CAMBRIA

ENVIRONMENTAL PROTECTION
98 JUL -7 PM 3:15

July 1, 1998

Ms. Susan Hugo
Alameda County Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Re: Well Installation Report
Shell Service Station
3420 San Pablo Avenue
Oakland, California
WIC #204-5508-5306
Cambria Project #240-0554

Dear Ms. Hugo:

On behalf of Shell Oil Products Company (Shell), Cambria Environmental Technology, Inc. (Cambria) is submitting this report summarizing the installation of two monitoring wells at the site referenced above. The objective of this work was to replace the monitoring wells abandoned due to site construction activities. The well replacement was requested by the Alameda County Department of Environmental Health (ACDEH). Cambria proposed the well replacement locations in a December 4, 1997 letter to ACDEH, and confirmed the installation plans in a June 15, 1998 facsimile to ACDEH.

SITE SUMMARY

Site Description: The site is a Shell service station undergoing renovation located at the southeast corner of the intersection of 35th Street and San Pablo Avenue in Oakland. Property use in the site vicinity is mixed residential/commercial. Primary surface water bodies in the vicinity of the site are the San Francisco Bay, which is located approximately 1.1 miles west of the site, the Oakland Inner Harbor approximately 2.0 miles south of the site, and Lake Merritt, a tidal lake, approximately 1.4 miles southeast of the site.

The station is currently not in operation. Site renovation activities include replacing product dispensers and piping, grading the site, installing a canopy, and constructing a commercial training center and a retail gasoline station on site (Figure 1). Currently, ground water quality beneath the site is monitored quarterly by nine monitoring wells (six on-site and three off-site wells). Monitoring wells MW-3 and MW-6 were abandoned due to construction activities in December 1997.

CAMBRIA
ENVIRONMENTAL
TECHNOLOGY, INC.
1144 65TH STREET,
SUITE B
OAKLAND,
CA 94608
PH: (510) 420-0700
FAX: (510) 420-9170

PREVIOUS INVESTIGATIONS:

1988 Soil Borings: In August 1988, Ensco Environmental Services, Inc., (Ensco) drilled five soil borings (B-1 through B-5) to a maximum depth of 20.5 feet (ft). Total petroleum hydrocarbons as gasoline (TPHg) were detected at a maximum concentration of 1,400 parts per million (ppm) at 5 ft depth in boring B-1, located at the north end of the UST pit. Benzene was also detected at a maximum concentration of 1.9 ppm in this sample.

1989 Monitoring Wells Installation: In April 1989, Delta Environmental Consultants (Delta) of Rancho Cordova, California, drilled and installed four on-site monitoring wells, MW-1 through MW-4.

1990 Monitoring Wells Installation: In January 1990, Delta drilled and installed five additional monitoring wells, MW-5 through MW-9. Monitoring well MW-5 was drilled to a depth of 26.5 ft below ground surface (bgs) and monitoring wells MW-6 through MW-9 were drilled to depths of 21.5 ft bgs. Monitoring wells MW-5 through MW-8 were located on site, and well MW-9 was located off site to the north, on 35th Street. TPHg was detected at a maximum concentration of 6.1 ppm in soil at 10.5 ft depth in well MW-9. Benzene was detected at a maximum concentration of 0.078 ppm in soil at 5.5 ft depth in well MW-7.

1991 Monitoring Wells Installation: In October 1991, Delta drilled and installed monitoring wells MW-10 and MW-11 off site. TPHg was detected at a maximum concentration of 1.8 ppm in soil at 10 ft depth in boring MW-10. The maximum benzene concentration of 0.06 ppm was also detected in this soil sample.

INVESTIGATION PROCEDURES AND RESULTS

As requested by the ACDEH, Cambria proposed to install two ground water monitoring well to replace abandoned monitoring wells MW-3 and MW-6. The monitoring well locations are shown in Figure 1.

Well Installation Date: June 18, 1998

Personnel Present During Soil Borings and Well Installation Activities:

Personnel	*Title*	*Company*
John Riggi	Staff Geologist	Cambria
Cortez Johnson	Project Superintendent	Winmax Construction
Jason Ogden	Head Driller	Gregg Drilling

Soil Boring and Well Installation

Permits:	ACPWA Drilling Permit No. 98WR234 (Attachment A).
Drilling Date:	The well casing and sand pack were installed and temporarily sealed on June 18, 1998. The well vaults will be installed upon completion of the asphalt paving.
Drilling Method:	8-inch hollow stem auger. The first 5 ft of the boring were hand-augered.
Soil Sampling:	Samples were collected every five feet using an 18-inch modified California split spoon sampler with stainless steel liners. Soil samples were not submitted for chemical analysis since previously installed monitoring wells had been analyzed for that data.
Number of Wells:	Two; Monitoring wells MW-3R and MW-6R (Figure 1).
Boring Depth:	31.5 ft below grade (Attachment B).
Ground Water Depth:	Ground water was initially encountered at 5.5 ft, and the static water level was measured at 6.0 ft (Attachment B).
Sediment Lithology:	Primarily silty clays, sandy silts, and sandy gravel to the total depth explored of 31.5 ft (Attachment B).
Well Materials:	Monitoring wells MW-3R and MW-6R were constructed using two-inch diameter, schedule 40 PVC well casing and 0.010-inch slotted well screen (Attachment B).
Screened Interval:	The wells were screened from 4.0 to 30.0 ft below grade (Attachment B).
Well Development:	The monitoring wells will be developed, purged, and sampled by Blaine Tech Services, Inc. (Blaine) of San Jose, California during the Third Quarter 1998.
Soil Disposal:	Soil cuttings produced from the well installations were stockpiled onsite with the excavated soils generated during site construction activities. Shell will arrange for transportation of the stockpile to an approved disposal/recycling facility.

CAMBRIA

CLOSING

Thank you for your assistance with this project. Please call if you have any questions or comments.

Sincerely,
Cambria Environmental Technology, Inc.

Paul Waite
Project Engineer

Diane M. Lundquist, P.E.
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
DIANE M. LUNDQUIST
NO. C46725
CIVIL
STATE OF CALIFORNIA

Attachments: A - Well Installation Permit
B - Boring Log and Well Construction Details
C - Standard Field Procedures for Well Installation

cc: A.E. (Alex) Perez, Shell Oil Products Company, P.O. Box 8080, Martinez, California 94553

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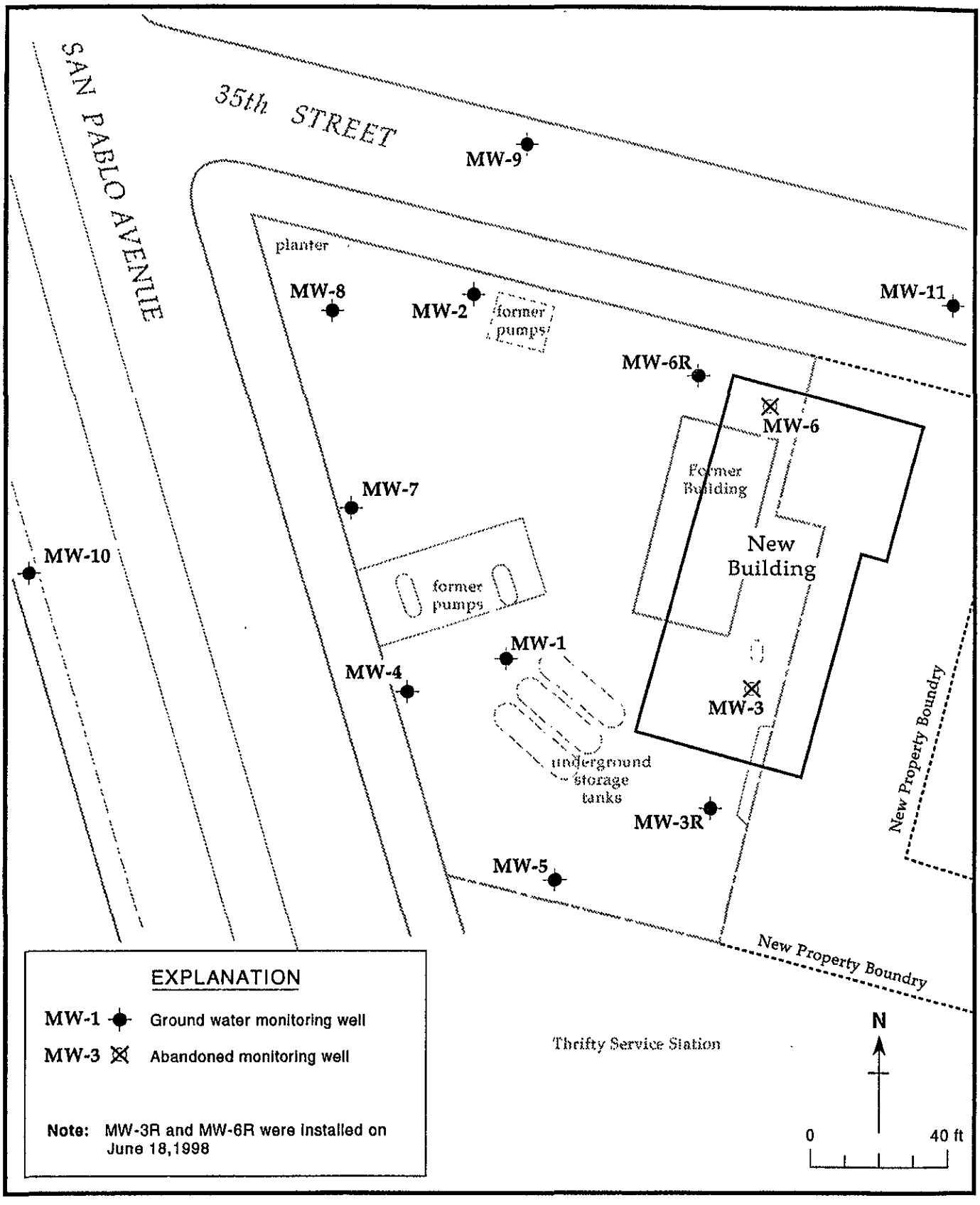


Figure 1. Building and Existing Well Locations - Shell Service Station WIC #204-5508-5306, 3420 San Pablo Avenue, Oakland, California

ATTACHMENT A

Well Installation Permit

ALAMEDA COUNTY PUBLIC WORKS AGENCY

WATER RESOURCES SECTION
951 TURNER COURT, SUITE 300, HAYWARD, CA 94545-2651
PHONE (510) 670-5575 ANDREAS GODFREY FAX (510) 670-5262
(510) 670-5248 ALVIN KAN

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT 3420 San Pablo Av
Oakland CA

California Coordinates Source _____ ft. Accuracy ± ___ ft.
CCN _____ ft. CCE _____ ft.
APN _____

CLIENT
Name Shell Oil Products Co. *
Address 501 Shell Ave Phone 510-335-5027
City Martinez Zip 94553
* Equilon Enterprises LLC after 7/1/98

APPLICANT
Name Cambria Environmental Technology, Inc.
Dan White Fax 510-420-9170
Address 1144 65th St Suite C Phone 510-420-3305
City Oakland Zip 94608

TYPE OF PROJECT

Well Construction		Geotechnical Investigation	
Cathodic Protection	☐	General	☐
Water Supply	☐	Contamination	☐
Monitoring	☒	Well Destruction	☐

PROPOSED WATER SUPPLY WELL USE

New Domestic	☐	Replacement Domestic	☐
Municipal	☐	Irrigation	☐
Industrial	☐	Other _____	☐

DRILLING METHOD:

Mud Rotary	☐	Air Rotary	☐	Auger	☒
Cable	☐	Other	☐		

DRILLER'S LICENSE NO. C57-485-165

WELL PROJECTS
Drill Hole Diameter 8-10 in. Maximum
Casing Diameter 4 in. Depth 30 ft.
Surface Seal Depth 10 ft. Number 2

GEOTECHNICAL PROJECTS
Number of Borings _____ Maximum
Hole Diameter _____ in. Depth _____ ft.

ESTIMATED STARTING DATE 6/18/98
ESTIMATED COMPLETION DATE 6/19/98

I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE _____ DATE 6/12/98

FOR OFFICE USE

PERMIT NUMBER 98WR234
WELL NUMBER _____
APN _____

PERMIT CONDITIONS

Circled Permit Requirements Apply

(A.) **GENERAL**
1. A permit application should be submitted so as to arrive at the ACPWA office five days prior to proposed starting date.
(2.) Submit to ACPWA within 60 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or drilling logs and location sketch for geotechnical projects.
(3.) Permit is void if project not begun within 90 days of approval date.

B. WATER SUPPLY WELLS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved.

(C.) **GROUNDWATER MONITORING WELLS INCLUDING PIEZOMETERS**
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.

D. GEOTECHNICAL
Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material. In areas of known or suspected contamination, tremied cement grout shall be used in place of compacted cuttings.

E. CATHODIC
Fill hole above anode zone with concrete placed by tremie.

F. WELL DESTRUCTION
See attached.

G. SPECIAL CONDITIONS

APPROVED Alvin Kan DATE 6/15/98

ATTACHMENT B

Boring and Well Construction Log

DRILLING LOG

Client: **Shell Oil Products Company**

Project No: **240-0554** Phase Task

Well ID **MW-3R** Boring ID **MW-3R**

Location **3420 San Pablo Avenue, Oakland, California**

Surface Elev. **NA ft,** Page **1** of **1**

Depth (feet)	Blow Count	Sample	% Rec	Lithologic Description
0	Ground Surface			
				ASPHALT
				Gravelly fill
5				**Silty CLAY**; (CH); black; stiff; moist; 60% clay, 40% silt; high plasticity; very low estimated permeability.
	NA			**Clayey Sandy SILT**; (ML); yellowish brown; medium stiff; moist; 20% clay, 40% silt, 30% fine to medium grained sand, 10% gravel; medium plasticity; low estimated permeability.
10	NA			20% clay, 40% silt, 40% sand.
15	NA			Wet; 25% clay, 40% silt, 30% fine grained sand, 5% gravel.
20	NA			**Clayey Silty SAND**; (SM); yellowish brown; medium dense; wet; 20% clay, 20% silt, 60% fine grained sand; medium plasticity; medium estimated permeability.
25	NA			**Silty Sandy GRAVEL**; (GP); brown; loose; wet; 5% clay, 20% silt, 20% fine to coarse grained sand, 55% angular gravel; no plasticity; high estimated permeability.
30	NA			**Clayey Silty SAND with gravel**; (SM); yellowish brown; medium dense; wet; 20% clay, 20% silt, 40% fine to medium grained sand, 20% angular gravel; low to medium plasticity; high estimated permeability.
35				

TPHg (ppm) | Graphic Log | Well Construction Graphics

Depth (feet)	Well Construction Details
0	T.O.C. Elev. na
5	
10	water encountered during drilling @ 6' static water level @ 6.25'
15	
20	
25	
30	
35	bottom of boring @ 31.5

Driller **Gregg Drilling**	Development Yield **NA**	Bentonite Seal **3' to 1'**
Logged By **J. Riggi**	Well Casing **2"** Dia. **0'** to **4'**	Sand Pack **3' to 30'**
Drilling Started **6/18/98**	Casing Type **Schedule 40 PVC**	Sand Pack Type **# 2/12 Sand**
Drilling Completed **6/18/98**	Well Screen **2"** Dia. **4'** to **30'**	Static Water Level **6.25** ft Depth
Construction Completed **6/18/98**	Screen Type **Schedule 40 PVC**	Date **6/18/98**
Development Completed **NA**	Slot Size **0.010"**	Notes: **Rhino Rig HSA 8" augers**
Water Bearing Zones **NA**	Drilling Mud **NA**	
	Grout Type **Concrete**	

WELL 24554 7/1/98

Cambria Environmental Technology, Inc.

DRILLING LOG

Client: **Shell Oil Products Company**

Project No: **240-0554** Phase Task

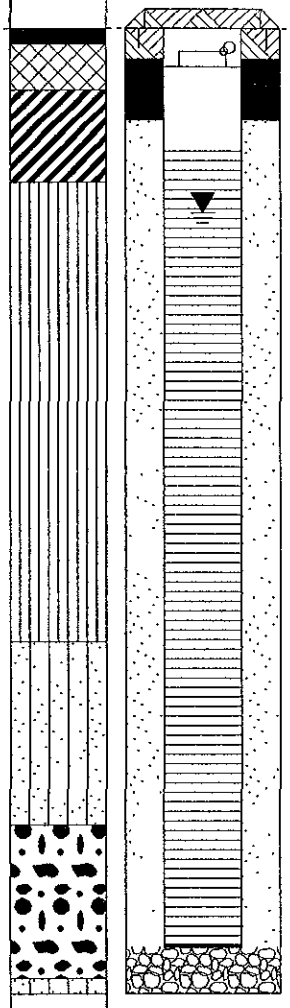
Well ID **MW-6R** Boring ID **MW-6R**

Location **3420 San Pablo Avenue, Oakland, California**

Surface Elev. **NA ft,** Page **1** of **1**

Depth (feet)	Blow Count	Sample	% Rec	Lithologic Description
0	Ground Surface			
	NA			**ASPHALT**
				Gravelly Fill
				Silty CLAY; (CH); black; stiff; moist; 60% clay, 40% silt; high plasticity; very low estimated permeability.
5	NA			**Clayey SILT**; (ML); olive; medium stiff; moist; 20% clay, 60% silt, 10% fine grained sand, 10% gravel; medium plasticity; low estimated permeability.
10	NA			**Clayey Sandy SILT**; (ML); yellowish brown; medium stiff; moist; 20% clay, 40% silt, 40% fine to medium grained sand; low to medium plasticity; low to medium estimated permeability.
15	NA			20% clay, 35% silt, 40% sand, 5% gravel.
20	NA			**Clayey Silty SAND**; (SM); yellowish brown; medium dense; moist; 20% clay, 20% silt, 60% sand; medium plasticity; medium estimated permeability.
25	NA			**Sandy GRAVEL**; (GP); brown; loose; wet; 5% clay, 10% silt, 35% fine to coarse sand, 50% angular gravel; no plasticity; high estimated permeability.
30	NA			10% clay, 10% silt, 30% fine to coarse grained sand, 50% angular gravel.
35				**Silty Clayey SAND**; (SM); yellow to yellowish brown; medium dense; moist; 20% clay, 20% silt, 50% fine to medium grained sand, 10% angular gravel; low to medium plasticity; high estimated permeability.

TPHg (ppm) | Graphic Log | Well Construction Graphics



Depth (feet)	Well Construction Details
0	T.O.C. Elev. na
5	water encountered during drilling @ 5.5' static water level @ 6'
10	
15	
20	
25	
30	bottom of boring @31.5'
35	

Driller	**Gregg Drilling**	Development Yield	**NA**	Bentonite Seal	**3' to 1'**
Logged By	**J. Riggi**	Well Casing	**2"** Dia. **0'** to **4'**	Sand Pack	**3' to 30'**
Drilling Started	**6/18/98**	Casing Type	**Schedule 40 PVC**	Sand Pack Type	**# 2/12 Sand**
Drilling Completed	**6/18/98**	Well Screen	**2"** Dia. **4'** to **30'**	Static Water Level	**6.00** ft Depth
Construction Completed	**6/18/98**	Screen Type	**Schedule 40 PVC**	Date	**6/18/98**
Development Completed	**NA**	Slot Size	**0.010"**	Notes:	**Rhino Rig HSA 8" augers**
Water Bearing Zones	**NA**	Drilling Mud	**NA**		
		Grout Type	**Concrete**		

Cambria Environmental Technology, Inc.

CAMBRIA

ATTACHMENT C

Standard Field Procedures for Well Installation

STANDARD FIELD PROCEDURES FOR MONITORING WELL INSTALLATION

This document presents standard field methods for drilling and sampling soil borings and installing, developing and sampling ground water monitoring wells. These procedures are designed to comply with Federal, State and local regulatory guidelines. Specific field procedures are summarized below.

SOIL BORINGS

Objectives

Soil samples are collected to characterize subsurface lithology, assess whether the soils exhibit obvious hydrocarbon or other compound vapor or staining, and to collect samples for analysis at a State-certified laboratory. All borings are logged using the Unified Soil Classification System by a trained geologist working under the supervision of a California Registered Geologist (RG).

Soil Boring and Sampling

Soil borings are typically drilled using hollow-stem augers or direct-push technologies such as the Geoprobe®. Soil samples are collected at least every five ft to characterize the subsurface sediments and for possible chemical analysis. Additional soil samples are collected near the water table and at lithologic changes. Samples are collected using lined split-barrel or equivalent samplers driven into undisturbed sediments at the bottom of the borehole.

Drilling and sampling equipment is steam-cleaned prior to drilling and between borings to prevent cross-contamination. Sampling equipment is washed between samples with trisodium phosphate or an equivalent EPA-approved detergent.

Sample Analysis

Sampling tubes chosen for analysis are trimmed of excess soil and capped with Teflon tape and plastic end caps. Soil samples are labeled and stored at or below 4° C on either crushed or dry ice, depending upon local regulations. Samples are transported under chain-of-custody to a State-certified analytic laboratory.

Field Screening

One of the remaining tubes is partially emptied leaving about one-third of the soil in the tube. The tube is capped with plastic end caps and set aside to allow hydrocarbons to volatilize from the soil. After ten to fifteen minutes, a portable volatile vapor analyzer measures volatile hydrocarbon vapor concentrations in the tube headspace, extracting the vapor through a slit in the cap. Volatile vapor analyzer measurements are used along with the field observations, odors, stratigraphy and ground water depth to select soil samples for analysis.

Water Sampling

Water samples, if they are collected from the boring, are either collected using a driven Hydropunch® type sampler or are collected from the open borehole using bailers. The ground water samples are decanted into the appropriate containers supplied by the analytic laboratory. Samples are labeled, placed in protective foam sleeves, stored on crushed ice at or below 4°C, and transported under chain-of-custody to the laboratory. Laboratory-supplied trip blanks accompany the samples and are analyzed to check for cross-contamination. An equipment blank may be analyzed if non-dedicated sampling equipment is used.

Grouting

If the borings are not completed as wells, the borings are filled to the ground surface with cement grout poured or pumped through a tremie pipe.

MONITORING WELL INSTALLATION, DEVELOPMENT AND SAMPLING

Well Construction and Surveying

Ground water monitoring wells are installed to monitor ground water quality and determine the ground water elevation, flow direction and gradient. Well depths and screen lengths are based on ground water depth, occurrence of hydrocarbons or other compounds in the borehole, stratigraphy and State and local regulatory guidelines. Well screens typically extend 10 to 15 ft below and 5 ft above the static water level at the time of drilling. However, the well screen will generally not extend into or through a clay layer that is at least three ft thick.

Well casing and screen are flush-threaded, Schedule 40 PVC. Screen slot size varies according to the sediments screened, but slots are generally 0.010 or 0.020 inches wide. A rinsed and graded sand occupies the annular space between the boring and the well screen to about one to two ft above the well screen. A two ft thick hydrated bentonite seal separates the sand from the overlying sanitary surface seal composed of Portland type I,II cement.

Well-heads are secured by locking well-caps inside traffic-rated vaults finished flush with the ground surface. A stovepipe may be installed between the well-head and the vault cap for additional security.

The well top-of-casing elevation is surveyed with respect to mean sea level and the well is surveyed for horizontal location with respect to an onsite or nearby offsite landmark.

Well Development

Wells are generally developed using a combination of ground water surging and extraction. Surging agitates the ground water and dislodges fine sediments from the sand pack. After about ten minutes of surging, ground water is extracted from the well using bailing, pumping and/or reverse air-lifting through an eductor pipe to remove the sediments from the well. Surging and extraction continue until at least ten well-casing volumes of ground water are extracted and the sediment volume in the ground water is negligible. This process usually occurs prior to installing the sanitary surface seal to ensure sand pack stabilization. If development occurs after surface seal installation, then development occurs 24 to 72 hours after seal installation to ensure that the Portland cement has set up correctly.

All equipment is steam-cleaned prior to use and air used for air-lifting is filtered to prevent oil entrained in the compressed air from entering the well. Wells that are developed using air-lift evacuation are not sampled until at least 24 hours after they are developed.

Ground Water Sampling

Depending on local regulatory guidelines, three to four well-casing volumes of ground water are purged prior to sampling. Purging continues until ground water pH, conductivity, and temperature have stabilized. Ground water samples are collected using bailers or pumps and are decanted into the appropriate containers supplied by the analytic laboratory. Samples are labeled, placed in protective foam sleeves, stored on crushed ice at or below 4°C, and transported under chain-of-custody to the laboratory. Laboratory-supplied trip blanks accompany the samples and are analyzed to check for cross-contamination. An equipment blank may be analyzed if non-dedicated sampling equipment is used.

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FACSIMILE

To:	**Susan Hugo**
Organization:	**Alameda County Department of Environmental Health**
Fax #:	**(510) 337-9335**
Re:	**Well Installation Shell Station, 3420 San Pablo, Oakland**
Date:	**July 1, 1998**
Pages:	**6, including this cover**

Ms. Hugo,

Attached is the text of our Well Installation Report for 3420 San Pablo, Oakland. A hard copy, including attachments, will be sent to you.

If you have any questions regarding this report, please contact me at (510) 420-3305. Thank you for your continued assistance with this project.

Paul Waite

From the desk of...

Paul Waite
Project Engineer
Cambria Environmental Technology
1144 65th Street, Suite C
Oakland, CA 94608

(510) 420-3305
Fax: (510) 420-9170

CAMBRIA

July 1, 1998

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Ms. Susan Hugo
July 1, 1998

CAMBRIA

CLOSING

Thank you for your assistance with this project. Please call if you have any questions or comments.

Sincerely,
Cambria Environmental Technology, Inc.

Paul Waite
Project Engineer

Diane M. Lundquist, P.E.
Principal Engineer

Attachments: A - Well Installation Permit
B - Boring Log and Well Construction Details
C - Standard Field Procedures for Well Installation

cc: A.E. (Alex) Perez, Shell Oil Products Company, P.O. Box 8080, Martinez, California 94553

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CAMBRIA
Environmental Technology, Inc.

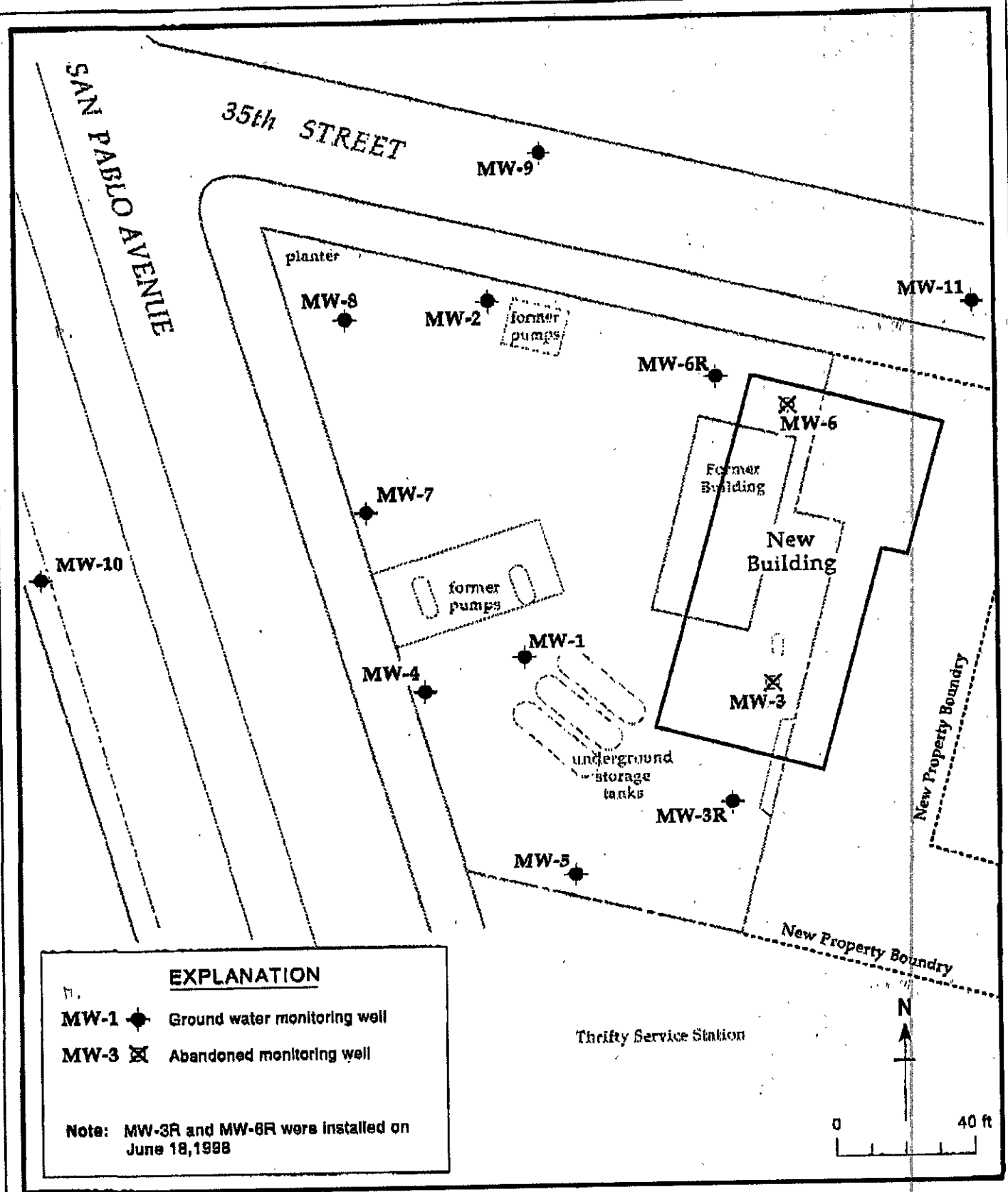

Figure 1. Building and Existing Well Locations - Shell Service Station WIC #204-5508-5306, 3420 San Pablo Avenue, Oakland, California

06/26/98

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