CAMBRIA

ENVIRONMENTAL PROTECTION

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March 18, 1999

#113

Mr. Barney Chan
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Re: **Work Plan Addendum**
Shell-branded Service Station
Incident # 98995746
4411 Foothill Boulevard
Oakland, California

Dear Mr. Chan:

On behalf of Equiva Services LLC (Equiva), Cambria Environmental Technology, Inc. (Cambria) is submitting this work plan addendum requested in your phone conversation with Cambria on February 1, 1999. Following is a response to specific issues regarding Cambria's *Letter Response and Work Plan* dated January 11, 1999. Specifically, you requested additional information regarding the application of liquid hydrogen peroxide (H_2O_2) and the location of proposed monitoring well S-4. You also provided Cambria with information regarding combined sampling efforts between the adjacent Chevron and BP sites. Following is an amended work plan.

Relocation of Proposed Monitoring Well S-4

As discussed in our February 1, 1999 phone conversation, Cambria will relocate proposed monitoring well S-4 to the location shown on Figure 1. This location will provide soil and ground water data closer to the station building and is in the direction of historical ground water flow to the southwest. The scope of work for the installation of MW-4, presented in Cambria's January 11, 1999 work plan, remains the same except we will also include collection of soil physical parameters for future risk analysis. Soil samples from the boring will be analyzed for dry bulk density, moisture content, porosity, and fraction organic carbon in addition to total petroleum hydrocarbons as gasoline (TPHg), benzene, toluene, ethylbenzene and xylenes (BTEX) and methyl tertiary butyl ether (MTBE).

Additional Information Regarding Injection of Liquid Hydrogen Peroxide

In the January 11, 1999 work plan, Cambria proposed injection of hydrogen peroxide into site wells. The objective of injecting liquid H_2O_2 was to increase dissolved oxygen (DO) levels in ground water and to oxidize dissolved MTBE is ground water. In our February 1, 1999 phone conversation you asked for additional information regarding the rational for liquid H_2O_2 injection versus Oxygen

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Release Compounds (ORCs). You also requested a more technical assessment for the rational of an 8% solution of hydrogen peroxide. After further evaluation, Cambria has determined that liquid H_2O_2 injection is not recommended for this site. The site is an active service station with active underground storage tanks (USTs) and product piping which presents safety issues associated with injecting a powerful oxidant such as liquid H_2O_2 near USTs and product equipment. Following is an amended work plan proposing ORC application rather than liquid H_2O_2 injection.

ORC Application

Cambria utilized the Regenesis supplied *ORC Application Software Version 2.0* to evaluate ORC application at this site. The model results are included in Attachment A. As a field test to correlate with the ORC model, Cambria proposes to install ORC socks in monitoring wells S-1, S-2 and tank back-fill well BW-A. Wells S-1, S-2 and BW-A were selected for ORC application to target the source area. Perimeter site wells, S-3 and S-4 (proposed) will serve to monitor the effectiveness of ORC application in source wells. We will install the ORCs from the top of the water table to the bottom of each well to provide as much ORC as possible to the aquifer. After installing the ORCs, we will continue to monitor for DO increases and aqueous-phase hydrocarbons reductions in site wells. ORCs may be installed in S-3 and S-4 in the future if there is no influence as a result of ORCs in the other wells. When the DO concentrations decrease to original background concentrations, we will evaluate the necessity for replacement of ORC socks.

Prior to installing ORC socks in BW-A, Cambria will coordinate de-watering of the back-fill well with a vacuum truck. Two vacuum truck purging events will be conducted prior to installing ORC socks to remove stagnate water from the back-fill well.

Combined Sampling

Blaine Tech Services (Blaine) of San Jose is the ground water sampling vendor for the Shell-branded site and the adjacent Chevron and BP sites. Cambria contacted Blaine to coordinate data exchange for future combined sampling events. Future ground water contour maps prepared by Cambria and included in quarterly monitoring reports will incorporate data from all three sites. Cambria will further evaluate the potential for preferential migration pathways after contour data from all three sites is combined.

Schedule

Upon receiving written approval of the work proposed above, Cambria will apply for the necessary permits and begin scheduling field activities. Our completed evaluation of preferential pathways for contaminant migration will be presented in the next quarterly ground water monitoring report.

CLOSING

We appreciate the opportunity to work with you on this project. Please call Darryk Ataide at (510) 420-3339 if you have any questions or comments.

Sincerely,
Cambria Environmental Technology, Inc.

D. Ataide

Darryk Ataide
Environmental Scientist

Diane M. Lundquist
Principle Engineer

Attachments: A - ORC Application Software Spreadsheet

cc: Karen Petryna, Equiva Services LLC, P.O. Box 6249, Carson, CA 90749-6249 and 7084 N. Cedar Avenue #314, Fresno, CA 93720

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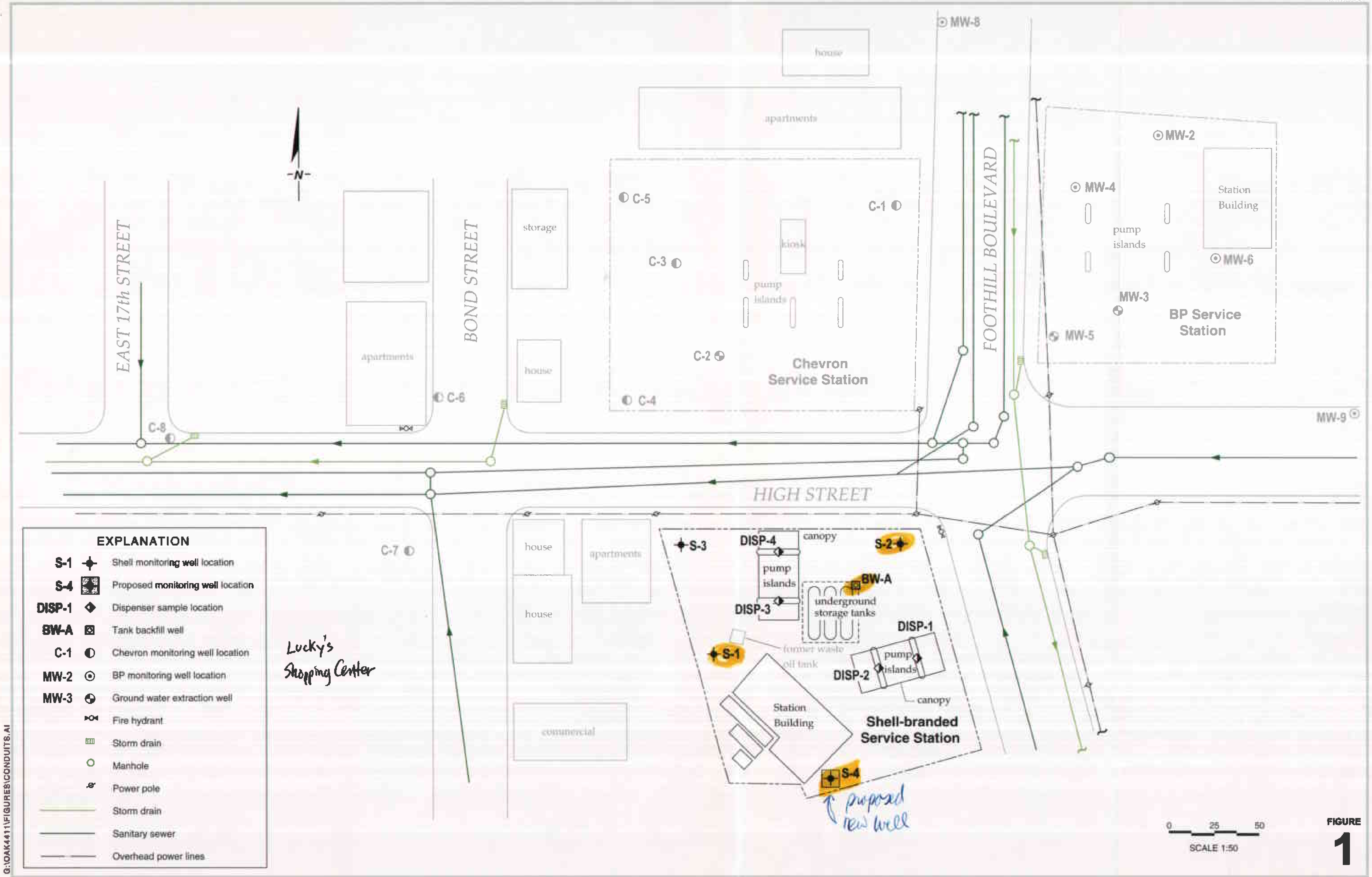

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Proposed Monitoring Well Location and Conduit Study Map

CAMBRIA

Shell-branded Service Station
4411 Foothill Boulevard
Oakland, California
Incident #98995746

FIGURE
1

ATTACHMENT A

ORC Application Software Spreadsheet

SOURCE TREATMENT - REPLACEMENT WELLS

Dissolved Hydrocarbon Level (ppm)	0.5
(For gasoline sites use BTEX measurements)	
Plume Width (ft)	85
Plume Velocity (ft/day)	0.22
Thickness of contamination in Saturated Zone (ft)	10
Thickness of ORC Filter Socks in Saturated Zone (ft)	10
Porosity	0.3
(sand = 0.3, silt = 0.35, clay = 0.4)	
Safety Factor for Barriers	2
(recommended value is about 2)	
Hydrocarbon Load Per Day (lbs)	0.004
Oxygen Demand per Day (lbs)	0.012
Oxygen Required (lbs)	2.2

APPLICATION COMMENTS

* Barrier Design should potentially handle constant mass flux requirements

Well Diameter (in.) ***enter 4 or 6 ONLY***	4
Number of Wells	3
Well Spacing (ft.)	28
Total Number of Socks	30
Oxygen Available (lbs)	8.25
Cost per sock	$ 37.50
Cost of ORC Socks per Charge	$ 1,125.00
Percent of O2 Available to O2 Requied	382%
Minimum number of recommended charges to complete clean up	1.00
Total Cost of ORC Socks for Cleanup	$ 1,125.00

Solute Transport Model

Compliance Point (ft.)	35
HC Level at compliance point after one charge in ppm	0.00