Timothy L. Bishop, P.G.
Project Manager
Marketing Business Unit

Chevron Environmental Management Company
6101 Bollinger Canyon Road
Suite 5213
San Ramon, CA 94583
Tel (925) 790-6463
TimBishop@chevron.com

March 31, 2014

Mr. Keith Nowell
Alameda County Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

RE: Implementation Plan for CPT Investigation
Former Union Oil Station No. 0843
1629 Webster Street, Alameda, California
Fuel Leak Case No.: RO0000450

Dear Mr. Nowell,

I declare under penalty of perjury that to the best of my knowledge the information and/or recommendations contained in the attached report is/are true and correct.

If you have any questions or need additional information, please contact me at (925) 790-6463.

Sincerely,

Timothy Bishop
Union Oil of California – Project Manager

Attachment
Implementation Plan for CPT Investigation

ARCADIS U.S., Inc.
2000 Powell Street
Suite 700
Emeryville
California 94608
Tel 510 652 4500
Fax 510 652 4906

MEMO

To:
Keith Nowell
Alameda County Department of
Environmental Health
1131 Harbor Bay Parkway
Alameda , CA 94502-6540

Copies:
Peter Schaefer (CRA)
Marvin Katz (Shell)
Tim Bishop (Union Oil)

From:
Katherine Brandt
David Lay, P.G.

Date:
March 31, 2014

ARCADIS Project No.:
B0047584.2014

Subject:
Implementation Plan for CPT Investigation
1601 and 1629 Webster Street
Alameda, CA

This Implementation Plan has been prepared for additional investigation activities at the former Union Oil Company of California (Union Oil) Station No. 0843 (site) located at 1629 Webster Street in Alameda, California (Figure 1 and 2). The investigation will be conducted jointly with the adjacent Shell Service Station No. 13-5032 (Alameda County Case No. RO0002745, Shell Service Station) located at 1601 Webster Street.

During a meeting with the Alameda County Department of Environmental Health (ACEH) on August 23, 2013, the agency requested the submittal of a working conceptual site model (CSM). ARCADIS submitted the working CSM in an email dated September 13, 2013. The working CSM provided documentation to delineate dissolved methyl tertiary butyl ether (MTBE) concentrations in intermediate and deep zone (20 to 40 feet below ground surface [bgs]). Following review of the working CSM and additional discussions with the ACEH, it was determined that downgradient delineation of the MTBE groundwater plume was required to meet the Low Threat Closure Policy Requirements. Shell and Union Oil met with ACEH on December 19, 2013 and discussed the joint offsite groundwater investigation. This implementation memo provides the scope of work and details the field activities to be completed.

Union Oil and Shell propose the use of cone penetrometer test (CPT) soil borings and HydroPunch™ sampling devices at select locations to further evaluate dissolved MTBE concentrations downgradient of

the sites in intermediate and deep groundwater zones. Additionally, data collected during the CPT/HydroPunch^{TM} investigation will be used to further confirm the site CSM and delineate dissolved MTBE plume extents.

The work proposed herein will be performed under the supervision of a State of California Licensed Professional Geologist.

Pre-Field Activities

Site-Specific Health and Safety Plan

As required by the Occupational Health and Safety Administration (OSHA) Standard "Hazardous Waste Operations and Emergency Response" guidelines (29 Code of Federal Regulations Section 1910.120), and by California Occupational Health and Safety Administration (Cal-OSHA) "Hazardous Waste Operations and Emergency Response" guidelines (California Code of Regulations Title 8, Section 5192), An environmental health and safety plan (HASP) will be provided prior to commencement of fieldwork. Field staff and contractors will be required to review the HASP before beginning field operations at the Site.

Traffic Control Plan

A Traffic Control Plan (TCP) will be prepared for the offsite CPT investigation activities. Work is planned to be completed in or directly adjacent a public roadway. Therefore, a permit-required TCP will need to be prepared to comply with local permitting authorities in accordance with ARCADIS' Health and Safety Standards for Roadway Work Zone Safety, Traffic Control and Employee Safety on Public Roadways. The TCP will be provided to the encroachment agencies and provided to field staff.

Permitting

A general roadway permit will be obtained for drilling activities conducted within the Buena Vista Avenue public right-of-way (CPT-02, CPT-03, CPT-04, and CPT-05). Applications for these encroachment permits will include a TCP and will be submitted to the Alameda County Department of Public Works (ACDPW). Completed applications shall receive either approval or denial within 60 days of their receipt. Upon approval, ACDPW will state any work hour restrictions. Additionally, necessary inspections for work performed in the public right-of-way must be coordinated with the ACDPW prior to performing work, by calling the number and county employee provided on the approved permit.

The proposed location of CPT boring CPT-01 is located on Webster Street, also known as State Highway 260. Encroachment permits for California state highways are issued by the California Department of Transportation (CDOT). ARCADIS will complete a standard encroachment permit application (Form TR-

0100), and submit it to the District 4 Encroachment Permit Office. Section 671.5 (a) of the California Streets and Highways Code requires that CDOT either approves or denies an encroachment permit within 60 calendar days, upon receipt of the completed application.

Unless otherwise specified on the permits, work in the encroachment areas must be initiated within 90 days of the date of issuance, or the permits may be lawfully suspended or cancelled.

Underground Utility Locate

A One Call Service (USA North) will be notified at least 48 hours prior to the commencement of work for public utility line clearance at the proposed CPT/HydroPunch™ boring locations. ARCADIS will also contract an independent utility locating company to use ground penetrating radar to verify the proposed locations are not co-located with existing underground or aboveground features. Proposed investigation locations determined to be in conflict with identified utilities/substructures will be relocated.

CPT / HydroPunch™ Groundwater Investigation

Scope of Work and Objectives

Proposed CPT boring locations are depicted on Figure 3. Previous boring logs for the sites are located in Attachment A. The CPT investigation may be conducted in two phases. Phase 1 includes the advancement of CPT-01 through CPT-04. If MTBE results are detected above MCLs or confidence in plume delineation is not clear, then Phase 2 would be implemented as a separate mobilization event after review of Phase 1 results and discussion with project team. As a result, the number of contingency borings and the proposed locations for Phase 2 are subject to change. CPT boring locations provided on Figure 3 are approximate, and the actual locations will be determined in the field based on the presence of subsurface infrastructure and site access agreements.

The primary objectives of the CPT soil boring investigation and HydroPunch™ groundwater sampling event are to:

- Obtain a detailed subsurface lithology downgradient of the site to identify potential migration pathways or confining layers that may either facilitate or inhibit the vertical migration of MTBE in shallow groundwater to intermediate and deep zone groundwater.

- Collect groundwater samples at discrete intervals from CPT boring locations using HydroPunch™ sampling tool to delineate the vertical and horizontal extents of the MTBE plume in intermediate and deep groundwater zones.

CPT Advancement

To meet these objectives, boring locations will be hand-augered to a minimum depth of eight feet and one inch bgs and/or 120% of the diameter of the CPT probe. Borings will be advanced to an approximate total depth of 45 feet bgs using a direct push drill rig, with a piezocone connected by stainless steel rods to the hydraulic system. The piezocone measures friction, tip resistance, and pore pressure, which are recorded and used to evaluate soil types on a nearly continuous geologic log. These continuous geologic logs provide detailed lithological data that can be used to identify high and low permeability zones in soils.

Groundwater Sample Collection

Groundwater samples will be collected from the CPT boring locations. Hydropunch™ technology will be used to collect four depth-discrete groundwater samples from each proposed CPT boring location at targeted depths of 25, 30, 35, and 40 feet bgs. Targeted depths may change based on lithology. The CPT rig will be used to advance the Hydropunch™ rods to the targeted depths. The rods will then be retracted, exposing an encased 4-foot filter screen and allowing groundwater to infiltrate hydrostatically from the formation into the inlet screen. A small-diameter bailer will be lowered through the rods into the screen interval for sample collection. Upon filling, the bailer will be retrieved and the groundwater will be decanted into the appropriate laboratory-supplied sample containers. Upon completion of sample collection, the equipment will be retracted and the borehole grouted with neat cement grout. The Groundwater Sampling Using HydroPunch™ Standard Operating Procedure (Attachment B) should be consulted during groundwater sampling.

Groundwater Sample Analysis

Groundwater samples will be transported under standard industry chain of custody procedures to a California-certified analytical laboratory. Groundwater samples will be analyzed for MTBE, by the United States Environmental Protection Agency (USEPA) Method 8260B.

Containment and Disposal of Investigation Derived Waste

Soil cuttings, purge water, and other investigated derived waste (IDW) generated during the field activities will be placed in Department of Transportation (DOT) approved 55-gallon drums (or other DOT approved container), sealed, and labeled. IDW will be sampled and analyzed to determine proper disposal methodology. Containerized IDW will be stored on-site until it is profiled and subsequently transported to an approved facility for disposal or recycling.

Quality Assurance and Quality Control Sampling

For quality assurance and quality control purposes, blind duplicate groundwater samples will be collected at a frequency of no less than 10%, or 1 duplicate for every 10 samples. Equipment blank samples will be collected at a frequency of at least one per day. To verify that cross-container contamination has not occurred during sample transport, trip blanks will be included in each cooler used to transport samples. Blind duplicate samples, equipment blanks, and trip blanks will be submitted under chain-of-custody procedures to a California-certified laboratory and analyzed for MTBE using USEPA Method 8260B on a standard turnaround time basis.

Surveying

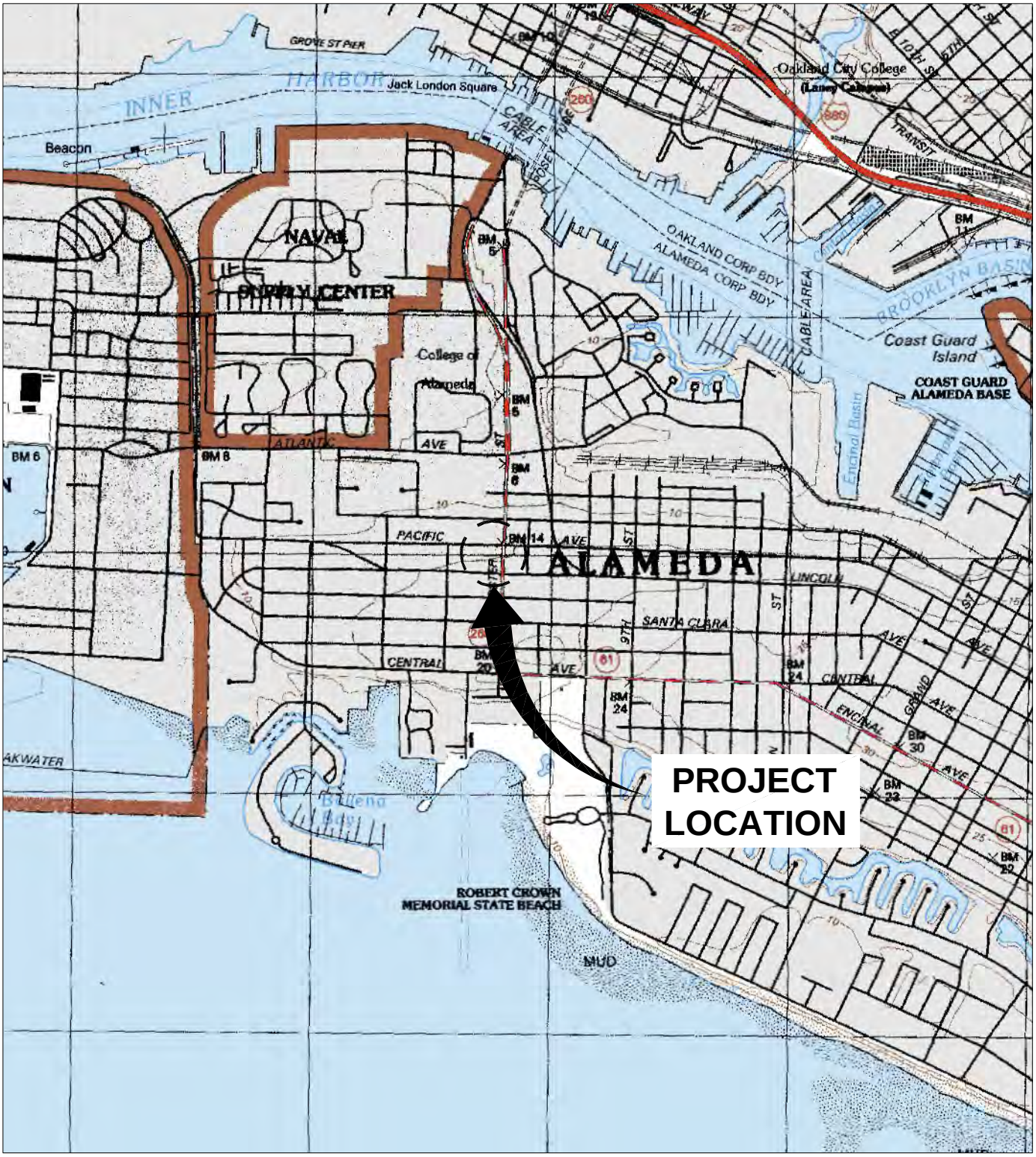
Following completion of the proposed field investigation, a licensed surveyor will survey the CPT boring locations to an established benchmark.

Schedule

ARCADIS is prepared to initiate field work once necessary site access agreements and all roadway encroachment permits have been obtained.

ARCADIS

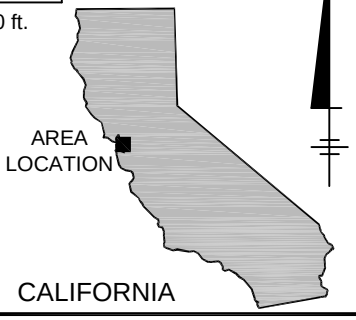
Figures



REFERENCE: BASE MAP USGS 7.5. MIN. TOPO. QUAD., OAKLAND WEST, CALIFORNIA, 1993.

0 2000' 4000'

Approximate Scale: 1 in. = 2000 ft.



UNION OIL
FORMER FACILITY NO. 0843
1629 WEBSTER STREET
ALAMEDA, CALIFORNIA

SITE LOCATION MAP

ARCADIS

FIGURE
1

CITY: PETALUMA, CA DIV/GROUP: ENV DB: J. HARRIS LD: J. HARRIS PIC: J. VOGELEY PM: K. ABBOTT TM: K. ABBOTT LYR:(Opt)ON=*;OFF=*REF*
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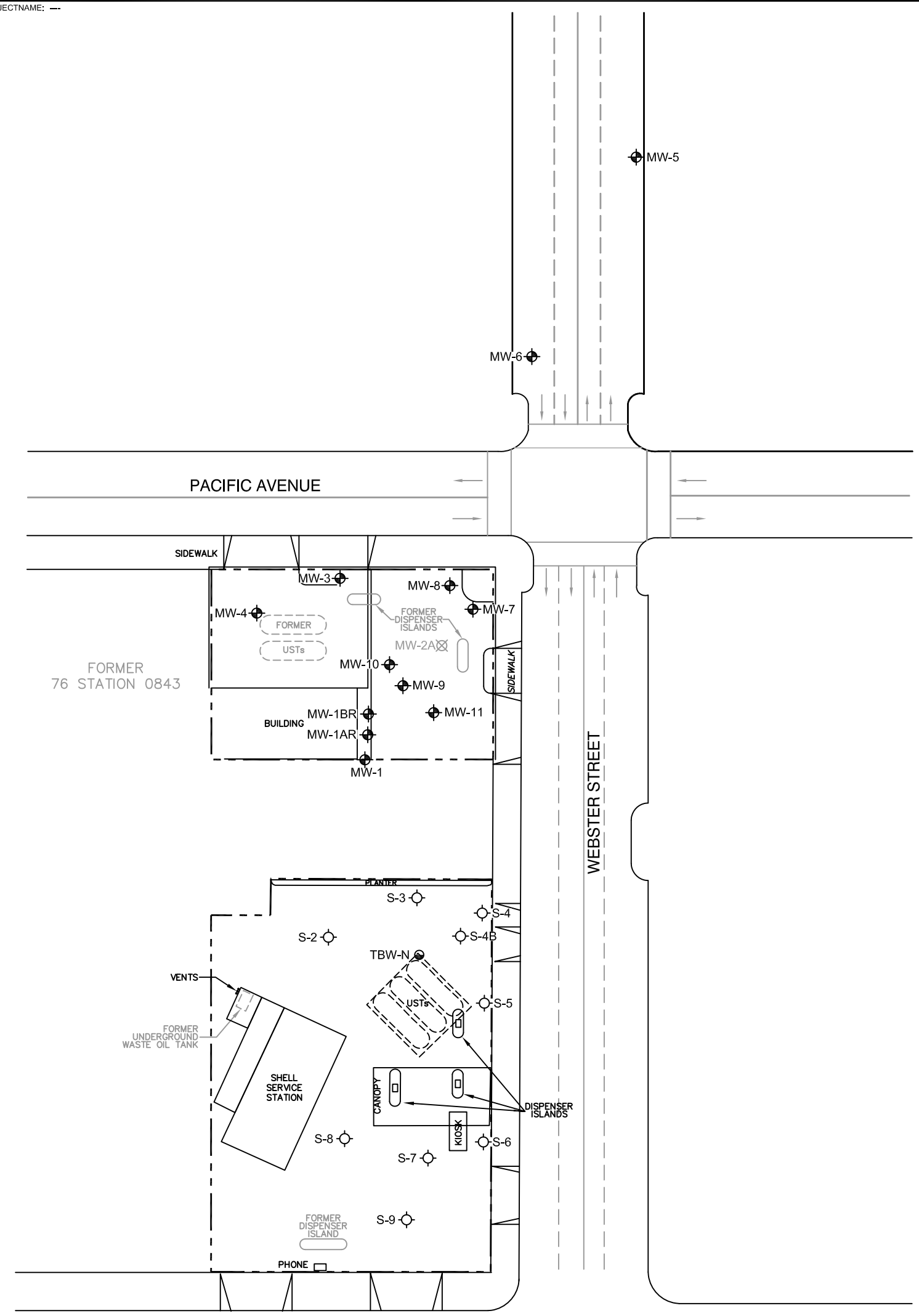
XREFS: IMAGES: PROJECTNAME: ---
Oakland West.jpg

CITY: PETALUMA, CA DIV/GROUP: ENV DB: J. HARRIS LD: J. HARRIS PIC: J. VOGELEY PM: K. ABBOTT TM: K. ABBOTT LYR:(Opt)ON=*;OFF=*REF*
C:\Users\jharris\Desktop\ENVCAD\B0047584\2012\00002\2Q12\DWG\47584B01.dwg LAYOUT: 2 SAVED: 6/25/2012 12:00 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: SETUP1 PLOTSTYLETABLE: ARCADIS.CTB PLOTTED: 6/25/2012 12:00 PM BY: HARRIS, JESSICA
XREFS: IMAGES: PROJECTNAME: —-
47584X01



LEGEND

- PROPERTY BOUNDARY
- MW-1 FORMER 76 STATION MONITORING WELL
- S-9 SHELL SERVICE STATION MONITORING WELL
- TBW-N SHELL TANK BACKFILL MONITORING WELL
- MW-2A ABANDONED WELL

0 50’ 100’

GRAPHIC SCALE

NOTES:

1. BASE MAP PROVIDED BY TRC, DATED AUGUST 2010, AT A SCALE OF 1"=60'. SHELL SERVICE STATION DATA PROVIDED BY CRA.
2. ALL SITE FEATURES AND LOCATIONS ARE APPROXIMATE.

UNION OIL
FORMER FACILITY NO. 0843
1629 WEBSTER STREET
ALAMEDA, CALIFORNIA

SITE PLAN

ARCADIS

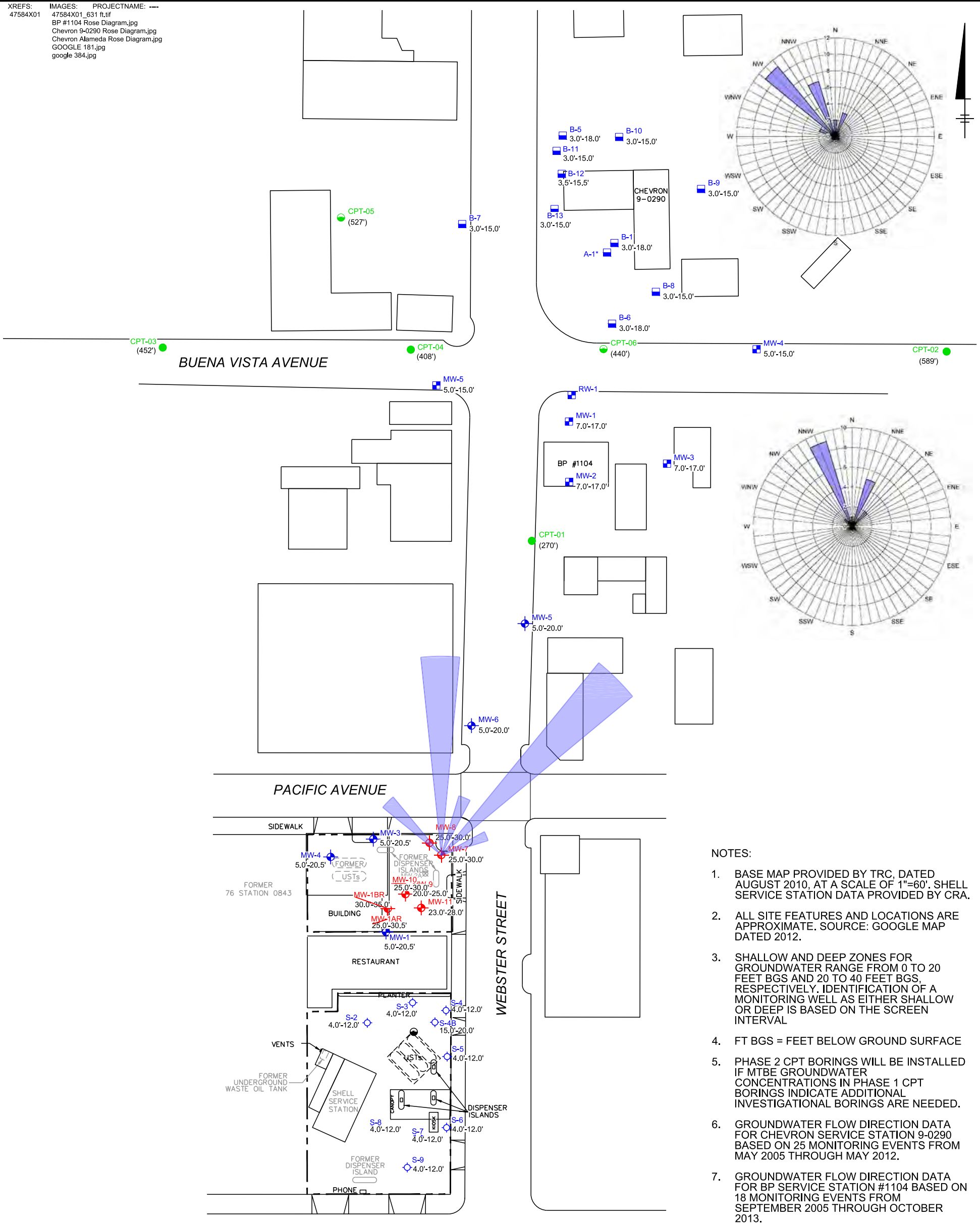
FIGURE
2

CITY: SAN RAFAEL, CA (PETALUMA) DIV/GROUP: ENV DB: J. HARRIS, B. ROBITAILLE, J. HARRIS
G:\ENVCAD\Roseville-CA\RETURN-TO\Petaluma-CA\B0047584\2014\00004\DWG\47584P02.dwg LAYOUT: 3 SAVED: 2/5/2014 9:15 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: SETUP1 PLOTSTYLETABLE: ARCADIS.CTB PLOTTED: 2/5/2014 9:15 AM BY: ROBITAILLE, BEVERLY

XREFS:
47584X01

IMAGES:
47584X01_631 ft.tif
BP #1104 Rose Diagram.jpg
Chevron 9-0290 Rose Diagram.jpg
Chevron Alameda Rose Diagram.jpg
GOOGLE 181.jpg
google 384.jpg

PROJECTNAME: ---



NOTES:

1. BASE MAP PROVIDED BY TRC, DATED AUGUST 2010, AT A SCALE OF 1"=60'. SHELL SERVICE STATION DATA PROVIDED BY CRA.
2. ALL SITE FEATURES AND LOCATIONS ARE APPROXIMATE. SOURCE: GOOGLE MAP DATED 2012.
3. SHALLOW AND DEEP ZONES FOR GROUNDWATER RANGE FROM 0 TO 20 FEET BGS AND 20 TO 40 FEET BGS, RESPECTIVELY. IDENTIFICATION OF A MONITORING WELL AS EITHER SHALLOW OR DEEP IS BASED ON THE SCREEN INTERVAL
4. FT BGS = FEET BELOW GROUND SURFACE
5. PHASE 2 CPT BORINGS WILL BE INSTALLED IF MTBE GROUNDWATER CONCENTRATIONS IN PHASE 1 CPT BORINGS INDICATE ADDITIONAL INVESTIGATIONAL BORINGS ARE NEEDED.
6. GROUNDWATER FLOW DIRECTION DATA FOR CHEVRON SERVICE STATION 9-0290 BASED ON 25 MONITORING EVENTS FROM MAY 2005 THROUGH MAY 2012.
7. GROUNDWATER FLOW DIRECTION DATA FOR BP SERVICE STATION #1104 BASED ON 18 MONITORING EVENTS FROM SEPTEMBER 2005 THROUGH OCTOBER 2013.
8. SITE GROUNDWATER FLOW DIRECTION DATA IS BASED ON XX MONITORING EVENTS FROM DATE YEAR THROUGH DATE YEAR.

LEGEND

- PROPERTY BOUNDARY
- MW-1 SITE MONITORING WELL (SHALLOW)
- MW-1 SITE MONITORING WELL (DEEP)
- S-9 SHELL SERVICE STATION MONITORING WELL (SHALLOW)
- B-1 CHEVRON SERVICE STATION MONITORING WELL (SHALLOW)
- MW-1 BP SERVICE STATION MONITORING WELL (SHALLOW)
- TBW-N SHELL TANK BACKFILL MONITORING WELL
- MW-2A ABANDONED WELL
- 5.0' - 20.0' SCREEN INTERVAL (FEET BGS)
- * SCREEN INTERVAL IS UNKNOWN
- CPT-01 PROPOSED PHASE 1 CPT BORING LOCATION
- CPT-04 PROPOSED PHASE 2 CPT BORING LOCATION
- (527') RADIAL DISTANCE OF PROPOSED CPT BORING LOCATION FROM SITE MONITORING WELL MW-7
- GROUNDWATER FLOW DIRECTION

0 80' 160'
GRAPHIC SCALE

UNION OIL COMPANY OF CALIFORNIA
FORMER FACILITY NO. 0843
1629 WEBSTER STREET
ALAMEDA, CALIFORNIA

PROPOSED CPT BORING LOCATIONS

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FIGURE
3

Attachment A

Boring Logs

ENVIRONMENTAL RESOLUTIONS, INC.

Project No.: 2248 Boring: B1/MW1 Plate: APPENDIX
Site: Former Tosco 76 Service Station 0843 Date: 3/2/99
Drill Contractor: Woodward Drilling
Sample Method: Split Spoon Geologist: MARK S. DOCKUM
Drill Rig: B57 Bore Hole Diameter: 8" Signature:
Location: South End of Site Approximately 50 Feet West of Southern Driveway Registration: R.G. 4412
Logged by: Dylan Crouse

DEPTH (ft)	BLOW COUNTS	PID/OVM (ppm)	SAMPLE	COLUMN	USCS	GEOLOGIC DESCRIPTION	WELL DESIGN
						3" asphalt	
					SP	Sand, trace of silt, yellowish brown, moist	
5	5	0					
						Sands, trace of silt and some clay, brown, moist, some plasticity	
10	38	0			SC		
						Sand, trace of silt, light yellowish brown, wet	
15	35	0			SP		
						sand, trace of silt, olive, wet	
20	40	0					
						Total depth at 20.5 feet. Groundwater encountered at 12 feet. Static groundwater encountered at 5.8 feet.	

Casing Diameter: 2" Slot Size: 0.020 , Sand Size: #3 , Grout: Portland I,II

FN: 2248B001

Delta Consultants

Project No: C102349210	Client: **ConocoPhillips**	Well No: **MW-1AR**
Logged By: Alan Buehler	Location: **1629 Webster Street**	Date Drilled: 5/13/09
Driller: **RSI Drilling**	**Alameda, California**	Page **1** of **2**
Drilling Method: Hollow Stem Auger	Hole Diameter: 8"	▽ = First Water
Sampling Method: Split Spoon	Hole Depth: 35'	▼ = Static Groundwater
Casing Type: Sched. 40 PVC	Well Diameter: 2"	
Slot Size: 0.02	Well Depth: 30.5'	
Gravel Pack: Filter Sand	First Water Depth: N/A	
Elevation	Northing	Easting

Well Completion (Backfill / Casing)	Static Water Level	Moisture Content	PID Reading (ppm)	Penetration (blows/6")	Sample Identification	Depth (feet)	Sample Recovery	Sample Interval	Soil Type	LITHOLOGY / DESCRIPTION
Well Box										
Concrete Seal					Air-Knife	1				Silty sand; trace clay with gravel.
						2				
						3				
						4				
	▼	moist	0.0			5			SM	Silty sand; light brown.
						6				
						7			SM	Same as above.
						8				
						9			SM	Same as above.
		moist	0.1			10			SM	Silty sand with gravel; dark brown.
						11				
						12			SM	Silty sand; light brown
						13				
						14				
		wet	1.3			15			SM	Same as above.
						16				
						17				
						18				
						19				
		sat.	2.9		11:23 @ 20'	20			SM	Encountered heaving sands to total depth of boring.
						21				
Bentonite Seal						22				

2" Sched. 40 PVC Blank Casing

Delta
Consultants

Project No: C102349210
Logged By: Alan Buehler
Driller: **RSI Drilling**
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon
Casing Type: Sched. 40 PVC
Slot Size: 0.02
Gravel Pack: Filter Sand

Client: **ConocoPhillips**
Location: **1629 Webster Street**
Alameda, California
Hole Diameter: 8"
Hole Depth: 30'
Well Diameter: 2"
Well Depth: 30.5'
First Water Depth: N/A

Well No: **MW-1AR**
Date Drilled: 5/13/09

▽ = First Water
▼ = Static Groundwater

Elevation | Northing | Easting

Well Completion (Backfill / Casing)	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery	Sample Interval	Soil Type	LITHOLOGY / DESCRIPTION
Filter Sand			N/A		23–30			**SM**	Encountered heaving sands to total depth of boring.
					31				**Total Depth of Boring = 30.5 Feet Below Ground Surface (bgs)**
					32–44				

Delta
Consultants

Project No:	C102349210	Client: **ConocoPhillips**	Well No: **MW-1BR**
Logged By:	Alan Buehler	Location: **1629 Webster Street**	Date Drilled: 5/15/09
Driller: **RSI Drilling**		**Alameda, California**	Page **1** of **2**
Drilling Method:	Hollow Stem Auger	Hole Diameter:	8"
Sampling Method:	Split Spoon	Hole Depth:	35'
Casing Type:	Sched. 40 PVC	Well Diameter:	2"
Slot Size:	0.02	Well Depth:	34.5'
Gravel Pack:	Filter Sand	First Water Depth:	N/A
Elevation		Northing	Easting

▽ = First Water

▼ = Static Groundwater

Well Completion (Backfill / Casing)	Static Water Level	Moisture Content	PID Reading (ppm)	Penetration (blows/6")	Sample Identification	Depth (feet)	Sample Recovery	Sample Interval	Soil Type	LITHOLOGY / DESCRIPTION
Well Box / Concrete Seal / 2" Sched. 40 PVC Blank Casing	▼				Air-Knife	1–5				Silty sand; trace clay with gravel.
		moist				5			SM	Silty sand; light brown.
		damp				7			SM	Same as above.
		damp				9			SM	Same as above.
		moist	0.2			10			SM	Silty sand with gravel; dark brown.
						12			SM	Silty sand; light brown
		moist	0.2			15			SM	Same as above.
		moist	0.6		13:41 @ 20'	20			SM	Encountered heaving sands to total depth of boring.

Delta
Consultants

Project No:	C102349210	Client: **ConocoPhillips**	Well No: **MW-1BR**
Logged By:	Alan Buehler	Location: **1629 Webster Street** Alameda, California	Date Drilled: 5/15/09
Driller:	**RSI Drilling**		Page **2** of **2**
Drilling Method:	Hollow Stem Auger	Hole Diameter:	8"
Sampling Method:	Split Spoon	Hole Depth:	35'
Casing Type:	Sched. 40 PVC	Well Diameter:	2"
Slot Size:	0.02	Well Depth:	34.5'
Gravel Pack:	Filter Sand	First Water Depth:	N/A
Elevation		Northing	Easting

▽ = First Water

▼ = Static Groundwater

Well Completion (Backfill / Casing)	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery	Sample Interval	Soil Type	LITHOLOGY / DESCRIPTION
Bentonite Seal					23				Continuation of heaving sands to total depth of boring.
Filter Sand					24				
					25				
					26				
					27				
					28				
					29				
					30				
					31				
					32				
					33				
					34				
					35				**Total Depth of Boring = 35 Feet Below Ground Surface (bgs)**
					36				
					37				
					38				
					39				
					40				
					41				
					42				
					43				
					44				

Project No.: 2248 Boring: B2/MW2 Plate: APPENDIX
Site: Former Tosco 76 Service Station 0843 Date: 3/2/99
Drill Contractor: Woodward Drilling
Sample Method: Split Spoon Geologist: MARK S. DOCKUM
Drill Rig: B57 Bore Hole Diameter: 8" Signature:
Location: Northeast Corner of Site Approximately 10 Feet North of East Dispenser Registration: R.G. 4412
Logged by: Dylan Crouse

DEPTH (ft)	BLOW COUNTS	PID/OVM (ppm)	SAMPLE	COLUMN	USCS	GEOLOGIC DESCRIPTION	WELL DESIGN
						Sand, fine-grained, trace of silt, yellowish brown, very moist	
5	2	0					
					SP	sand, trace of silt, olive gray, very moist	
10	27	1023				sand, trace of silt, dark yellowish brown, wet	
15	43	46				sand, trace of silt, light olive yellow, wet	
20	86	9					
						Total depth at 20.5 feet. Groundwater encountered at 8.5 feet. Static groundwater encountered at 5.3 feet.	

Casing Diameter: 2" Slot Size: 0.020 , Sand Size: #3 , Grout: Portland I/II

FN: 2248B002

Project No.: 2248 Boring: B3/MW3 Plate: APPENDIX
Site: Former Tosco 76 Service Station 0843 Date: 3/2/99
Drill Contractor: Woodward Drilling
Sample Method: Split Spoon Geologist: MARK S. DOCKUM
Drill Rig: B57 Bore Hole Diameter: 8" Signature:
Location: North Center in the Planter Approximately 1 Foot South of the Sidewalk Registration: R.G. 4412
Logged by: Dylan Crouse

DEPTH (ft)	BLOW COUNTS	PID/OVM (ppm)	SAMPLE	COLUMN	USCS	GEOLOGIC DESCRIPTION	WELL DESIGN
						3" planter soil	
						Silt, trace of sand and clay, fine-grained, dark yellowish brown, very moist, some plasticity	
5	5	0			ML		
10	35	0					
15	20	1				silt, trace of sand, fine-grained, dark yellowish brown, wet, no plasticity	
20	37	7				very moist	
						Total depth at 20.5 feet. Groundwater encountered at 12 feet. Static groundwater encountred at 4.9 feet.	

Casing Diameter: 2" Slot Size: 0.020 , Sand Size: #3 , Grout: Portland I,II

FN: 2248B0C3

ENVIRONMENTAL RESOLUTIONS, INC.

Project No.: 2248 Boring: B4/MW4 Plate: APPENDIX
Site: Former Tosco 76 Service Station 0843 Date: 3/2/99
Drill Contractor: Woodward Drilling
Sample Method: Split Spoon Geologist: MARK S. DOCKUM
Drill Rig: B57 Bore Hole Diameter: 8" Signature:
Location: Northeast Corner of Site Approximately 13 Feet South of Driveway Registration: R.G. 4412
Logged by: Dylan Crouse

DEPTH (ft)	BLOW COUNTS	PID/OVM (ppm)	SAMPLE	COLUMN	USCS	GEOLOGIC DESCRIPTION	WELL DESIGN
						3" asphalt at top	
5	10	▽ 0			ML	silt, trace of sands, fine-grained, gravel and clay 0.5", dark yellowish brown, moist, some plasticity	
10	50	5				olive, very moist	
15	33	0 ▼				light olive brown, wet, no plasticity	
20	35	0				Total depth at 20.5 feet. Groundwater encountered at 15 feet. Static groundwater encountered at 4.7 feet.	

Casing Diameter: 2" Slot Size: 0.020 , Sand Size: #3 , Grout: Portland 1 II

FN: 2248B004

ENVIRONMENTAL RESOLUTIONS, INC.

Project No.: 2248 Boring: MW5 Plate: APPENDIX

Site: Former Tosco 76 Service Station 0843 Date: 12/8/99

Drill Contractor: Woodward Drilling

Sample Method: Split Spoon Geologist: MARK S. BOCKUM

Drill Rig: B57 Bore Hole Diameter: 8" Signature:

Location: 6.3 Feet from Curb 215 North and 95 Feet East of Northeast Site Boundary Registration: R.G. 4412

Logged by: Dylan Crouse

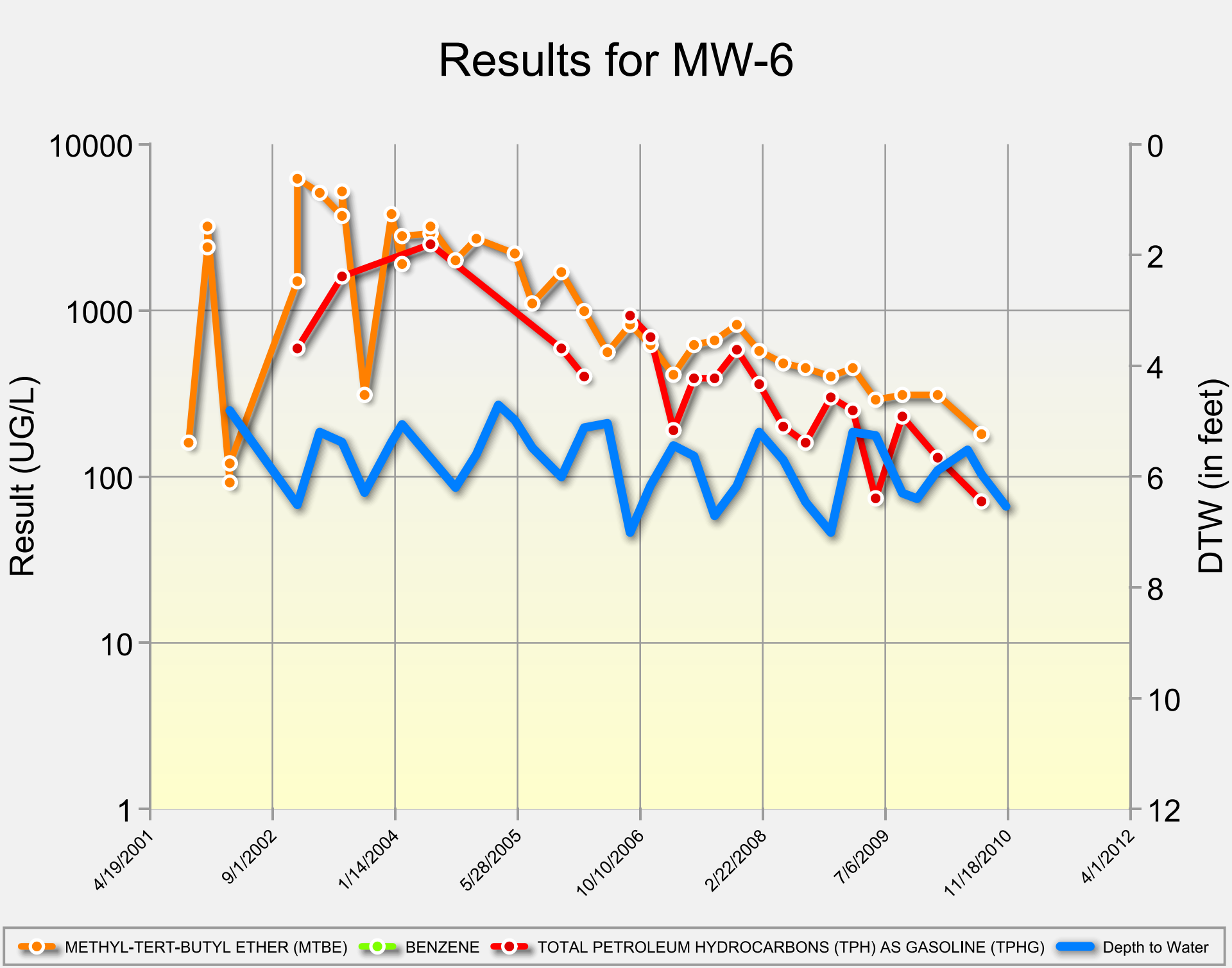
DEPTH (ft)	BLOW COUNTS	PID/OVM (ppm)	SAMPLE	COLUMN	USCS	GEOLOGIC DESCRIPTION	WELL DESIGN
						1' asphalt Fill, sand	
5	9	0			CL	*Sand with some clay, olive gray, moist, slight plasticity, (25% clay, 75% sand), very fine-grained	
10	26	0			SM	Sand with some silt, yellowish orange, (25% silt, 75% sand), very fine-grained, wet, red staining	
15	36	0				same as above	
20	50	0				same as above	

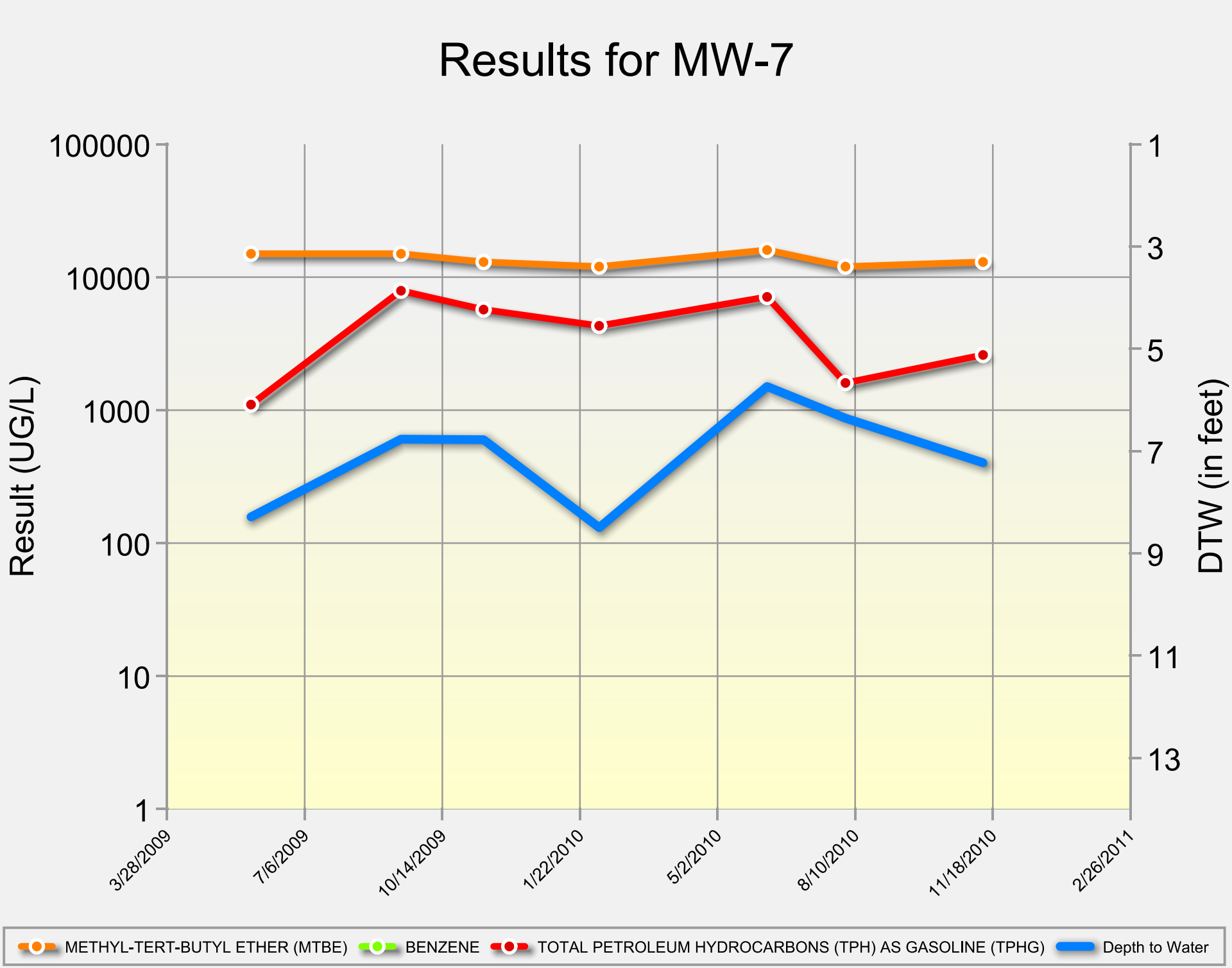
Total depth at 21.5 feet.
First encountered groundwater at 10 feet.
Static groundwater at 6.9 feet.

*Soil description modified following field work.
Original field log available upon request from ERI.

Casing Diameter: 2" Slot Size: .010 , Sand Size: 2/12 , Grout: Portland I/II

FN: 2248B006


Results for MW-6
Result (UG/L)
10000
1000
100
10
1
DTW (in feet)
0
2
4
6
8
10
12
4/19/2001
9/1/2002
1/14/2004
5/28/2005
10/10/2006
2/22/2008
7/6/2009
11/18/2010
4/1/2012
METHYL-TERT-BUTYL ETHER (MTBE)
BENZENE
TOTAL PETROLEUM HYDROCARBONS (TPH) AS GASOLINE (TPHG)
Depth to Water


Results for MW-7
Result (UG/L)
100000
10000
1000
100
10
1
DTW (in feet)
1
3
5
7
9
11
13
3/28/2009
7/6/2009
10/14/2009
1/22/2010
5/2/2010
8/10/2010
11/18/2010
2/26/2011
METHYL-TERT-BUTYL ETHER (MTBE)
BENZENE
TOTAL PETROLEUM HYDROCARBONS (TPH) AS GASOLINE (TPHG)
Depth to Water

Delta
Consultants

Project No:	C102349210	Client:	**ConocoPhillips**
Logged By:	Caitlin Morgan	Location:	**1629 Webster Street**
Driller:	**RSI Drilling**		**Alameda, CA**
Drilling Method:	Hollow Stem Auger	Hole Diameter:	8"
Sampling Method:	Split Spoon	Hole Depth:	30'
Casing Type:	Sched. 40 PVC	Well Diameter:	2"
Slot Size:	0.02	Well Depth:	29.5'
Gravel Pack:	Filter Sand	First Water Depth:	18'

Well No: **MW-8**
Date Drilled: 5/14/09
Page **1** of **2**

▽ = First Water
▼ = Static Groundwater

Elevation | Northing | Easting

Well Completion (Backfill / Casing)	Static Water Level	Moisture Content	PID Reading (ppm)	Penetration (blows/6")	Sample Identification	Depth (feet)	Sample Recovery	Sample Interval	Soil Type	LITHOLOGY / DESCRIPTION
Well Box / Concrete Seal / 2" Sched. 40PVC Blank Casing					Air-Knife	1–4			SW	Well graded sand with clay and gravel, trace roots.
	▼	moist	0.2			5			SW	Well graded sand with clay and gravel, trace roots; dark brown.
		moist	0.2			8			SW-SM	Well graded sand with silt, trace clay. More moist than above.
		moist	0.2			10			SW-SM	Same as above. Slight odor.
		wet	3.1		12:36 @ 15'	15			SC	Clayey sand, trace roots; gray; more moist than above; slight odor.
						17			SC	Same as above. Some brown mottling; less clay.
	▽	sat.				18			SW-SM	Well graded sand with silt, trace clay.
		sat.	0.5			20			SW-SM	Same as above. Less mottling.
Bentonite Seal						22				

Delta
Consultants

Project No: C102349210
Logged By: Caitlin Morgan
Driller: **RSI Drilling**
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon
Casing Type: Sched. 40 PVC
Slot Size: 0.02
Gravel Pack: Filter Sand

Client: **ConocoPhillips**
Location: **1629 Webster Street**
Alameda, California
Hole Diameter: 8"
Hole Depth: 30'
Well Diameter: 2"
Well Depth: 29.5'
First Water Depth: 18'

Well No: **MW-8**
Date Drilled: 5/14/09

▽ = First Water
▼ = Static Groundwater

Elevation | Northing | Easting

Well Completion (Backfill / Casing)	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery	Sample Interval	Soil Type	LITHOLOGY / DESCRIPTION
Filter Sand		sat.	0.4		25			SW-SM	Same as above.
		sat.	0.4		29			SW-SM	Same as above.
					30				**Total Depth of Boring = 30 Feet Below Ground Surface (bgs)**

23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44

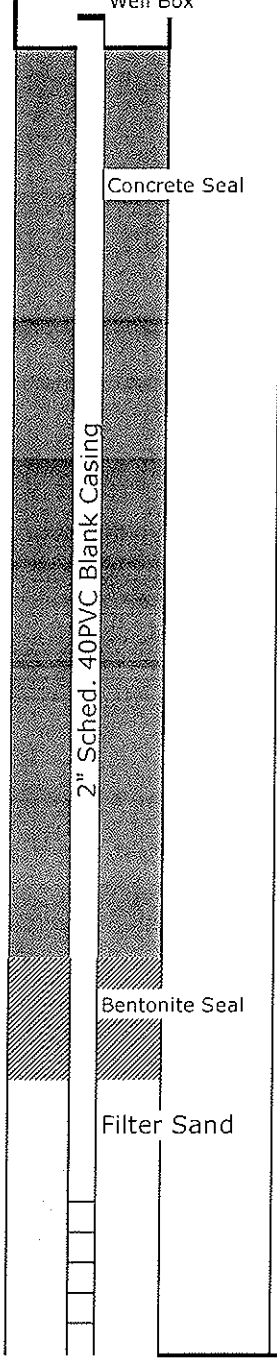
Delta
Consultants

Project No:	C102349210	Client:	**ConocoPhillips**
Logged By:	Caitlin Morgan	Location:	**1629 Webster Street**
Driller:	**RSI Drilling**		**Alameda, California**
Drilling Method:	Hollow Stem Auger	Hole Diameter:	8"
Sampling Method:	Split Spoon	Hole Depth:	25'
Casing Type:	Sched. 40PVC	Well Diameter:	8"
Slot Size:	0.02	Well Depth:	24.8'
Gravel Pack:	Filter Sand	First Water Depth:	N/A
Elevation		Northing	Easting

Well No: **MW-9**
Date Drilled: 5/13/09

▽ = First Water

▼ = Static Groundwater



Moisture Content	PID Reading (ppm)	Penetration (blows/6")	Sample Identification	Depth (feet)	Sample Recovery	Sample Interval	Soil Type	LITHOLOGY / DESCRIPTION
			Air-Knife	1–5			SW-SM	Well graded sand with silt and gravel; brown.
moist	18			5–10			SW-SM	Well graded sand with silt and gravel, trace clay, trace wood chips; brown to light brown.
moist	2105		MW-9 @10' 14:40	10–15			SW-SC	Same as above; more clay. Greenish gray; strong petroleum hydrocarbon odor.
moist	520			15–20			SW-SC	Same as above; brown w/ some greenish gray; less odor from the sample itself however at this point drillers note strong petroleum hydrocarbon odor coming from borehole. PID of 12.0 was obtained from above the open borehole/auger.
sat.	183			20–22			SW-SM	Well graded sand with silt, trace clay; brown to light brown; moist; low odors.

Delta
Consultants

Project No: C102349210
Logged By: Caitlin Morgan
Driller: **RSI Drilling**
Drilling Method: Hollow Stem Auger
Sampling Method: Split Spoon
Casing Sched. 40PVC
Slot Size: 0.02
Gravel Pack: Filter Sand

Client: **ConocoPhillips**
Location: **1629 Webster Street**
Alameda, California
Hole Diameter: 8"
Hole Depth: 25'
Well Diameter: 2"
Well Depth: 24.8'
First Water Depth: N/A

Well No: **MW-9**
Date Drilled: 5/13/09
Page **2** of **2**

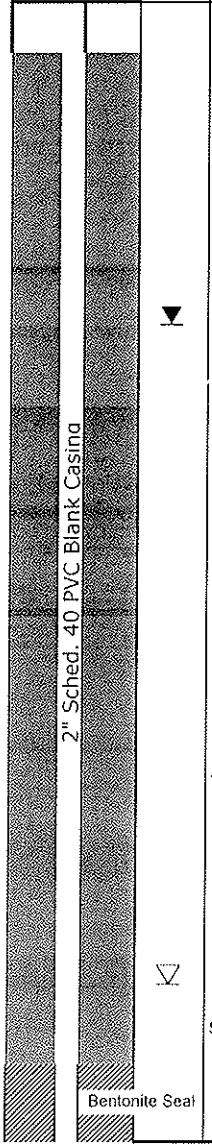
▽ = First Water
▼ = Static Groundwater

Elevation	Northing	Easting

Well Completion (Backfill / Casing)	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery	Sample Interval	Soil Type	LITHOLOGY / DESCRIPTION
		sat.			23			**SW-SM**	Well graded sand with silt, trace clay; brown to light brown; moist; low odors.
					24				
					25				**Total Depth of Boring = 25 Feet Below Ground Surface (bgs)**
					26				
					27				
					28				
					29				
					30				
					31				
					32				
					33				
					34				
					35				
					36				
					37				
					38				
					39				
					40				
					41				
					42				
					43				
					44				

Delta Consultants

Project No:	C102349210	Client: **ConocoPhillips**	Well No: **MW-10**
Logged By:	Caitlin Morgan	Location: **1629 Webster Steet**	Date Drilled: 5/20/09
Driller: **RSI Drilling**		**Alameda, California**	Page **1** of **2**
Drilling Method:	Geoprobe	Hole Diameter: 8"	
Sampling Method:	Direct Push	Hole Depth: 30'	▽ = First Water
Casing Type:	Sched. 40 PVC	Well Diameter: 2"	▼ = Static Groundwater
Slot Size:	0.02	Well Depth: 30'	
Gravel Pack:	Filter Sand	First Water Depth: 19'	
Elevation		Northing	Easting



Static Water Level	Moisture Content	PID Reading (ppm)	Penetration (blows/6")	Sample Identification	Depth (feet)	Sample Recovery	Sample Interval	Soil Type	LITHOLOGY / DESCRIPTION
				Air-Knife	1				Silty sand; trace clay and gravel.
					2				
					3				
					4				
	moist	23.0			5				**SC** Clayey sand; brown; fine to medium fine; medium plasticity; firm; slight odor.
▼					6				
					7				
					8				**SP-SC** Poorly graded sand with clay; brown with some gray; medium plasticity; soft; slight odor.
					9				
	moist	57.4		9:23 @ 10'	10				**SP-SM** Poorly graded sand with silt; fine grained; low plasticity; soft; odor more prevalent.
					11				
					12				
					13				
					14				**SP-SC** Same as at 8-feet.
	damp	0			15				**SP-SM** Same as at 10-feet. More moisture; no odor.
					16				
					17				*** Drillers indicate presence of heaving sands.
					18				
					19				
▽					20				
	sat.	3			21				**SM** Silty sand; brown.
					22				

Delta
Consultants

Project No:	C102349210	Client: **ConocoPhillips**	Well No: **MW-10**
Logged By:	Caitlin Morgan	Location: **1629 Webster Street**	Date Drilled: 5/20/2009
Driller: **RSI Drilling**		**Alameda, California**	Page **2** of **2**
Drilling Method:	Geoprobe	Hole Diameter: 8"	
Sampling Method:	Direct Push	Hole Depth: 30"	
Casing Type:	PVC	Well Diameter: 2"	
Slot Size:	0.02	Well Depth: 30'	
Gravel Pack:	Filter Sand	First Water Depth: 19'	

▽ = First Water

▼ = Static Groundwater

Elevation | Northing | Easting

Well Completion (Backfill / Casing)	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery	Sample Interval	Soil Type	LITHOLOGY / DESCRIPTION
		Sat.	2.9		24			SM	Continued heaving sands.
		Sat.	2.3		29			SM	Same as above.
					30				**Total Depth of Boring= 30 Feet Below Ground Surface (bgs)**
					31				
					32				
					33				
					34				
					35				
					36				
					37				
					38				
					39				
					40				
					41				
					42				
					43				
					44				

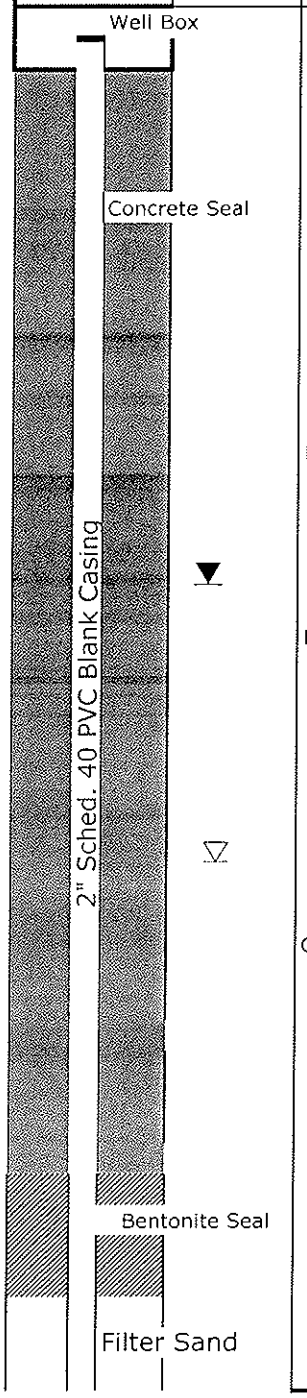
Delta
Consultants

Project No:	C102349210	Client:	**ConocoPhillips**
Logged By:	Caitlin Morgan	Location:	**1620 Webster Street**
Driller:	**RSI Drilling**		**Alameda, California**
Drilling Method:	Hollow Stem Auger	Hole Diameter:	8"
Sampling Method:	Split Spoon	Hole Depth:	28'
Casing Type:	Sched. 40 PVC	Well Diameter:	2"
Slot Size:	0.02	Well Depth:	28.0'
Gravel Pack:	Filter Sand	First Water Depth:	14'
Elevation		Northing	Easting

Well No: **MW-11**
Date Drilled: 5/15/09

▽ = First Water

▼ = Static Groundwater



Depth (feet)	Moisture Content	PID Reading (ppm)	Penetration (blows/6")	Sample Identification	Recovery	Interval	Soil Type	LITHOLOGY / DESCRIPTION
1–5				Air-Knife			SW-SM	Sandy clay, trace silt; brown to light brown; trace organics, also debris/fill including ceramic kitchenware.
5	dry	0.0					SC	Clayey sand with gravel; light brown, trace roots.
7	moist	0.0					SW-SM	Well graded sand with silt and gravel; brown.
10	moist	18.3		9:15 @ 10'			SC	Clayey sand with silt; gray; slight odor.
15	damp	3.4					SC	Same as above.
17							SC	Same as above; slight petroleum hydrocarbon odor.
20	sat.	1.5					SC	Same as above.

Delta
Consultants

Project No:	C102349210	Client: **ConocoPhillips**	Well No: **MW-11**
Logged By:	Caitlin Morgan	Location: **1629 Webster Street**	Date Drilled: 5/15/09
Driller: **RSI Drilling**		Alameda, California	Page **2** of **2**
Drilling Method:	Hollow Stem Auger	Hole Diameter:	8"
Sampling Method:	Split Spoon	Hole Depth:	25'
Casing Type:	Sched. 40 PVC	Well Diameter:	2"
Slot Size:	0.02	Well Depth:	28"
Gravel Pack:	Filter Sand	First Water Depth:	14'

▽ = First Water

▼ = Static Groundwater

Elevation | Northing | Easting

Well Completion (Backfill / Casing)	Static Water Level	Moisture Content	PID Reading (ppm)	Sample Identification	Depth (feet)	Sample Recovery	Sample Interval	Soil Type	LITHOLOGY / DESCRIPTION
		sat.	1.3		23–27			**SC**	Sandy clay with silt; gray; slight odor.
					28				**Total Depth of Boring = 28 Feet Below Ground Surface (bgs)**
					29–44				

Attachment B

Standard Operating Procedure:
Groundwater Sampling Using
HydroPunch™

ARCADIS
Infrastructure, environment, facilities

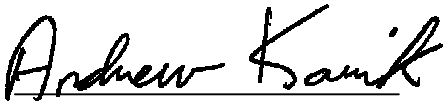
Imagine the result

Groundwater Sampling Using HydroPunch™

Rev. #: 01

Rev Date: March 3, 2009

Approval Signatures

Prepared by:  Date: 3/3/09

Reviewed by:  Date: 3/3/09
(Technical Expert)

I. Scope and Application

This document describes procedures for collecting discrete-depth groundwater samples using the HydroPunch™ sampling device (QED Environmental Services, Inc.), or equivalent, during drilling in unconsolidated materials. HydroPunch™ can be used to collect a single sample from a selected depth, or multiple samples from a single borehole to produce a profile of groundwater quality data versus depth. The HydroPunch™ sampler is typically driven through open-ended drill casing or hollow-stem augers.

HydroPunch™ consists of a drive point, a stainless steel screen section, a sample reservoir integral within the tool body, and assorted O-rings and check valves to create watertight seals within the various components. Two models of HydroPunch™ have been developed, having slightly different designs and/or component parts as shown on the attached HydroPunch™ schematic drawings. All components are made of stainless steel, Teflon, or other relatively inert materials. The tool can be disassembled easily for cleaning between samples.

Although this document refers to groundwater sample collection, HydroPunch™ is also capable of obtaining samples of light or dense non-aqueous phase liquid (LNAPL or DNAPL, respectively), if present at sufficient saturation and pressure head at the depth of the ampler during deployment.

II. Personnel Qualifications

ARCADIS personnel directing, supervising, or leading groundwater sample collection activities using HydroPunch™ should have a minimum of 2 years of previous groundwater sampling experience and current health and safety training including 40-hour HAZWOPER training, site supervisor training, site-specific training, first aid, and CPR, as needed. Field personnel will also be compliant with client-specific training requirements. In addition, ARCADIS field sampling personnel will be versed in the relevant SOPs and posses the required skills and experience necessary to successfully complete the desired field work.

III. Equipment List

The following materials are required for the collection of discrete-depth groundwater samples using HydroPunch™.

- HydroPunch™ sampling device provided by drilling subcontractor

- Drill casing or augers having an effective inside diameter of at least 1.25 inches (to be provided by drilling subcontractor)
- Electronic water-level probe
- Groundwater sample containers provided by the testing laboratory
- Health and safety monitoring equipment and personal protective equipment
- Materials for decontamination of the sampler between samples

IV. Cautions

Because the HydroPunch™ sampler is a groundwater sampling device, it must be used in saturated soils. Positive hydraulic head is required to fill the sampler, and the sampler may fill slowly or not at all at depths just below the water table. HydroPunch™ I and HydroPunch™ II in the "groundwater mode" cannot be used at sampling depths less than 5 feet below the water table. HydroPunch™ II in the "hydrocarbon mode" is preferred for sampling at the water table.

Some types of geologic materials may not allow effective use of the HydroPunch™ sampler, even at significant depth below the water table. For example, extremely dense soils or those containing cobbles or boulders may resist penetration of the sampler, precluding its use. Low permeability soil such as silt and clay may not produce groundwater at a sufficient rate to fill the HydroPunch™ sampler within a practicable timeframe. For these types of situations, an alternative approach should be considered, such as collecting a sample of saturated soil for analysis.

Groundwater samples collected using HydroPunch™ should be considered screening-level data, suitable for obtaining a general understanding of groundwater quality and selecting depths for monitoring well screens. Samples obtained using HydroPunch™ are commonly more turbid than those produced from installed, developed monitoring wells. Higher turbidity could affect sample quality if samples are to be analyzed for sorptive analytes such as polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), pesticides or metals. For these types of analytes, unfiltered HydroPunch™ samples could produce concentrations that are higher than those of sediment-free aquifer water. Field or laboratory filtering of the samples obtained for these types of constituents should be considered. For less-sorptive analytes (volatile organic compounds, anions such as chloride, etc.), sample turbidity is unlikely to adversely impact the direct usability of unfiltered samples.

V. Health and Safety Considerations

- Sample collection will be performed using procedures consistent with the project Health and Safety Plan.
- Appropriate personal protective equipment must be worn by ARCADIS field personnel

VI. Procedure

The following steps will be followed during the collection of discrete-depth groundwater Samples using HydroPunch™:

1. Select the desired groundwater sampling depth.
2. The drilling subcontractor will advance the borehole to approximately 2 feet above the depth from which a discrete water sample is to be obtained.
3. The drilling subcontractor will disassemble the HydroPunch™ sampling device according to the manufacturer's instructions to allow the sampler to be decontaminated. The sampler should be completely disassembled, including O-rings and/or check valves.
4. Decontaminate the sampler as appropriate for the range of groundwater analytes to be sampled for, by washing with laboratory-grade detergent and potable water wash, followed by solvent rinse (if sampling for organics) and final rinse with deionized or distilled water. Check the condition of the O-rings during each cleaning, and replace if necessary.
5. The drilling subcontractor will reassemble the decontaminated HydroPunch™ sampling device according to the manufacturer's instructions and lower the device to the bottom of the borehole.
6. The drilling subcontractor will push or drive the HydroPunch™ 5 feet below the bottom of the casing or augers, then retract the sampler 3 feet upward. Subsurface friction will retain the drive point in place, exposing the screen and allowing groundwater to enter the sampling tool.
7. Allow sufficient time to allow the sampler to fill with water. Typically 30 minutes is sufficient, except in low permeability materials.
8. Collect a groundwater sample by:

- Retracting the sampler to ground surface – the drilling subcontractor will then open the sampler allowing collection of the groundwater sample [if using the HydroPunch™ I or else the HydroPunch™ II in groundwater mode (see Attachment A)]

- Lowering a bailer or a peristaltic or inertia pump tube through the rods and body of the sampler, and retrieving the bailer or operating the pump to collect the groundwater sample [if using the HydroPunch™ II in hydrocarbon mode (see Attachment A)]

9. Perform field filtering of samples if required by the work plan, FSP and/or QAPP.

10. Obtain field water quality measurements if required by the work plan, FSP and/or QAPP.

11. Label the sample containers at the time of sampling with the following information.

    - Project name and number
    - Sample location
    - Sample number
    - Date and time of collection
    - Sampler initials
    - Analyses required

12. Preserve, store, handle, and ship samples to the analytical laboratory under chain of custody procedures as described in by the work plan, FSP and/or QAPP.

VII. Waste Management

Investigation-derived waste will be managed as described in the Investigation-Derived Waste Handling and Storage SOP.

VIII. Data Recording and Management

Borehole identification, sample depth, sample date and time will be recorded in the field notebook, the boring log, and/or the personal digital assistant (PDA). The sample will also be identified on an appropriate chain of custody form, as appropriate for submittal to an analytical laboratory for analysis, if required. Consider digital photography to record unusual field conditions or to document compliance.

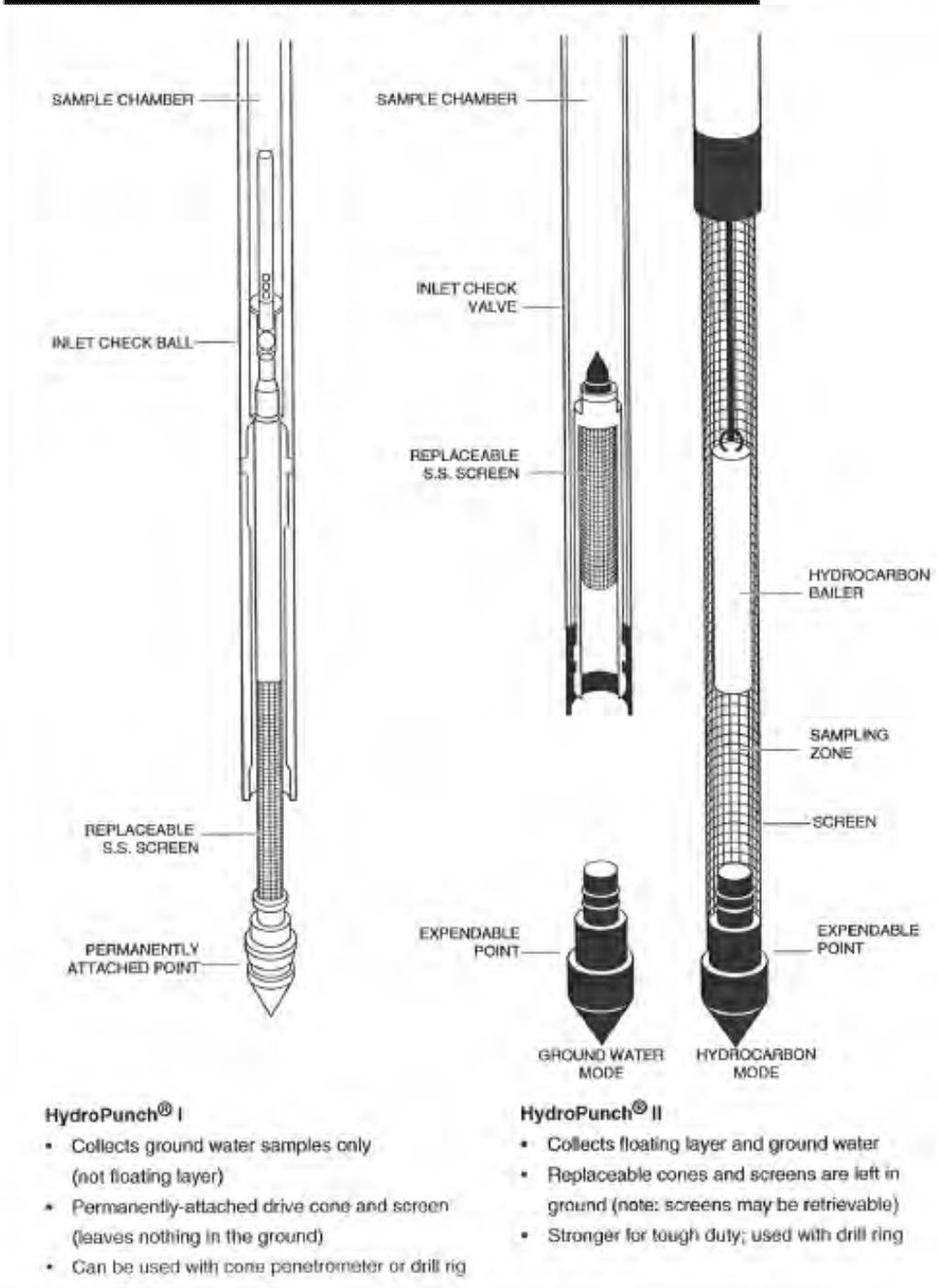
IX. Quality Assurance

The HydroPunch™ sampling device will be decontaminated as appropriate for the list of analytical parameters for which the groundwater samples are collected.

X. References

No references are required to accompany this SOP.

Attachment A - Hydropunch® Schematics



HydroPunch® I

- Collects ground water samples only (not floating layer)
- Permanently-attached drive cone and screen (leaves nothing in the ground)
- Can be used with cone penetrometer or drill rig

HydroPunch® II

- Collects floating layer and ground water
- Replaceable cones and screens are left in ground (note: screens may be retrievable)
- Stronger for tough duty; used with drill ring