)



Comments: Packer #2 | Time: 3:40 pm

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW 1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 19/05

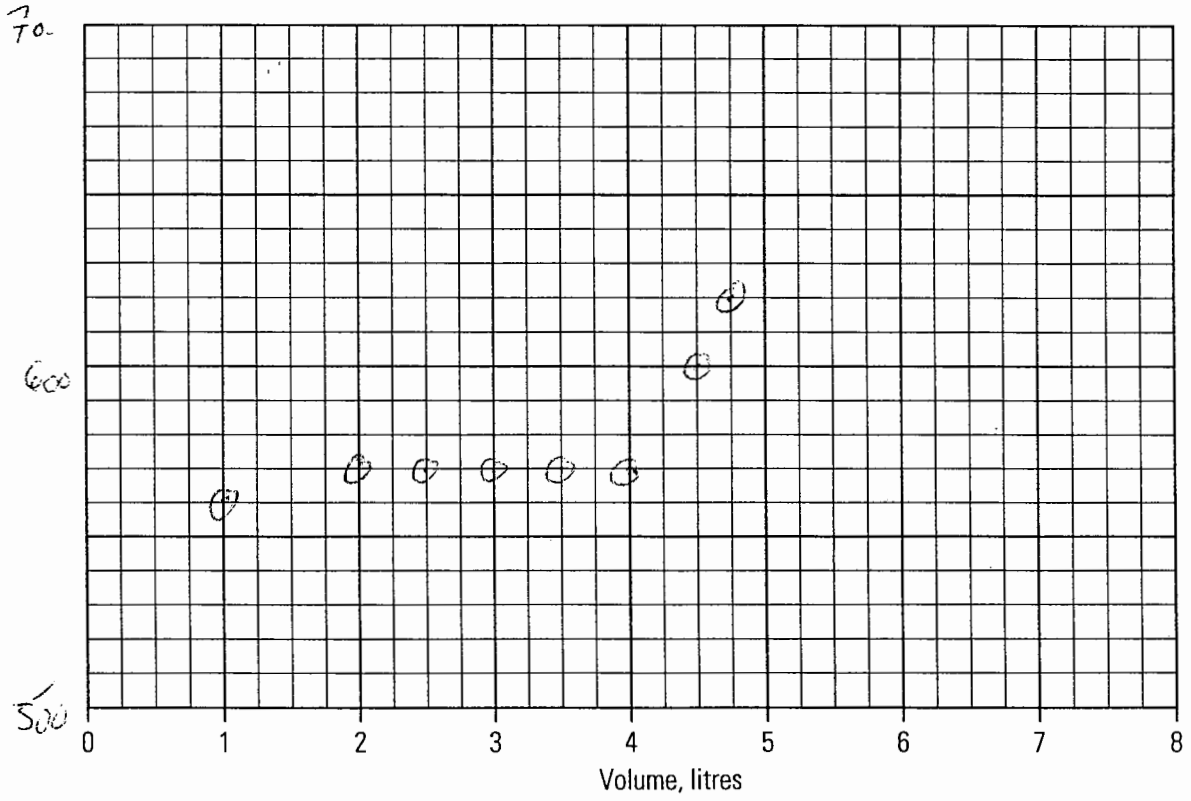
Packer No.: 3, comp 8 | Serial No.: 14283 | Depth (ft / m): 773 | Inflation Tool No.: TIW1088

Packer Valve Pressure, P_V: 150 psi | Final Line Pressure, P_L: 620 psi | Tool Pressure, P_T: 425 psi

Borehole Water Level: 261 (ft / m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = 160 psi

Volume, litres	1.0	2.0	2.5	3.0	3.5	4.0	4.5	4.75	4.5		
Pressure, psi	560	570	570	570	570	570	600	620	∅		
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



Comments Packer #3 Time: 4:00 p.m

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 21/05

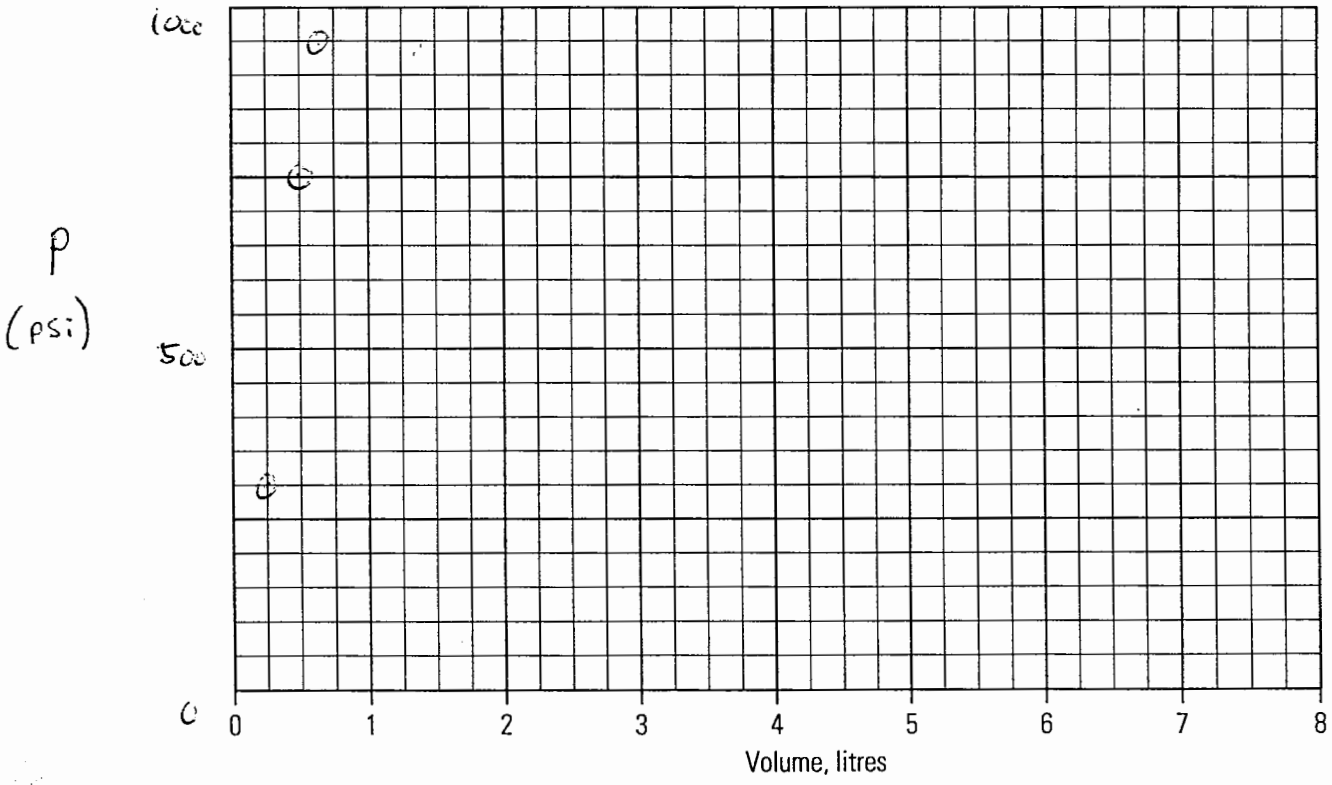
Packer No.: BWT | Serial No.: N/A | Depth (ft / m): 703 | Inflation Tool No.: Tronics

Packer Valve Pressure, P_V: N/A psi | Final Line Pressure, P_L: 950 psi | Tool Pressure, P_T: 450 psi

Borehole Water Level: 761 (ft / m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = N/A psi

Volume, litres	0.25	0.5	0.7	0.25							
Pressure, psi	300	750	950	0							
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



Comments: Blank Wall Test | Time: 8:40 am

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 21/05

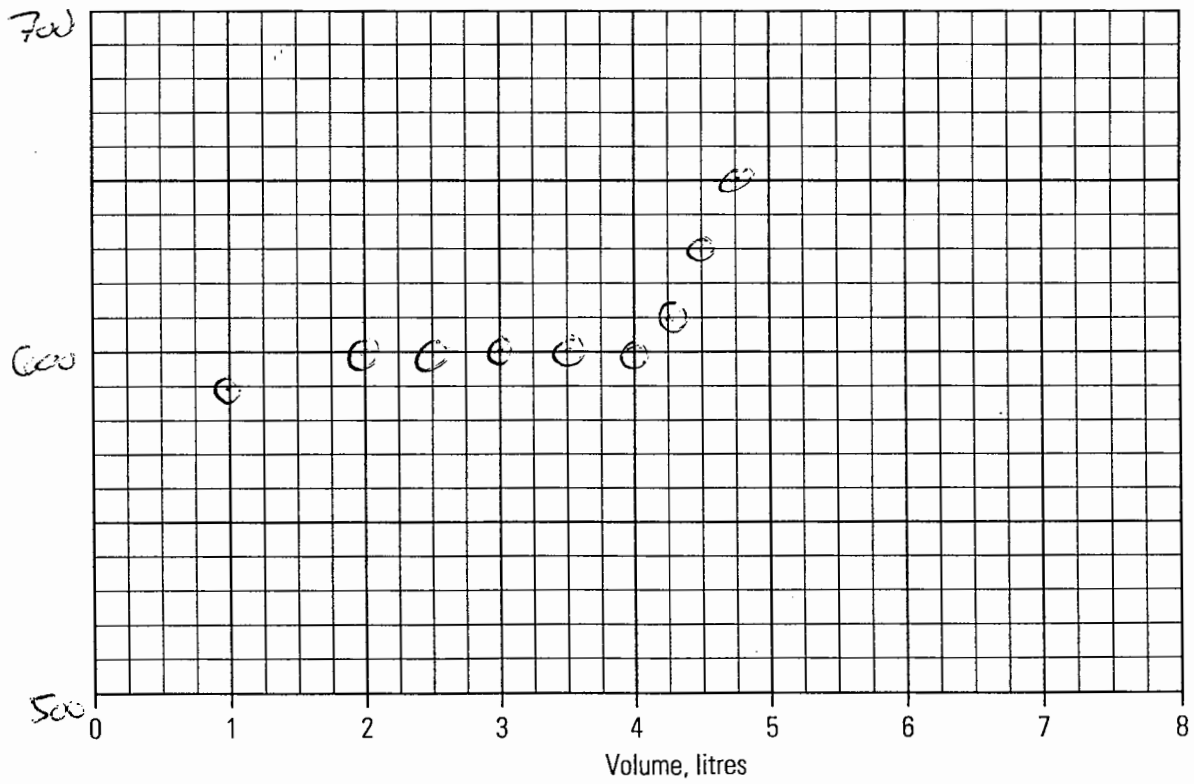
Packer No.: 4.5mP20 | Serial No.: 14232 | Depth (ft / m): 663 | Inflation Tool No.: TEW088

Packer Valve Pressure, P_V: 160 psi | Final Line Pressure, P_L: 650 psi | Tool Pressure, P_T: 450 psi

Borehole Water Level: 261 (ft / m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = 155 psi

Volume, litres	~~1.0~~	1.0	2.0	2.5	3.0	~~3.5~~	4.0	4.25	4.5	4.75	4.45
Pressure, psi	~~690~~	590	600	600	600	600	600	610	630	650	0
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



Comments Packer #4 Time: 9:10 am

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW 1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 31/05

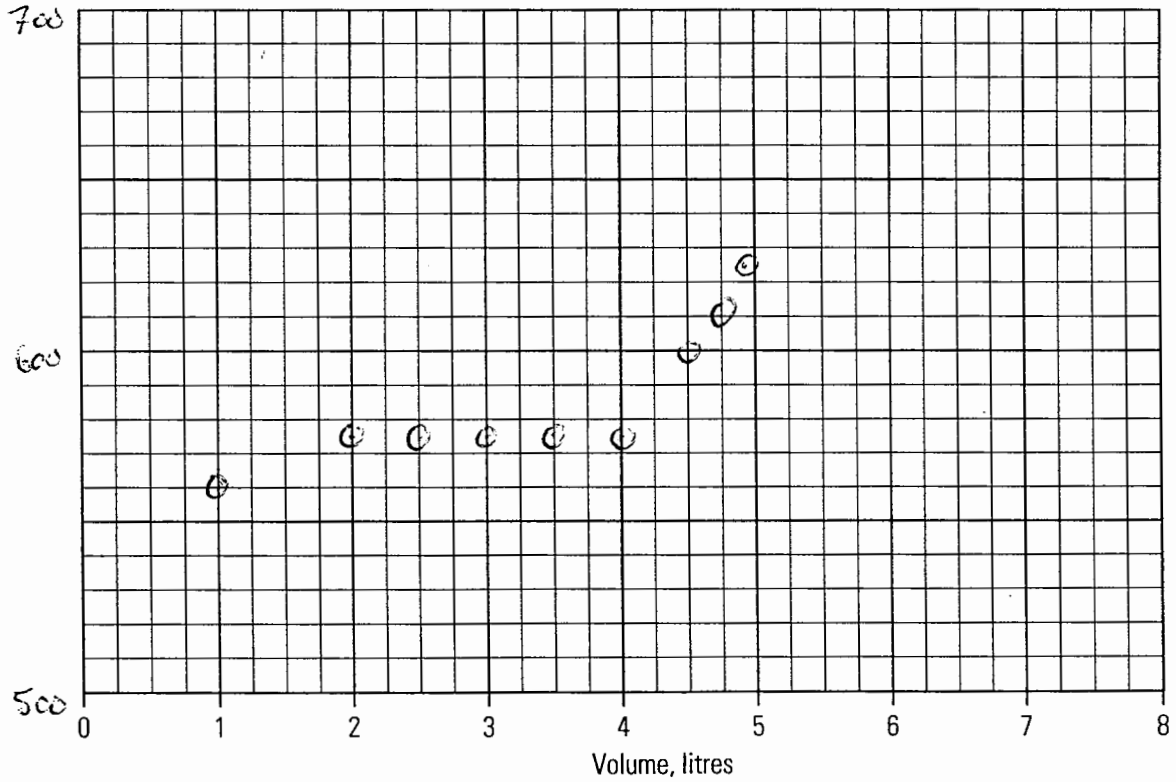
Packer No.: 5, comp 24 | Serial No.: 14281 | Depth (ft / m): 643 | Inflation Tool No.: TIU1088

Packer Valve Pressure, P_V: 150 psi | Final Line Pressure, P_L: 625 psi | Tool Pressure, P_T: 450 psi

Borehole Water Level: 261 (ft / m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = 140 psi

Volume, litres	1.0	2.0	2.5	3.0	3.5	4.0	4.5	4.75	4.9	4.6	
Pressure, psi	560	575	575	575	575	575	600	610	625	ϕ	
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



Comments: Packer #5 | Time: 9:32 am

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 21/05

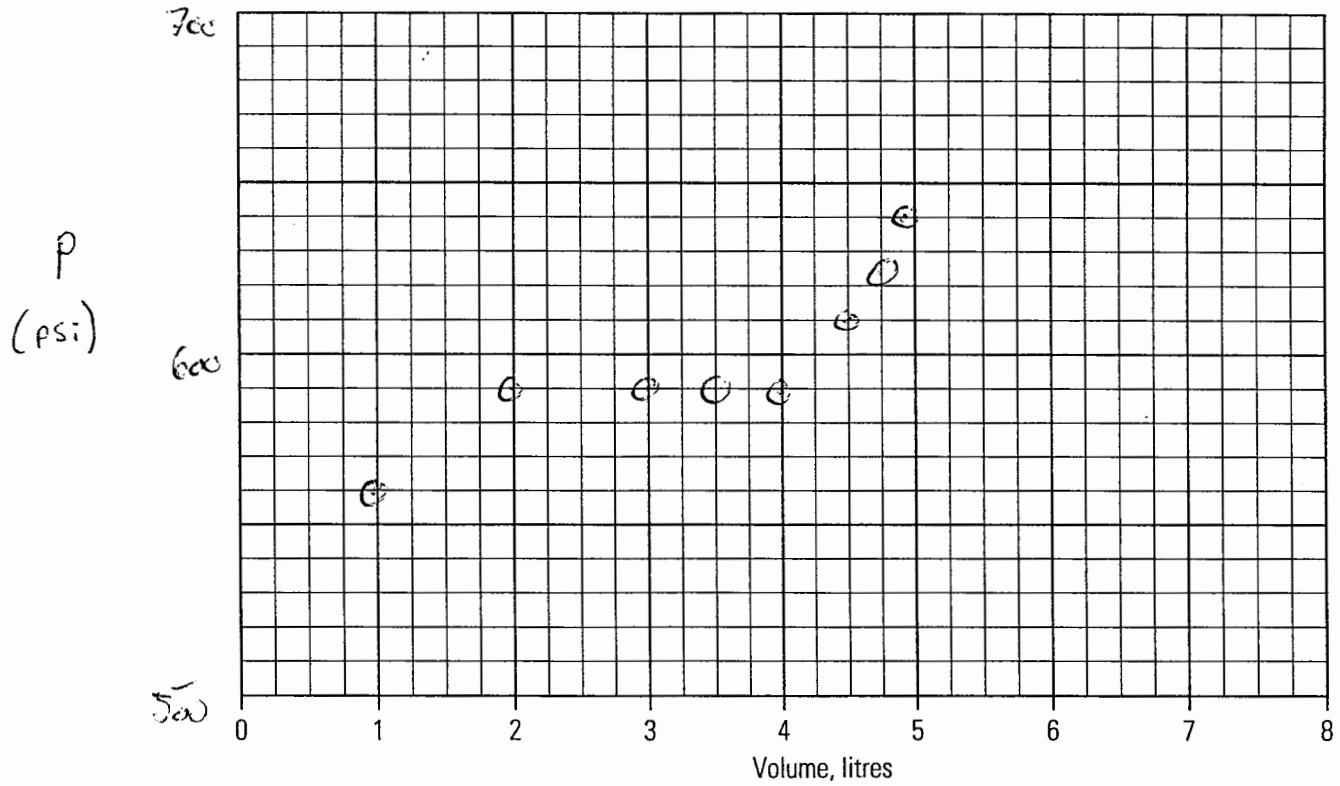
Packer No.: 6, comp 26 | Serial No.: 14267 | Depth (ft / m): 633 | Inflation Tool No.: TW1065

Packer Valve Pressure, P_V: 160 psi | Final Line Pressure, P_L: 640 psi | Tool Pressure, P_T: 450 psi

Borehole Water Level: 201 (ft / m) = 165 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = 145 psi

Volume, litres	1.0	2.0	3.0	3.5	4.0	4.5	4.75	4.9	4.6		
Pressure, psi	560	590	590	590	590	610	625	640	∅		
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



Comments: Packer #6 | Time: 9:48 am

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW 1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 21 05

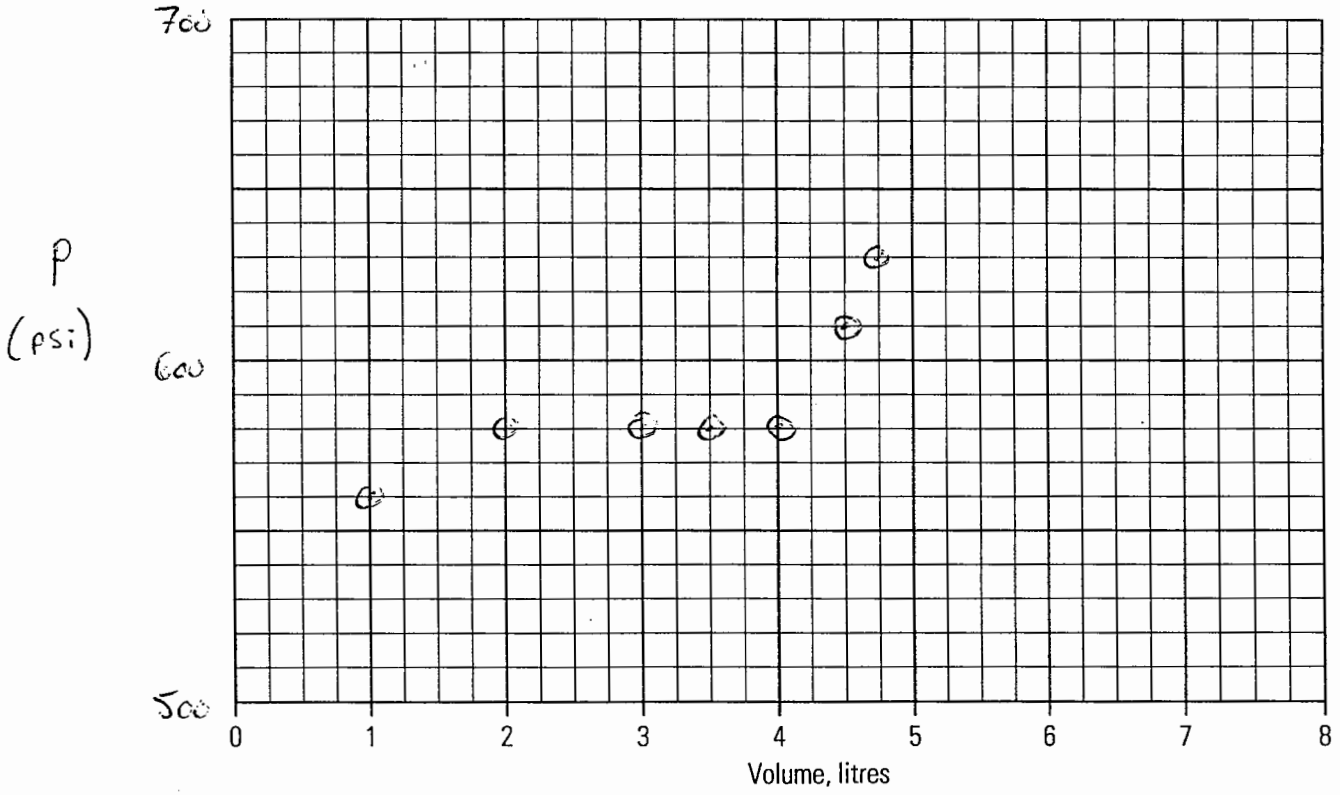
Packer No.: 7 comp 30 | Serial No.: 14266 | Depth (ft / m): 598 | Inflation Tool No.: IEW 018

Packer Valve Pressure, P_V: 145 psi | Final Line Pressure, P_L: 630 psi | Tool Pressure, P_T: 450 psi

Borehole Water Level: 261 (ft / m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = 150 psi

Volume, litres	1.0	2.0	3.0	3.5	4.0	4.5	4.75	4.4			
Pressure, psi	560	580	580	580	580	610	630	ø			
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



Comments: Packer #7 | Time: 10:05 am

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW 1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 21/05

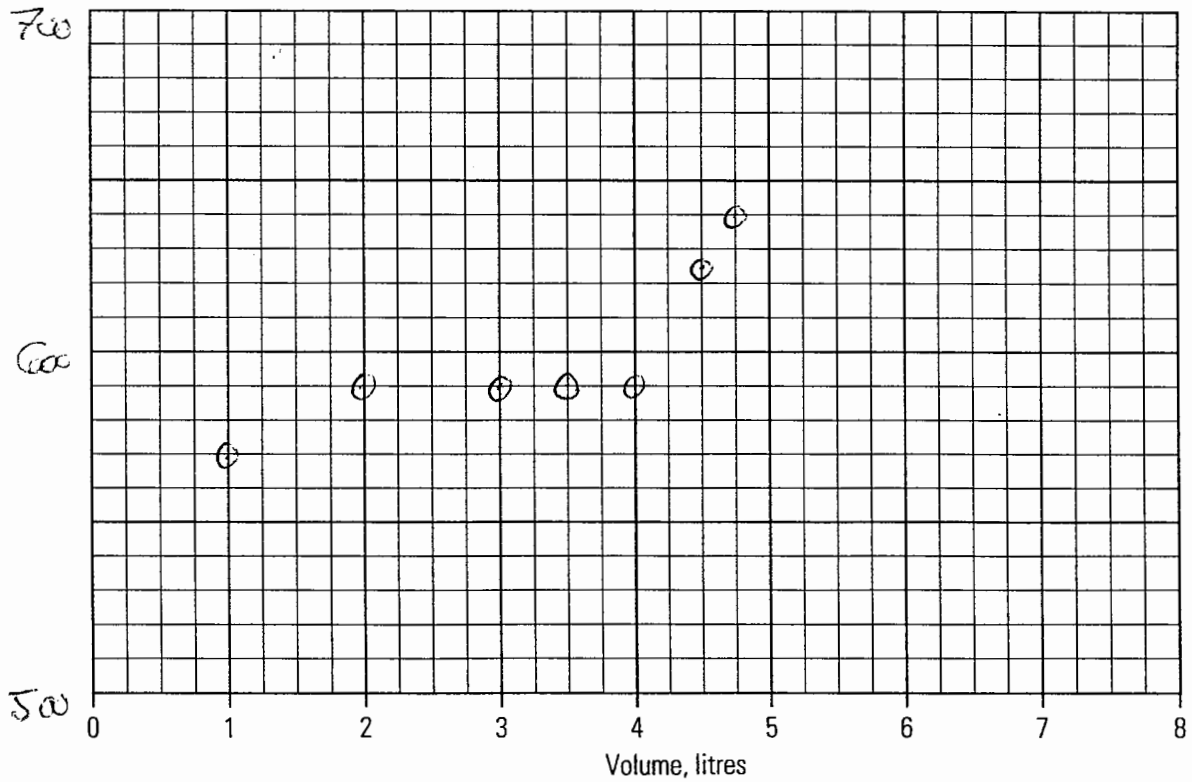
Packer No.: Comp34 Serial No.: 14205 | Depth (ft / m): 578 | Inflation Tool No.: TW 1088

Packer Valve Pressure, P_V: 160 psi | Final Line Pressure, P_L: 640 psi | Tool Pressure, P_T: 450 psi

Borehole Water Level: 261 (ft / m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = 145 psi

Volume, litres	1.0	2.0	3.0	3.5	4.0	4.5	4.75	4.4			
Pressure, psi	570	590	590	590	590	625	640	ϕ			
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



P (psi)

Comments Packer # 8 Time: 10.23am

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 21/05

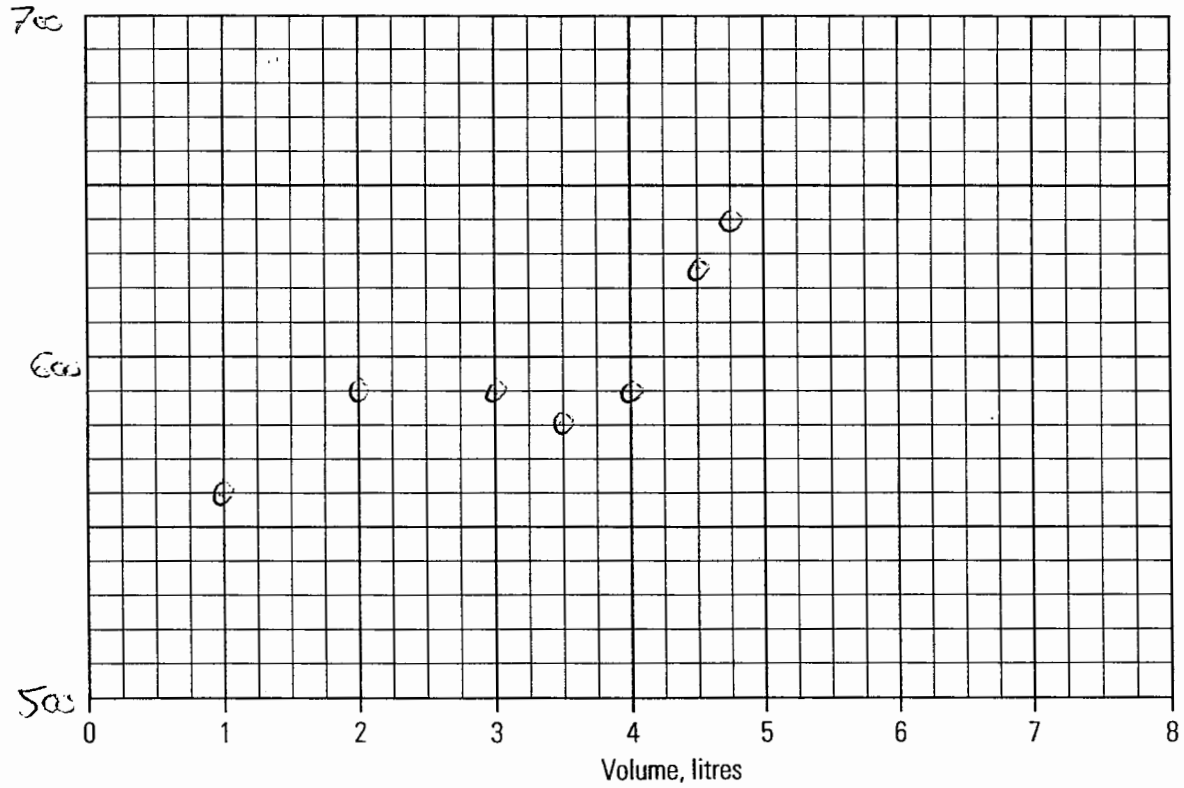
Packer No.: 9 comp | Serial No.: 14268 | Depth (ft / m): 568 | Inflation Tool No.: IEW 1088

Packer Valve Pressure, P_V: 150 psi | Final Line Pressure, P_L: 640 psi | Tool Pressure, P_T: 450 psi

Borehole Water Level: 261 (ft / m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = 155 psi

Volume, litres	1.0	2.0	3.0	3.5	4.0	4.5	4.75	4.5			
Pressure, psi	500	590	590	590	590	625	640	ϕ			
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



P (psi)

Comments Packer #9 Time: 10:40 am

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 21/05

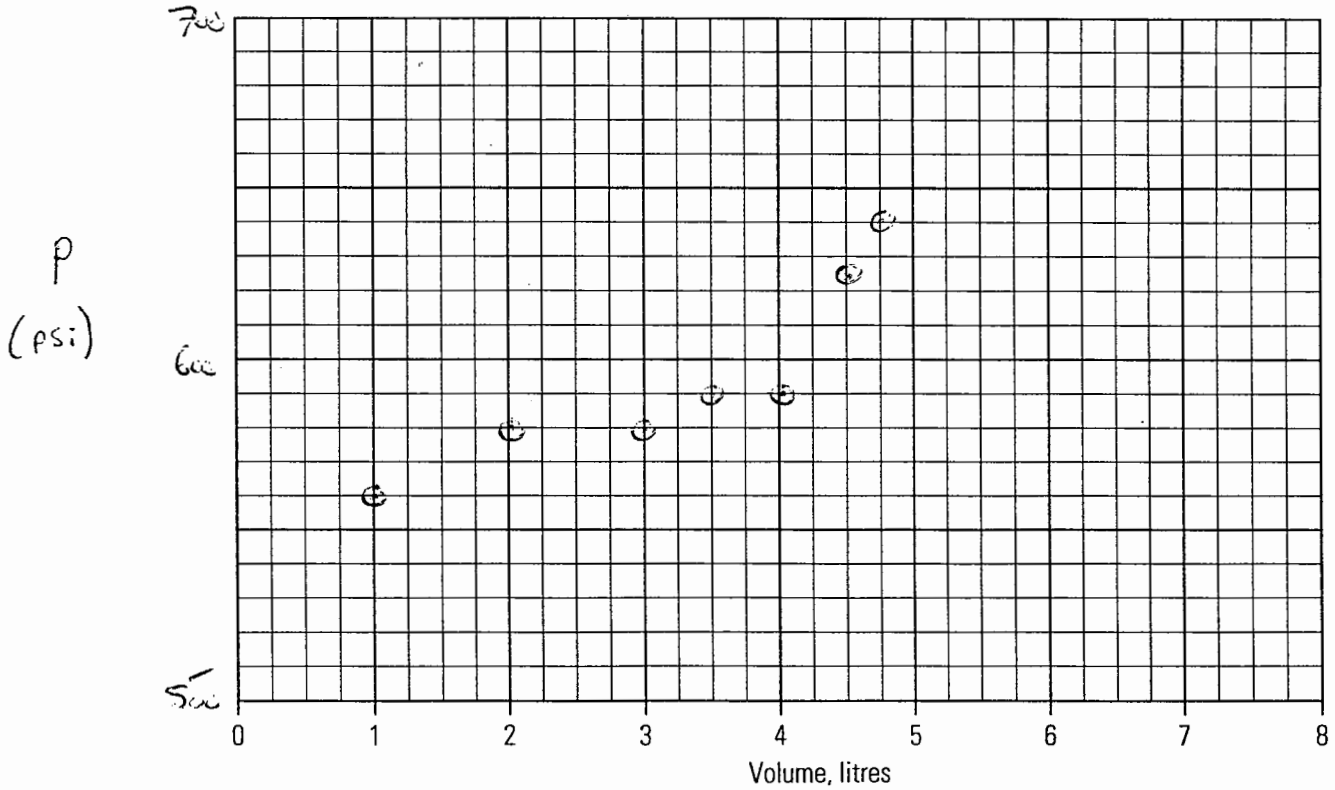
Packer No.: 10, comp 42 | Serial No.: 14272 | Depth (ft) m): 518 | Inflation Tool No.: TIW-1-80

Packer Valve Pressure, P_V: 150 psi | Final Line Pressure, P_L: 640 psi | Tool Pressure, P_T: 450 psi

Borehole Water Level: 261 (ft / m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = 155 psi

Volume, litres	1.0	2.0	3.0	3.5	4.0	4.5	4.75	4.4			
Pressure, psi	560	580	580	590	590	625	640	Q			
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



Comments: Packer #10 | Time: 10.55 am

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 21/05

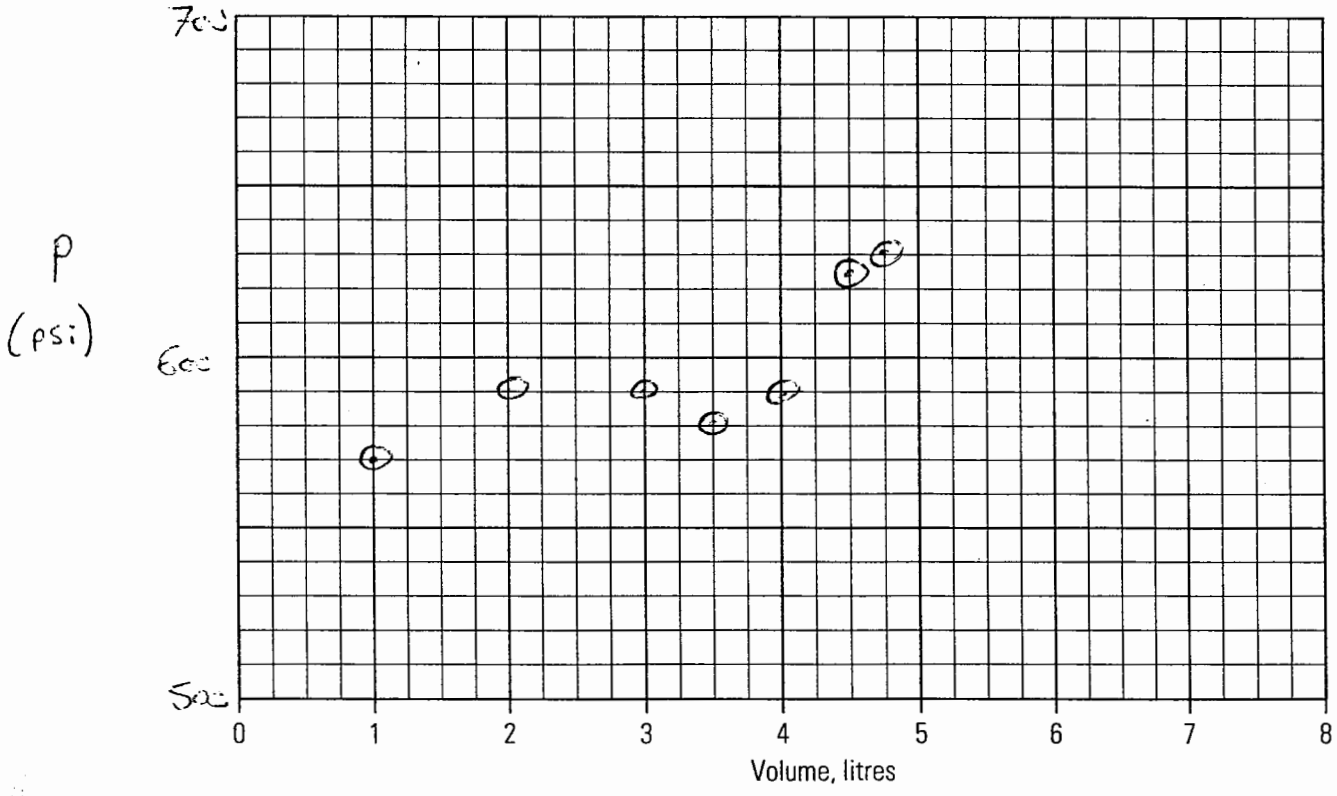
Packer No.: Westbay 46 | Serial No.: 14271 | Depth (ft / m): 498 | Inflation Tool No.: Duke #2

Packer Valve Pressure, P_V: 150 psi | Final Line Pressure, P_L: 630 psi | Tool Pressure, P_T: 450 psi

Borehole Water Level: 261 (ft / m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = 145 psi

Volume, litres	1.0	2.0	3.0	3.5	4.0	4.5	4.75	4.4			
Pressure, psi	570	590	590	580	590	625	630	Ø			
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



Comments: Packer # 11 | Time: 11:14 am

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW 1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 21/05

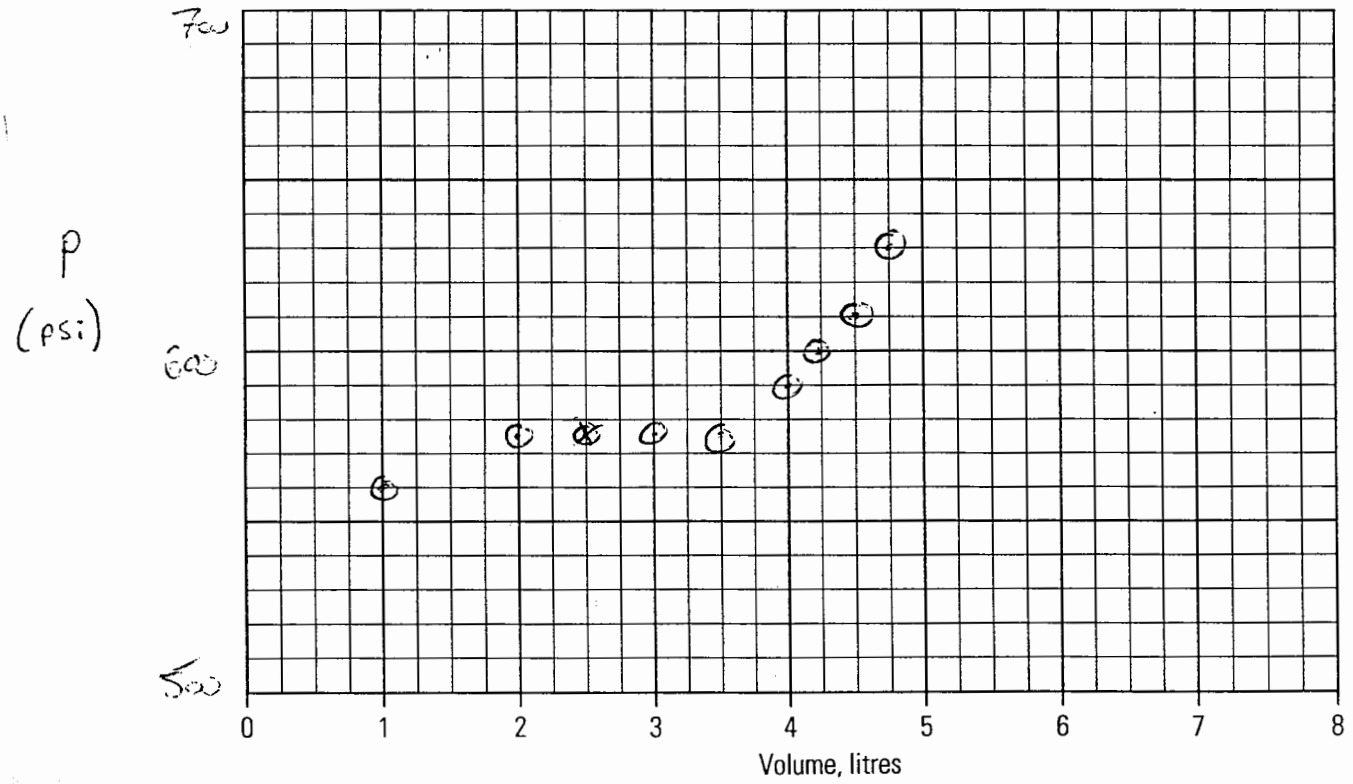
Packer No.: 12, 2 of 8 | Serial No.: 14271 | Depth (ft / m): 488 | Inflation Tool No.: TW 1088

Packer Valve Pressure, P_V: 150 psi | Final Line Pressure, P_L: 630 psi | Tool Pressure, P_T: 450 psi

Borehole Water Level: ~~261~~ (ft / m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = 145 psi

Volume, litres	1.0	2.0	3.0	3.5	4.0	4.25	4.5	4.75	4.4		
Pressure, psi	560	575	575	575	590	600	610	630	∅		
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



Comments: Packer #12 | Time: 11:31 am

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW 1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 21/05

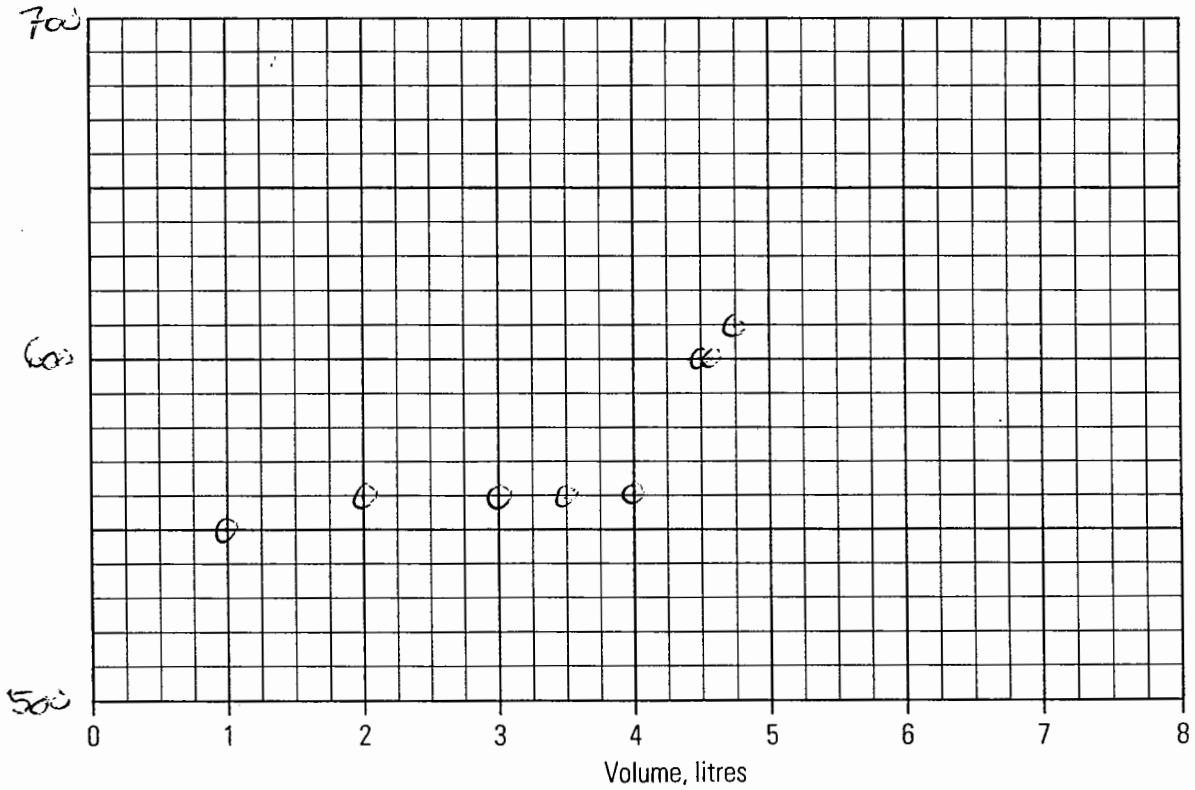
Packer No.: 13, comp 56 | Serial No.: 14269 | Depth (ft / m): 418 | Inflation Tool No.: IFW1088

Packer Valve Pressure, P_V: 135 psi | Final Line Pressure, P_L: 610 psi | Tool Pressure, P_T: 450 psi

Borehole Water Level: 261 (ft / m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = 140 psi

Volume, litres	1.0	2.0	3.0	3.5	4.0	4.5	4.6	4.75	4.45		
Pressure, psi	550	560	560	560	560	600	600	610	ϕ		
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



Comments: Packer #13 | Time: 11:48 am

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW 1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 21/05

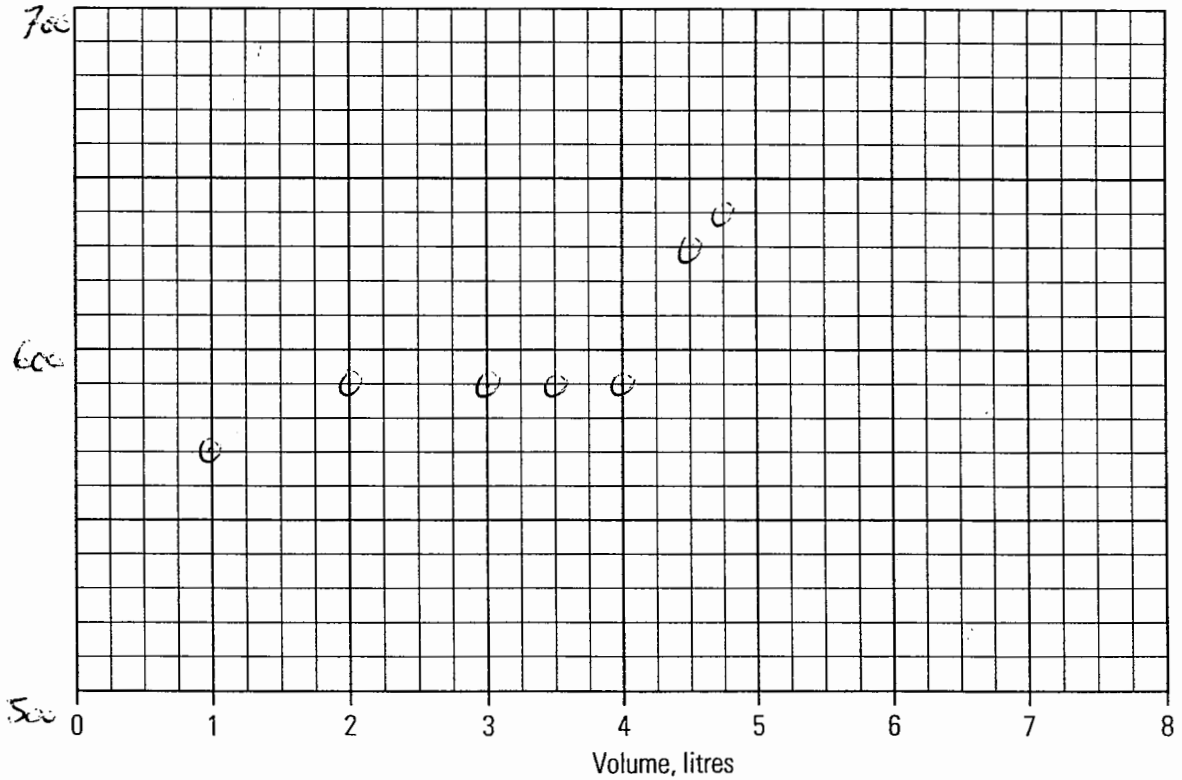
Packer No.: 14, comp 60 | Serial No.: 14275 | Depth (ft / m): 398 | Inflation Tool No.: Denio??

Packer Valve Pressure, P_V: 150 psi | Final Line Pressure, P_L: 640 psi | Tool Pressure, P_T: 450 psi

Borehole Water Level: 261 (ft / m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = 155 psi

Volume, litres	1.0	2.0	3.0	3.5	4.0	4.5	4.75	4.4			
Pressure, psi	570	590	590	590	590	630	640	0			
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



Comments: Packer #14 | Time: 12:06 pm

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 21/05

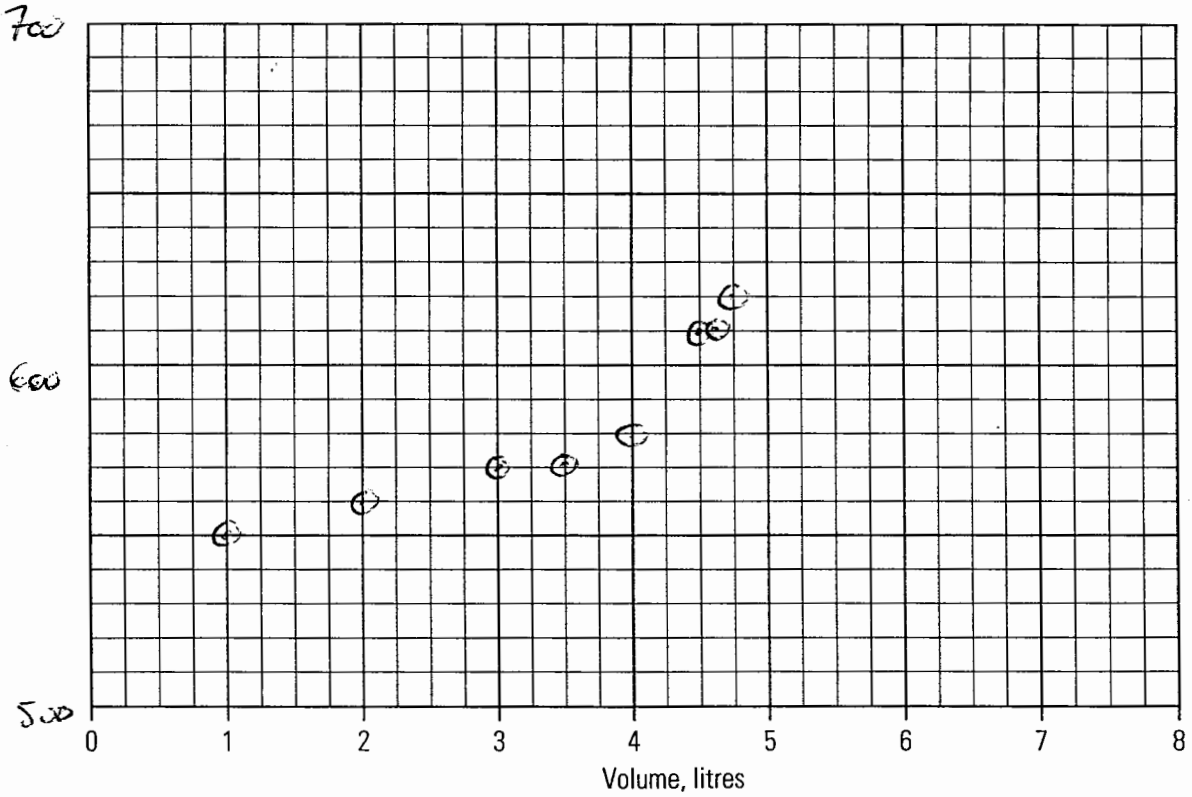
Packer No.: 15 cmp 62 | Serial No.: 14276 | Depth (ft / m): 388 | Inflation Tool No.: TFW 078

Packer Valve Pressure, P_V: 150 psi | Final Line Pressure, P_L: 620 psi | Tool Pressure, P_T: 450 psi

Borehole Water Level: 261 (ft / m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = 135 psi

Volume, litres	1.0	2.0	3.0	3.5	4.0	4.5	4.6	4.7	4.35		
Pressure, psi	550	560	570	570	580	610	610	620	↓		
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



Comments: Packer #15 | Time: 12:22pm

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 21/05

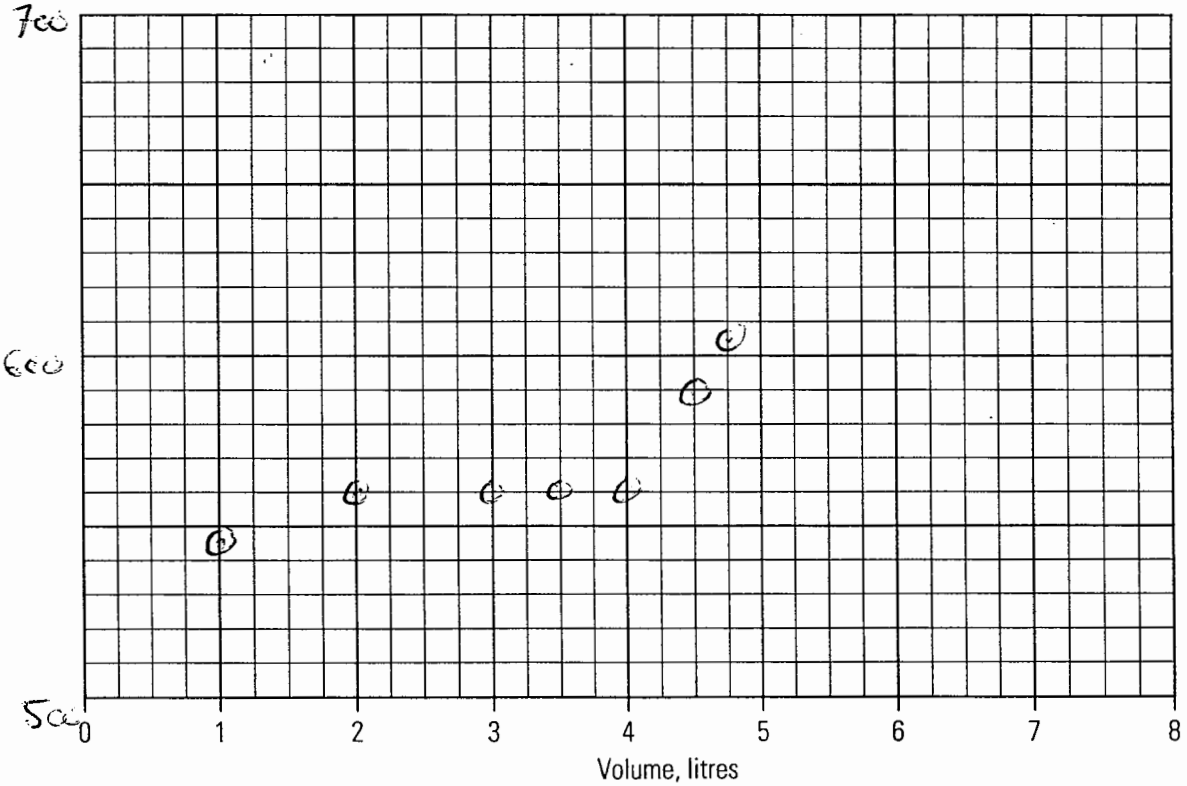
Packer No.: 16, comp 67 | Serial No.: 14274 | Depth (ft / m): 348 | Inflation Tool No.: TEW 1687

Packer Valve Pressure, P_V: 145 psi | Final Line Pressure, P_L: 605 psi | Tool Pressure, P_T: 450 psi

Borehole Water Level: 261 (ft / m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = 125 psi

Volume, litres	1.0	2.0	3.0	3.5	4.0	4.5	4.75	4.45			
Pressure, psi	545	560	560	560	560	590	605	0			
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



Comments: Packer # 16 | Time: 12:37 p.m

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 21/05

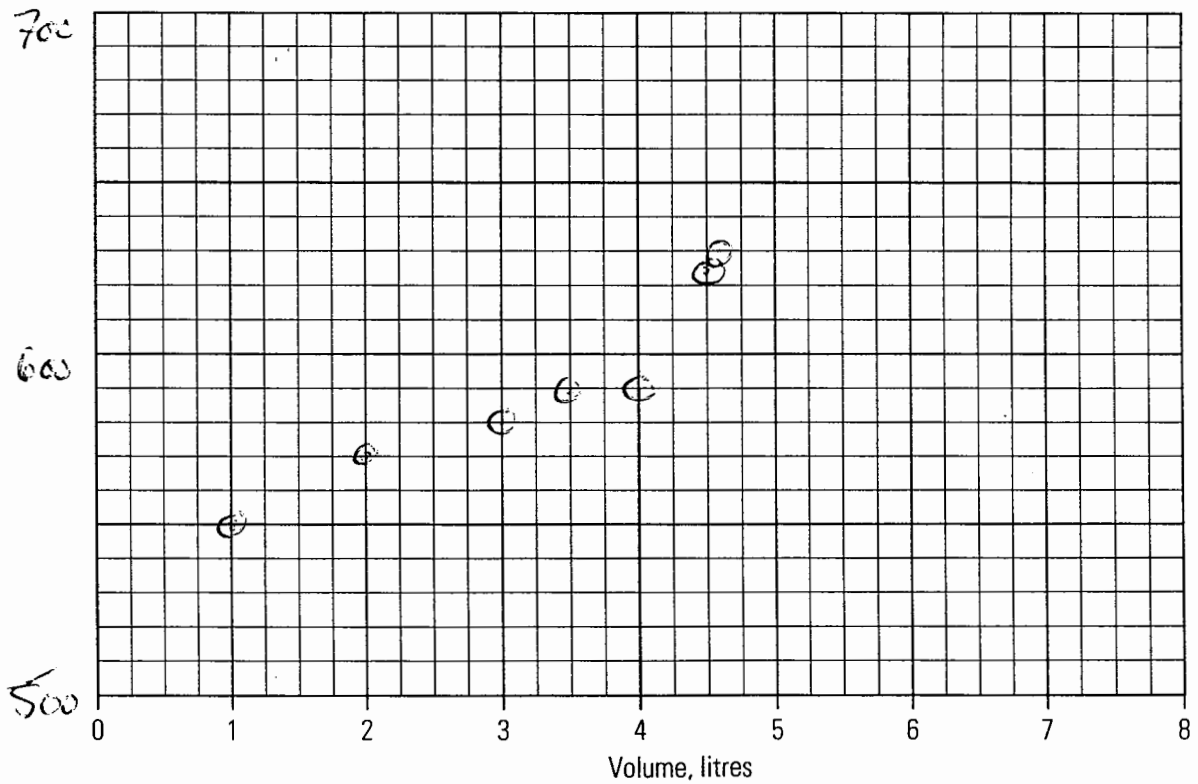
Packer No.: 17, comp. 71 | Serial No.: 14277 | Depth (ft) m): 328 | Inflation Tool No.: TEW10X85

Packer Valve Pressure, P_V: 150 psi | Final Line Pressure, P_L: 630 psi | Tool Pressure, P_T: 450 psi

Borehole Water Level: 261 (ft) m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = 145 psi

Volume, litres	1.0	2.0	3.0	3.5	4.0	4.5	4.6	4.25			
Pressure, psi	550	570	580	590	590	625	630	ϕ			
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



Comments: Packer #17 | Time: 12:56 p.m

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 21/05

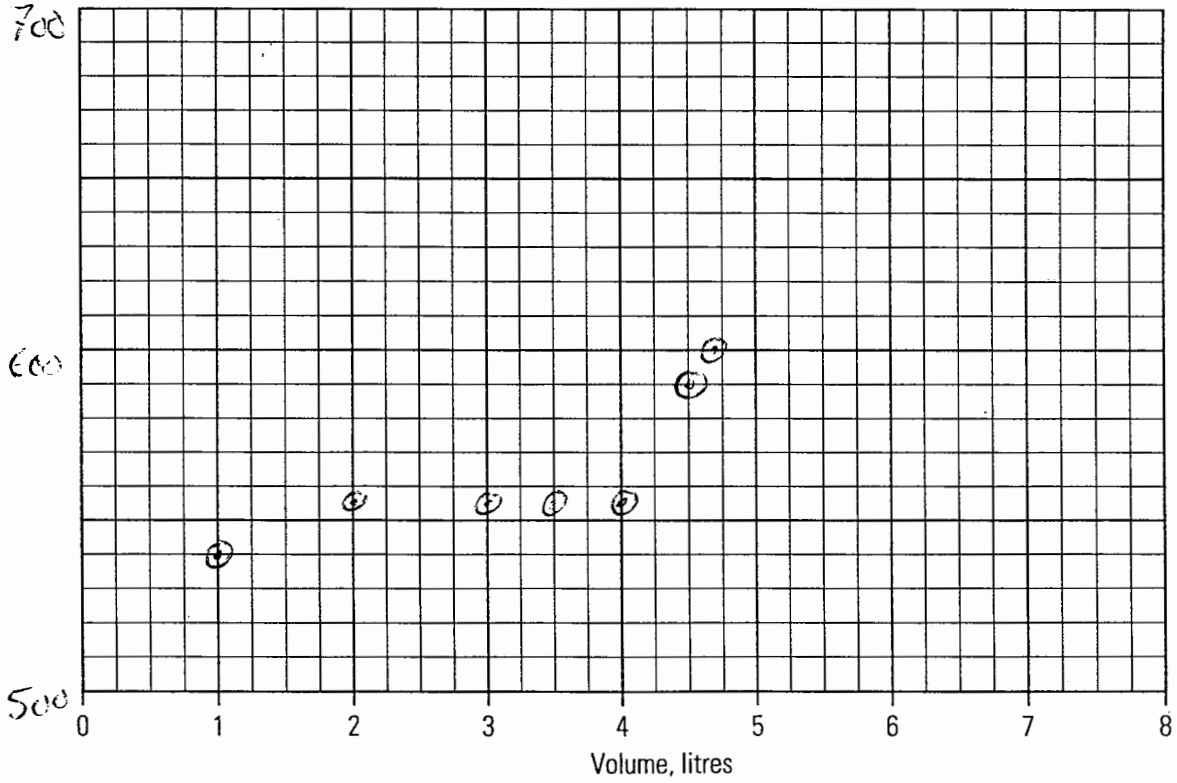
Packer No.: 18, comp 73 | Serial No.: 14278 | Depth (ft/m): 318 | Inflation Tool No.: TFW1088

Packer Valve Pressure, P_V: 130 psi | Final Line Pressure, P_L: 600 psi | Tool Pressure, P_T: 450 psi

Borehole Water Level: 261 (ft/m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = 135 psi

Volume, litres	1.0	2.0	3.0	3.5	4.0	4.5	4.7	4.35			
Pressure, psi	540	555	555	555	555	590	600	Ø			
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



Comments Packer # 18 | Time: 1.10 pm

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 21/05

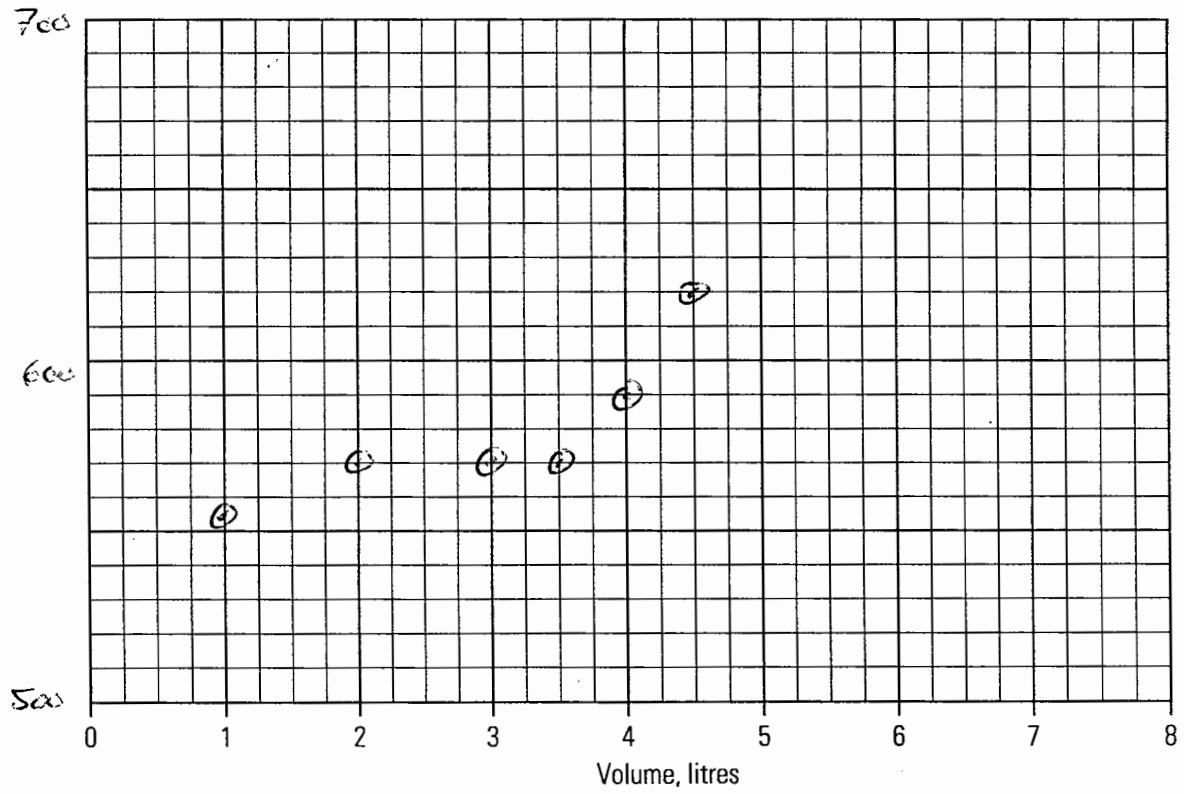
Packer No.: 19, comp78 | Serial No.: 14280 | Depth (ft / m): 278 | Inflation Tool No.: TEW078

Packer Valve Pressure, P_V: 150 psi | Final Line Pressure, P_L: 620 psi | Tool Pressure, P_T: 450 psi

Borehole Water Level: 261 (ft / m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = 135 psi

Volume, litres	1.0	2.0	3.0	3.5	4.0	4.5	4.2				
Pressure, psi	555	570	570	570	590	620	Ø				
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



Comments: Packer #19 | Time: 1:23 pm

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW 1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 21/05

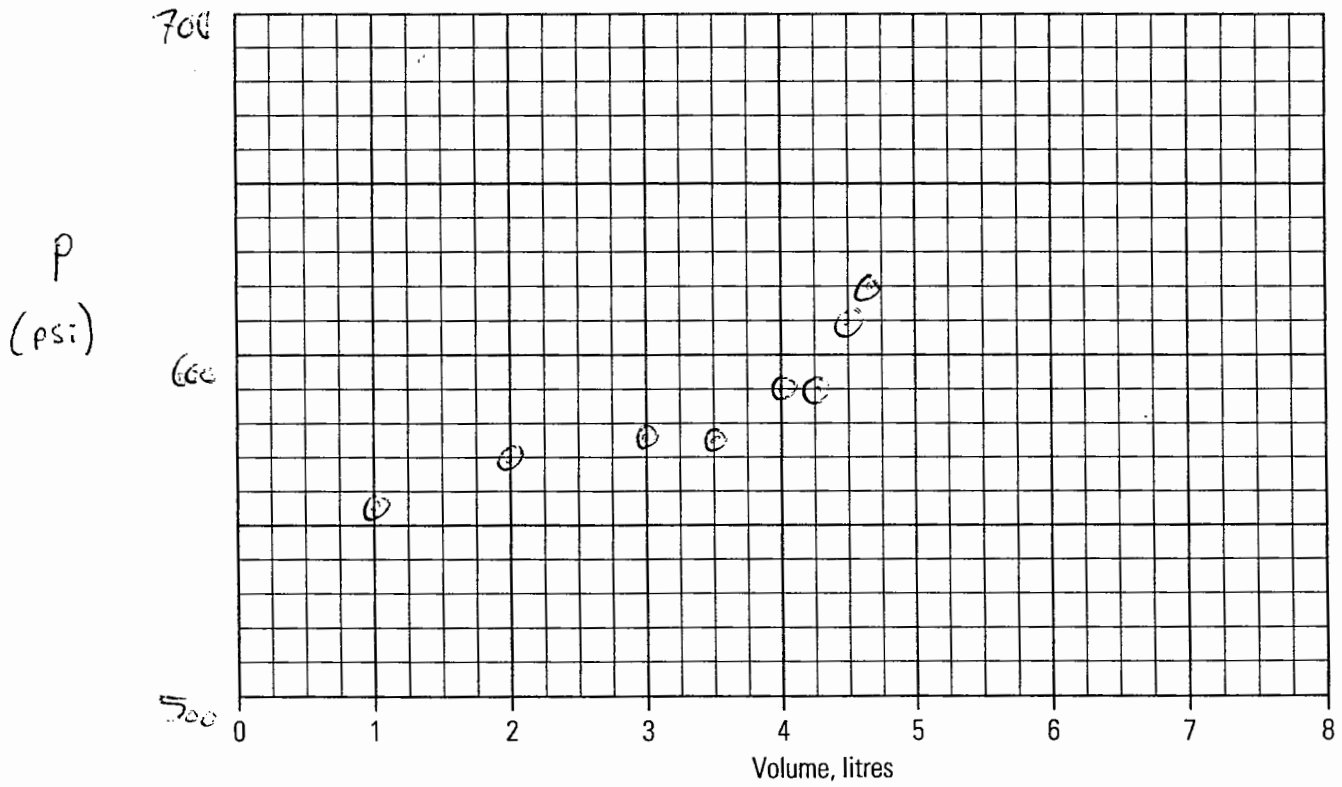
Packer No.: 20, comp 82 | Serial No.: 14273 | Depth (ft / m): 258 | Inflation Tool No.: Towed 3"

Packer Valve Pressure, P_V: 140 psi | Final Line Pressure, P_L: 620 psi | Tool Pressure, P_T: 450 psi

Borehole Water Level: 264 (ft / m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = 145 psi

Volume, litres	1.0	2.0	3.0	3.5	4.0	4.25	4.5	4.7	4.35		
Pressure, psi	555	570	575	575	590	590	610	620	ø		
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



Comments: Packer # 20 | Time: 1:46 pm

Westbay Instruments Inc.
A Schlumberger Company

MP Packer Inflation Record

Project: WDC | Project No.: WB 824 | Well No.: MW1-6

Location: Alhambra | Completed by: Mark Lessard | Date Inflated: Feb 21/05

Packer No.: 21 comp 64 | Serial No.: 14271 | Depth (ft / m): 248 | Inflation Tool No.: IW1088

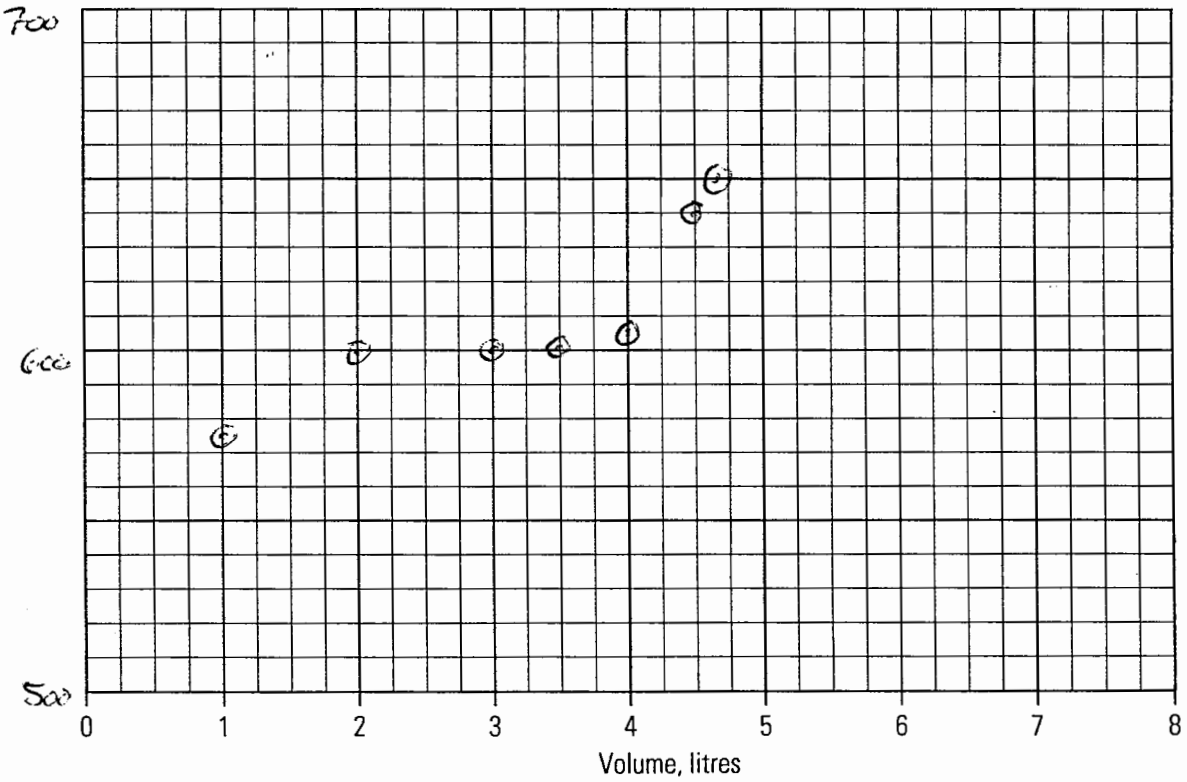
Packer Valve Pressure, P_V: 150 psi | Final Line Pressure, P_L: 650 psi | Tool Pressure, P_T: 450 psi

Borehole Water Level: 361 (ft / m) = 115 psi (P_W) | Calculated Packer Element Pressure, $P_E = P_L + P_W - P_V - P_T$ = 160 psi

Packer 248 ft - 115 psi (Pw)

Volume, litres	1.0	2.0	3.0	3.5	4.0	4.5	4.65	4.3			
Pressure, psi	575	600	600	600	605	640	650	ø			
Volume, litres											
Pressure, psi											

Plot of Gauge Pressure (psi) vs. Volume (litres)



Comments: Packer #21 | Time: 2:01 pm