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June 15, 2001

Ms. Eva Chu
Alameda County Health Care Services Agency
Environmental Health Services
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

JUN 19 2001

Re: **Well Replacement Work Plan**
ARCO Service Station No. 6113
785 East Stanley Boulevard
Livermore, California
Cambria Project #438-1611

Ms. Chu:

On behalf of ARCO, Cambria Environmental Technology, Inc. (Cambria) is submitting the attached *Well Replacement Work Plan* for ARCO service station No. 6113 in response to your April 3, 2001 letter. The site background, proposed scope of work, and schedule are presented in the report.

If you have any questions, please call me at (510) 450 – 1983.

Sincerely,
Cambria Environmental Technology, Inc.

Ron Scheele, RG
Senior Geologist

Attachments: Well Replacement Work Plan

cc: Mr. Paul Supple, ARCO, PO Box 6549, Moraga, California 94570

Oakland, CA
San Ramon, CA
Sonoma, CA

Cambria Environmental Technology, Inc.

1144 65th Street
Suite B
Oakland, CA 94608
Tel (510) 420-0700
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WELL REPLACEMENT WORK PLAN

ARCO Service Station No. 6113
785 East Stanley Boulevard
Livermore, California
Cambria Project No. 438-1611

June 15, 2001

Prepared for:

Mr. Paul Supple
ARCO
PO Box 6549
Moraga, CA 94570

Prepared by:

Cambria Environmental Technology, Inc.
6262 Hollis Street
Emeryville, California 94608

REGISTERED GEOLOGIST
RONALD A. SCHEELE
No. 6842
STATE OF CALIFORNIA

Jason Olson
Senior Staff Environmental Scientist

Ron Scheele, RG
Senior Geologist

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WELL REPLACEMENT WORK PLAN

ARCO Service Station No. 6113
785 East Stanley Boulevard
Livermore, California
Cambria Project No. 438-1611

June 15, 2001

INTRODUCTION

On behalf of ARCO, Cambria Environmental Technology, Inc. (Cambria) is submitting the attached *Well Replacement Work Plan* for the above referenced site in response to an Alameda County Health Care Services Agency (ACHCSA) letter dated April 3, 2001. The agency correspondence is presented as Appendix A. The site background, proposed scope of work, and schedule are presented below.

SITE BACKGROUND

Site Description: The site is located at 785 East Stanley Boulevard on the southwestern corner of the intersection of East Stanley and Murrieta Boulevards in Livermore, California. The site is occupied by an active ARCO service station consisting of two gasoline USTs (one 20,000 and one 22,000 gallon tanks), three gasoline dispenser islands, and a station building (see Figure 1).

Site Hydrogeology: The topography surrounding the site generally slopes towards the northwest at an elevation of about 450 feet above mean sea level. Based on previous investigations, the lithology beneath the site consists primarily of sandy gravel and clayey gravel with interbedded sandy silt and silty clay. Depth to groundwater ranges from 13 to 28 feet below grade (fbg). Based on Cambria's *Semi-Annual Groundwater Monitoring Report: Fourth Quarter 2000*, groundwater flow at the site is towards the north-northwest.

Three USTs and associated product piping were replaced during station upgrade activities in January 2001. During station upgrade activities, wells MW-3 and VW-5 were abandoned. Please refer to Cambria's *Underground Storage Tank, Piping Removal, and Well Abandonment Report* dated March 19, 2001 for more information.

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PROPOSED SCOPE OF WORK

Well Installation

To further define the extent of hydrocarbons in soil and groundwater, one monitoring well will be installed at the site (see Figure 1).

Site Health and Safety Plan: A comprehensive site safety plan will be prepared to protect site workers. The plan will be kept onsite during field activities and signed by each site worker.

Permits: Well installation permits will be obtained from the Alameda County Water District (ACWD), Zone 7.

Utility Location: The proposed drilling locations will be marked and Underground Service Alert will be notified of Cambria's site activities to identify utilities in the site vicinity.

Soil Sampling: One soil boring will be drilled to approximately 30 fbg using a drill rig equipped with 8-inch diameter hollow stem augers in the existing and remediation system junction box. Soil samples will be collected at five foot intervals using a modified California split spoon sampler (see Appendix B). Field screening of hydrocarbons and VOCs will include visual or olfactory observations, and/or photo-ionization detector readings.

Well Installation: The boring will be converted into a 2-inch diameter monitoring well, constructed of polyvinyl chloride and screened from approximately 15 to 30 fbg with 0.010-inch machined slot. A filter pack consisting of No. 2/12 sand will be installed to 1 to 2 feet above the top of the well screen, which will be overlain by 1 to 2 feet of bentonite, and bentonite-cement grout to the surface (see Appendix B). Following installation, the well head will be surveyed to determine the top of casing elevation.

Chemical Analysis: Selected soil samples from the boring will be analyzed for TPHg by modified EPA Method 8015, and BTEX and MTBE by EPA Method 8020. Soil samples will be submitted to a California-certified laboratory for analysis.

Reporting: After the analytical results are received, a subsurface investigation report will be prepared that, at a minimum, will contain:

- Descriptions of the soil sampling method,
- Boring log and well construction detail,
- Tabulated soil analytical results,
- Laboratory report and chain-of-custody form, and
- A summary of field activities including findings and conclusions.

Groundwater Monitoring

Following installation, the new wells will be developed by surging and purging approximately 10 casing volumes of water. Groundwater samples will be collected and analyzed for TPHg by modified EPA Method 8015, and BTEX and MTBE by EPA Method 8020. A proposal for well sampling frequency will be prepared based on the results of the initial sampling event.

SCHEDULE

Upon receiving written Work Plan approval, well permits will be acquired and the field activities will be scheduled. An investigation report will be submitted approximately six weeks after the completion of field activities.

ATTACHMENTS

Figure 1 – Proposed Monitoring Well Locations

Appendix A – ACHCSA Letter dated April 3, 2001
Appendix B – Standard Field Procedures for Monitoring Wells

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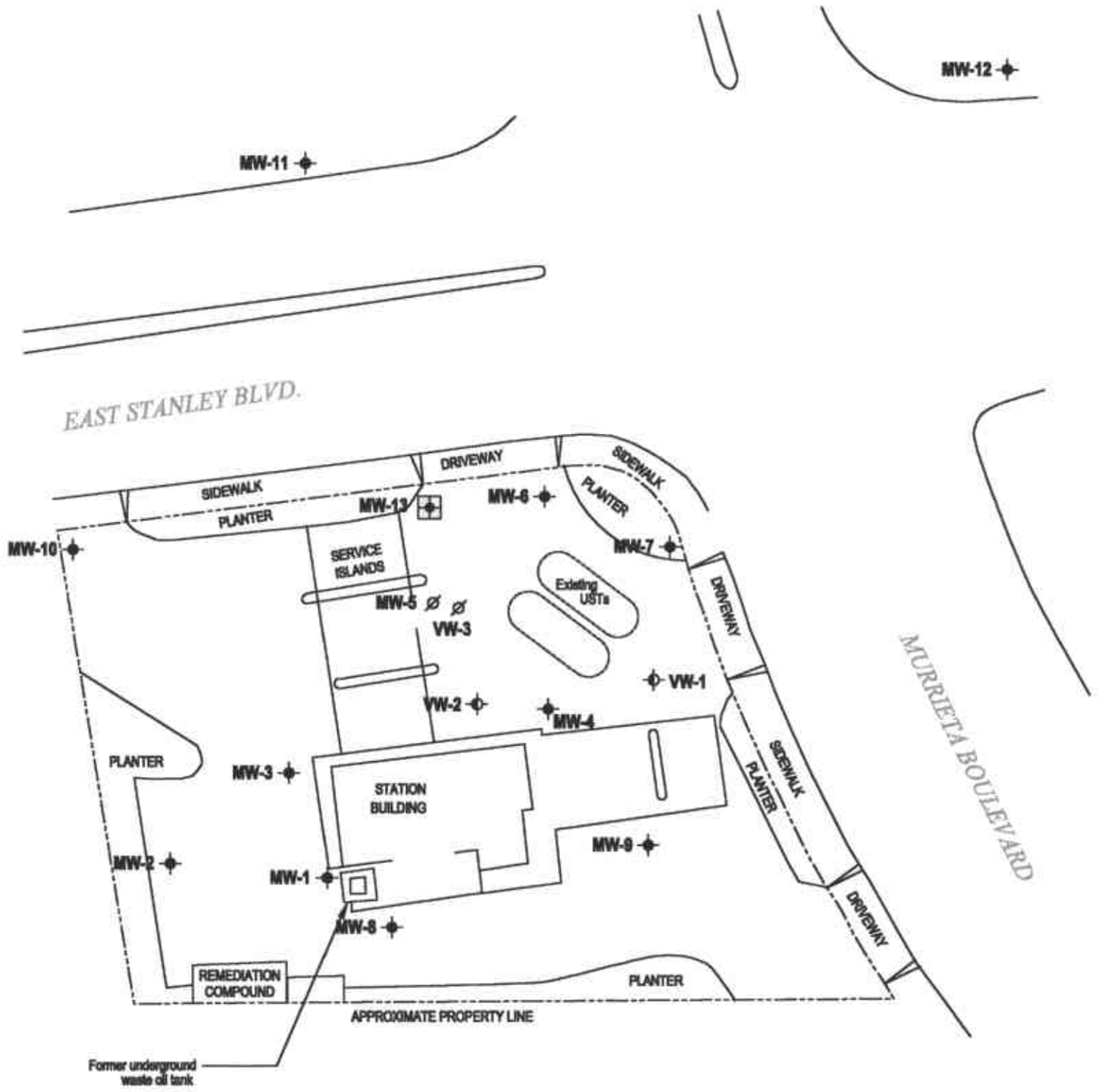
6/14/01

EXPLANATION

- MW-1 — Monitoring Well Location
- VW-1 — Vapor Extraction Well Location
- MW-5 ⌀ — Destroyed Well Location
- MW-13 — Proposed Monitoring Well Location



N

0 20 40 80

Scale (ft)

Proposed Monitoring Well Location

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ARCO Service Station 6113
785 East Stanley Boulevard
Livermore, California

FIGURE
1

APPENDIX A

ACHCSA Letter dated April 3, 2001

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
DAVID J. KEARS, Agency Director

ENVIRONMENTAL HEALTH SERVICES
ENVIRONMENTAL PROTECTION
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577
(510) 567-6700
FAX (510) 337-9335

StID 3883

April 3, 2001

Mr. Paul Supple
ARCO
P.O. Box 6549
Moraga, CA 94570

RE: Monitoring Well Replacement for ARCO Station 6113 at 785 E. Stanley Blvd., Livermore, CA

Dear Mr. Supple:

I have completed review of Cambria's March 19, 2001 *Underground Storage Tank, Piping Removal, and Well Abandonment Report* prepared for the above referenced site. Three USTs were removed in January 2001 and replaced with two new USTs. Soil samples collected from the tank excavation contained elevated concentrations of TPHg, BTEX and MTBE. During the replacement activities, wells MW-5 and VW-3 were abandoned. Both wells were drilled out and grouted.

At this time a replacement well should be installed north-northwest of the tank complex. It is recommended that this well be screened from approximately 15 to 30 feet bgs. A workplan for the installation of a replacement is due within 60 days of the date of this letter, **or by June 5, 2001.**

If you have any questions, I can be reached at (510) 567-6762.

eva chu
Hazardous Materials Specialist

c: Ron Scheele, Cambria, 1144 65th Street, Suite B, Oakland, CA 94608

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APPENDIX B

Standard Field Procedures For Monitoring Wells

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STANDARD FIELD PROCEDURES FOR MONITORING WELLS

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.