ARCADIS
Infrastructure Water Environment Buildings

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ENVIRONMENT

Ms. Dilan Roe, P.E.
Hazardous Materials Specialist
Alameda County Environmental Health
1131 Harbor Bay Parkway
Alameda, California 94502

Subject:
EAB Implementation
Former BP Service Station No. 11126
1700 Powell Street
Emeryville, California 94608

Date:
October 9, 2012

Contact:
Hollis Phillips

Phone:
415.432.6903

Email:
hollis.phillips@arcadis-us.com

Our ref:
GP09BPNA.C044.B0000

Dear Ms. Roe:

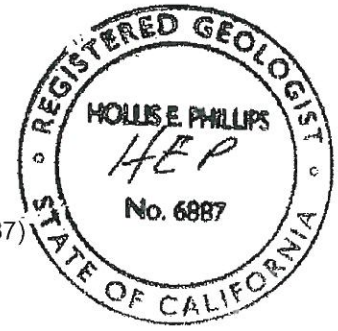
ARCADIS U.S., Inc (ARCADIS) has prepared this letter on behalf of BP Remediation Management, a BP affiliated company, for the former BP service station listed below.

BP Facility No.	ACEH Site No.	Location
11126	RO0000066	1700 Powell Street Emeryville, California

I declare, to the best of my knowledge at the present time, that the information and/or recommendations contained in the attached document are true and correct. If you have any questions or comments regarding the content of this letter, please contact Hollis Phillips by telephone at 415.432.6903 or by e-mail at hollis.phillips@arcadis-us.com.

Sincerely,

ARCADIS U.S., Inc.



Hollis E. Phillips, P.G. (No. 6887)
Principal Geologist

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Dear Ms. Roe:

ARCADIS U.S., Inc. (ARCADIS) is submitting this letter to provide additional information on the proposed enhanced aerobic bioremediation (EAB) remedial program at the former BP Service Station No. 11126 located at 1700 Powell Street in Emeryville, California (Site). On September 28, 2012, ARCADIS discussed the proposed implementation of EAB with Alameda County Environmental Health (ACEH). The ACEH requested a formal submittal of the EAB recommendation and rationale and to address potential vapor migration concerns as stated in the ACEH correspondence *Corrective Action Plan for Fuel Leak Case No. RO0000066 and GeoTracker Global ID T0600100208, BP #11126, 1700 Powell Street, Emeryville, CA 94608* dated December 6, 2011 (ACEH 2011).

Proposed Corrective Action Plan

Several cleanup options were presented in the *Feasibility Study and Corrective Action Plan* (FS/CAP; ARCADIS 2011) to determine the most effective action to address site impacts. These alternatives were screened and evaluated on the basis of their effectiveness, implementability, and cost. Based on the results of the evaluation, EAB was selected as the cleanup action for the site. EAB is the process in which microorganisms in the presence of sufficient oxygen and other nutrients metabolize a carbon source (i.e., petroleum hydrocarbons) into carbon dioxide, water, and microbial biomass. EAB technologies are used to accelerate naturally occurring subsurface bioremediation of petroleum hydrocarbons by providing indigenous microorganisms in the subsurface with a supplemental supply of oxygen.

The proposed EAB implementation will consist of the injection of calcium peroxide slurry into the subsurface at the Site. Calcium peroxide was selected over other alternatives because it was found to have high oxygen-releasing capabilities. The implementation plan for the EAB program, as well as the full assessment of the other remedies evaluated for the Site is discussed in detail in the FS/CAP.

Response to ACEH Comment Regarding Potential Vapor Migration

In a December 6, 2011 directive from ACEH to implement the CAP, ACEH expressed concerns that there may be a potential for vapor migration along subsurface utility corridors or other subsurface preferential pathways as a result of in-situ chemical oxidation (ISCO), which may adversely affect off-site properties. The directive indicated that soil vapor monitoring points must be installed in the vicinity of the injection wells near utility corridors.

ISCO was evaluated as a potential remedial alternative for the Site in the FS/CAP, however, the technology was not selected. Based on the soil types and distribution of impacts, EAB is the more appropriate technology to address source area mass remaining at the Site. As discussed in the FS/CAP, ISCO technology involves injection of strong oxidants (e.g., hydrogen peroxide, ozone, permanganate, and persulfate) to directly destroy residual mass through chemical oxidation. Typically ISCO is accomplished by conveying the oxidant through a dedicated injection well that places the oxidant directly into groundwater. Placement of the oxidant into groundwater as well as the reactive nature of remedial-based oxidiation can create the potential for displacement of soil vapor and may potentially lead to vapor migration away from the treatment area.

The FS/CAP identifies the selected remedy as EAB which does not induce vapor migration. The purpose of using calcium peroxide is to provide a source of oxygen for months after the injection event. Slurry consistencies typically have high viscosities that allow the slurry to adhere to soil throughout the treatment interval and maintain longer contact times with groundwater. The limited rate kinetics of EAB copmounds will ensure rapid gas generation will not occur in the subsurface.

It appears either ACEH thought the injection of calcium peroxide was an ISCO technology not an EAB technology or they confused calcium peroxide (EAB) with hydrogen peroxide (ISCO). Soil gas vapors will not be generated during the injection of calcium peroxide and therefore ARCADIS is of the opinion that soil vapor

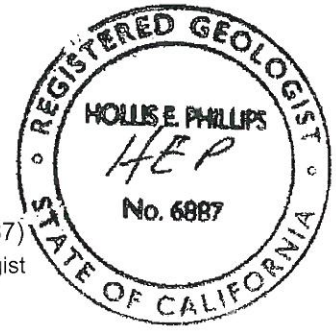
monitoring should not be required. If you have any questions or comments, please do not hesitate to contact me at (415) 432-6903 or by e-mail at hollis.phillips@arcadis-us.com.

Sincerely,

ARCADIS U.S., Inc.

HE Phillips

Hollis E. Phillips, P.G. (No. 6887)
Project Manager/ Senior Geologist



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References

Alameda County Environmental Health, 2011. *Corrective Action Plan for Fuel Leak Case No. RO0000066 and GeoTracker Global ID T0600100208, BP #11126, 1700 Powell Street, Emeryville, CA 94608*. December 6.

ARCADIS U.S., Inc. (ARCADIS), 2011. *Feasibility Study and Corrective Action Plan, Former British Petroleum Service Station No.11126, 1700 Powell Street, Emeryville, California, ACEH Case #RO0000066*. October 14.

San Francisco Bay – Regional Water Quality Control Board, 2008. *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater. Interim Final – November 2007*. (Revised May 2008).

STATE WATER RESOURCES CONTROL BOARD

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UPLOADING A GEO_REPORT FILE

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Your GEO_REPORT file has been successfully submitted!

Submittal Type:	**GEO_REPORT**
Report Title:	**EAB Implementation 101612**
Report Type:	**Correspondence**
Report Date:	**10/9/2012**
Facility Global ID:	**T0600100208**
Facility Name:	**BP #11126**
File Name:	**RO066 - BP 11126 - EAB Implementation Ltr.pdf**
Organization Name:	**ARCADIS**
Username:	**ARCADISBP**
IP Address:	**216.207.98.101**
Submittal Date/Time:	**10/16/2012 1:38:18 PM**
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