Hooshang Hadjian
2108 San Ramon Valley Blvd.
San Ramon, CA 94583

Ms. Dilan Roe
Alameda County Health Care Services Agency
Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Re: Dublin Auto Wash
7240 Dublin Boulevard
Dublin, California
ACHCSA Case No. 304

Dear Ms. Roe:

I, Mr. Hooshang Hadjian, have retained Pangea Environmental Services, Inc. (Pangea) as the environmental consultant for the project referenced above. Pangea is submitting the attached report on my behalf.

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

Sincerely,

Hooshang Hadjian

June 14, 2013

VIA ALAMEDA COUNTY FTP SITE

Ms. Dilan Roe
Alameda County Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Re: **Enhanced Bioremediation Pilot Test Workplan**
Dublin Auto Wash
7240 Dublin Boulevard
Dublin, California
ACEH Case No. 304

Dear Ms. Roe:

On behalf of Mr. Hooshang Hadjian, Pangea Environmental Services, Inc. has prepared this *Enhanced Bioremediation Pilot Test Workplan*. On May 28, 2013, Pangea met with ACEH to discuss site conditions and future site activities. As a result of the meeting ACEH prepared a May 28, 2013 letter requesting preparation of a pilot test workplan for bio-organic catalyst (BOC) injection and biosparging. The pilot test will also provide additional data about potential submerged free product and secondary source material, which can be incorporated into the requested updated site conceptual model.

If you have any questions or comments, please call me at (510) 435-8664.

Sincerely,
Pangea Environmental Services, Inc.

Bob Clark-Riddell, P.E.
Principal Engineer

Attachment: *Enhanced Bioremediation Pilot Test Workplan*

cc: Mr. Hooshang Hadjian, 2108 San Ramon Valley Blvd, San Ramon, CA 94583
Mr. Jim Lange, 6500 Dublin Blvd., Suite 202, Dublin, CA 94568
SWRCB Geotracker (electronic copy)

ENHANCED BIOREMEDIATION PILOT TEST WORKPLAN

Dublin Auto Wash
7240 Dublin Boulevard
Dublin, California

June 14, 2013

Prepared for:

Mr. Hooshang Hadjian
2108 San Ramon Valley Blvd
San Ramon, CA 94583

Prepared by:

Pangea Environmental Services, Inc.
1710 Franklin Street, Suite 200
Oakland, California 94612

Written by:

REGISTERED PROFESSIONAL ENGINEER
ROBERT G. CLARK-RIDDELL
No. C 049629
Exp. SEPT 2014
CIVIL
STATE OF CALIFORNIA

Morgan Gillies
Project Manager

Bob Clark-Riddell, P.E.
Principal Engineer

INTRODUCTION

On behalf of Mr. Hooshang Hadjian, Pangea Environmental Services, Inc. (Pangea) has prepared this *Enhanced Bioremediation Pilot Test Workplan*. On May 28, 2013, Pangea met with ACEH to discuss site conditions and future site activities. As a result of the meeting ACEH prepared a May 28, 2013 letter (Appendix A) requesting preparation of a pilot test workplan for bio-organic catalyst (BOC) injection and biosparging. The pilot test will also provide additional data about potential submerged free product and secondary source material, which can be incorporated into the requested updated site conceptual model.

SITE BACKGROUND

The Dublin Auto Wash retail gasoline station is located at the southwest corner of Dublin Boulevard and Village Parkway in Dublin, California (Figure 1). Currently, there are three 10,000-gallon underground storage tanks (USTs) and a carwash at the site. Land use immediately surrounding the station is commercial. Mr. Hadjian is the responsible party for an unauthorized release from a leaking stainless steel flex-hose near the northernmost dispenser island in February 1997. A new product delivery system was installed and about 31 cubic yards of contaminated soil was removed from the release area.

Significant site assessment and groundwater monitoring has been performed in response to the 1997 release. In 2006, Pangea installed additional monitoring wells with shorter screen lengths in identified water-bearing zones. An 18-inch sanitary sewer line in Dublin Boulevard may affect groundwater flow and act as a preferential pathway for contamination migration. The site subsurface consists primarily of clay, sandy clay, and clayey sand. Pangea describes the subsurface water-bearing zones as an upper shallow (AA) zone from approximately 9 to 14 ft bgs (MW-7AA, DPE-1 and DPE-2); a shallow (A) zone from approximately 15 to 20 ft bgs (MW-3A, MW-6A, MW-7A, MW-8A, MW-9A and MW-10A); a middle (B) zone from approximately 25 to 30 ft bgs (MW-6B and MW-7B); and a deep (C) zone from approximately 34 to 45 ft bgs (MW-6C, MW-7C, MW-9C, MW-10C and MW-11C). Well MW-3A was installed at a shallower depth than the other A-zone wells to intercept the SPH previously observed in destroyed well MW-3. The shallower (AA, A and B) water-bearing zones primarily consist of thin lenses of clayey sand within sandy clay, while higher permeability silty sand and clayey sand are the predominant soil types constituting the deeper C water-bearing zone. Vapor wells VW-1 through VW-3 are screened from approximately 3 to 9 ft bgs in the upper shallow seasonal water-bearing zone, which appears to be a perched zone.

Short-term remediation has been performed at the site. In July 2006, Pangea extracted approximately 40 gallons of impacted liquid from wells MW-3A and MW-7AA with a vacuum truck. In November 2007, Pangea conducted a five-day dual-phase extraction (DPE) test and source removal event. For two months in late 2010 (September 15 to November 15, 2010), Pangea performed dual-phase extraction (DPE) from select site wells. The DPE system operated for nearly 50 days and removed approximately 443 lbs TPHg and 4 lbs benzene, and 0.25 lbs MTBE. Additional site background information is presented in Pangea's *Corrective Action Plan Addendum,* dated March 18, 2013.

ENHANCED BIOREMEDIATION PILOT TEST WORKPLAN

Due to recent increases and persistence of hydrocarbon concentrations in key source area wells (MW-3A and MW-6A), Pangea proposes a biosparging pilot test to evaluate the effectiveness of this low cost remedial technique. To enhance bioremediation, Pangea also proposes the addition of a low cost bio-organic catalyst (BOC) during pilot testing. The bio-organic catalyst product (NONTOX^{TM}-TPH Eliminator) is a low-cost, innovative and 'green' product with potential applicability for a wide range of sites impacted by petroleum hydrocarbons. Pangea is currently using NONTOX^{TM} at several area sites with some promising results. Information about the biosparging technique and BOC was presented in Pangea's *Corrective Action Plan Addendum* dated March 18, 2013.

During pilot testing, Pangea will check for the presence of free product or increased hydrocarbon concentrations, which could be indicative of submerged free product or significant residual secondary source material.

Proposed Pilot Test Overview

Pangea proposes to perform pilot testing in wells MW-3A and MW-6A (Figure 2). Given a groundwater depth of approximately 10 to 11 ft bgs, well MW-6A, screened from approximately 15 to 20 ft bgs, is ideally suited for enhanced bioremediation via biosparging and BOC injection. The submerged well screen will allow injected air to move laterally within the shallow groundwater-bearing materials. Screened from 10 to 17 ft bgs, well MW-3A is also amenable to biosparging, but the air injection will be more localized around the well because the well casing and shallower filter pack may not provide lateral air injection into surrounding soil. Biosparging in MW-3A may rely more on oxygen diffusion from MW-3A into the well vicinity.

For enhanced bioremediation pilot testing, Pangea proposes the following tasks for key source area wells MW-3A and MW-6A as detailed below:

1. Measuring background conditions in the wells.
2. Injecting BOC and water mixture into the wells.
3. Performing an air injection test in the wells, which will also help distribute and activate the BOC for hydrocarbon desorption and bioattenuation.
4. Extracting/pumping groundwater and injected BOC from site wells.
5. Monitoring for free product and increased dissolved hydrocarbon concentrations (and residual BOC) in the wells following extraction.
6. After 2 to 4 weeks of equilibration, performing groundwater monitoring of key site wells.

Based on prior extraction from these wells, Pangea anticipates very low groundwater extraction flow rates. Therefore, Pangea plans to pump groundwater from each well until it dewaters, and return daily for 5 to 10 days to extract desorbed hydrocarbons and residual BOC.

Pilot Test Procedures

Pangea will first conduct groundwater sampling and field monitoring of wells MW-3A and MW-6A to establish pre-pilot testing groundwater conditions. Pangea will record field parameters such as dissolved oxygen (DO) and oxygen reduction potential (ORP), and groundwater samples will be analyzed for TPHg, BTEX and MTBE by EPA Method 8015/8021. Pangea will then inject BOC into the two wells. For each well, Pangea will initially inject approximately 2.5 gallons of BOC followed by flushing/dispersion with approximately 25 gallons of water.

To further distribute the BOC/water mixture and to perform a brief (1-2 hour) biosparging air injection test, Pangea will inject air into each well. Pangea will monitor the air flow rates and air pressures required to perform biosparging in the wells. Pangea will procure a small air compressor, tubing, wellhead connection fittings and associated controls. Air valves and flow meters will be used to regulate air flow rates into wells MW-3A and MW-6A. Electrical service will be obtained with a small generator or from the service on the nearby vacuum island associated with the carwash facilities.

Approximately two days after BOC/water injection and air injection testing, Pangea will return to the site to initiate daily BOC/groundwater extraction from wells MW-3A and MW-6A. A submersible pump will be used to extract fluid from the wells, and will be stored in 55-gallon drums, 250-gallon totes, or other aboveground storage tank. The daily fluid extraction will continue for 5 to 10 days depending on groundwater yield and estimated significant recovery of BOC material. For each day, Pangea will purge approximately three well volumes, collect groundwater samples, and purge remaining water in the wells. For each groundwater sampling event, Pangea will record field parameters such as DO and ORP readings. To evaluate enhanced hydrocarbon recovery during extraction, daily groundwater samples will be analyzed for TPHg, BTEX and MTBE by EPA Method 8015/8021. Pangea will also monitor groundwater samples for the presence of BOC using visual indicators (pale amber water color and foam/bubbles in shaken sample), since NONTOX™ makes water cloudy and acts like a surfactant. At the completion of groundwater extraction, samples will also be analyzed for residual BOC compounds as cobalt thiocyanante active substances/non-ionic surfactants (CTAS) by EPA Method 5540D and 2-propanol (IPA) by EPA Method 8260B. Samples will be analyzed by a State-certified laboratory.

Approximately two to four weeks after the last groundwater extraction event, Pangea will perform routine groundwater monitoring from wells MW-3A and MW-6A. Pangea will purge three well volumes, measure DO and ORP, and collect samples for analysis for hydrocarbons and residual BOC. DO and ORP readings will be collected using field instruments. Groundwater samples will be analyzed for TPHg, BTEX and MTBE by EPA Method 8015/8021, and for CTAS by EPA Method 5540D and 2-propanol (IPA) by EPA Method 8260B.

Reporting

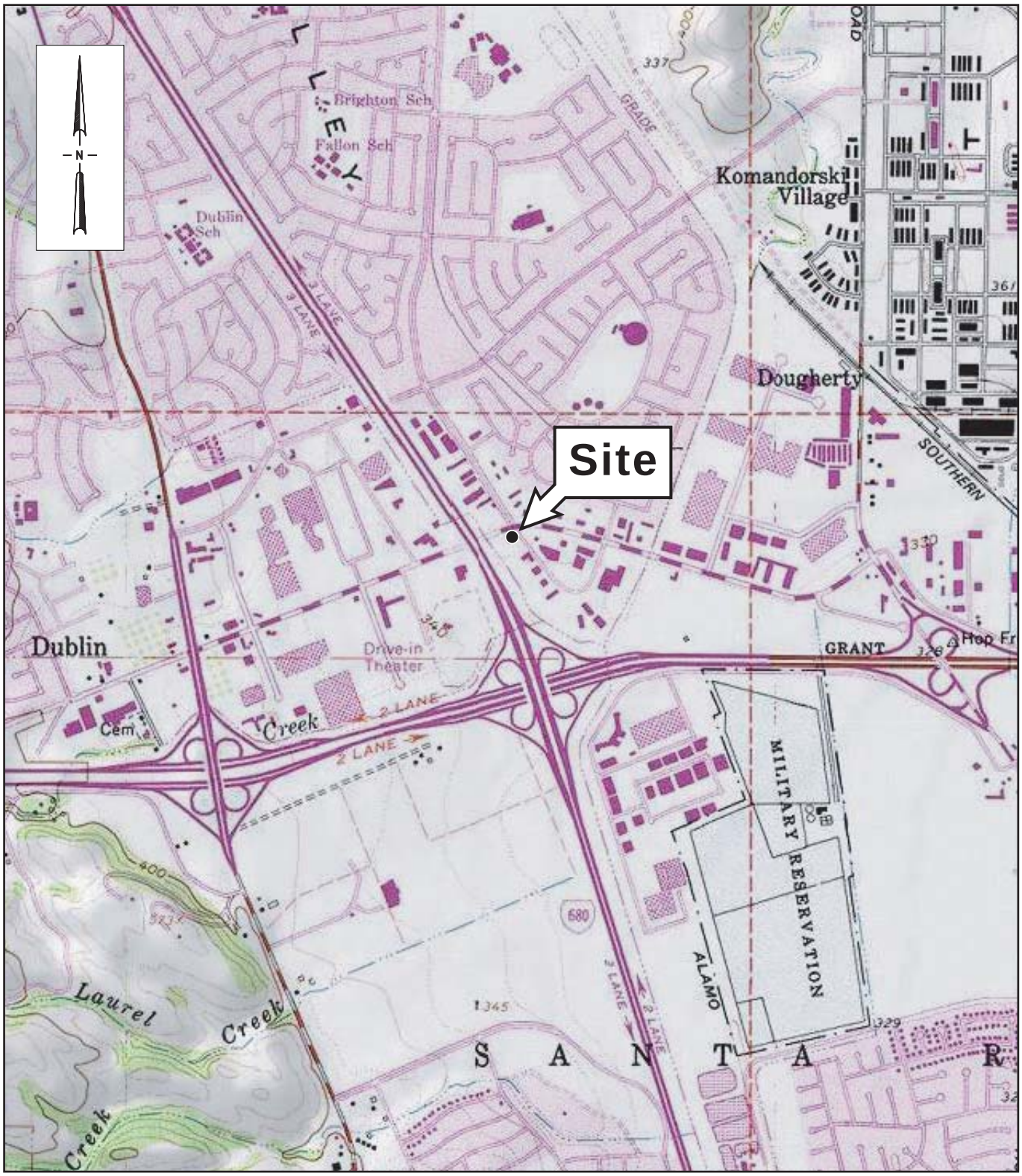
Enhanced bioremedation pilot testing will be summarized in a groundwater monitoring report or a separate technical report. The report will present tabulated pilot test data, evaluate biosparging and enhanced bioremediation performance, and include recommendations for future site activity. Pilot test information will be incorporated into the updated conceptual site model.

ATTACHMENTS

Figure 1 – Site Location Map
Figure 2 – Site Map

Appendix A – Regulatory Letter

2/17/2005



SOURCE: TOPO! MAPS

0 1/8 1/4 1/2 1

SCALE : 1" = 1/4 MILE

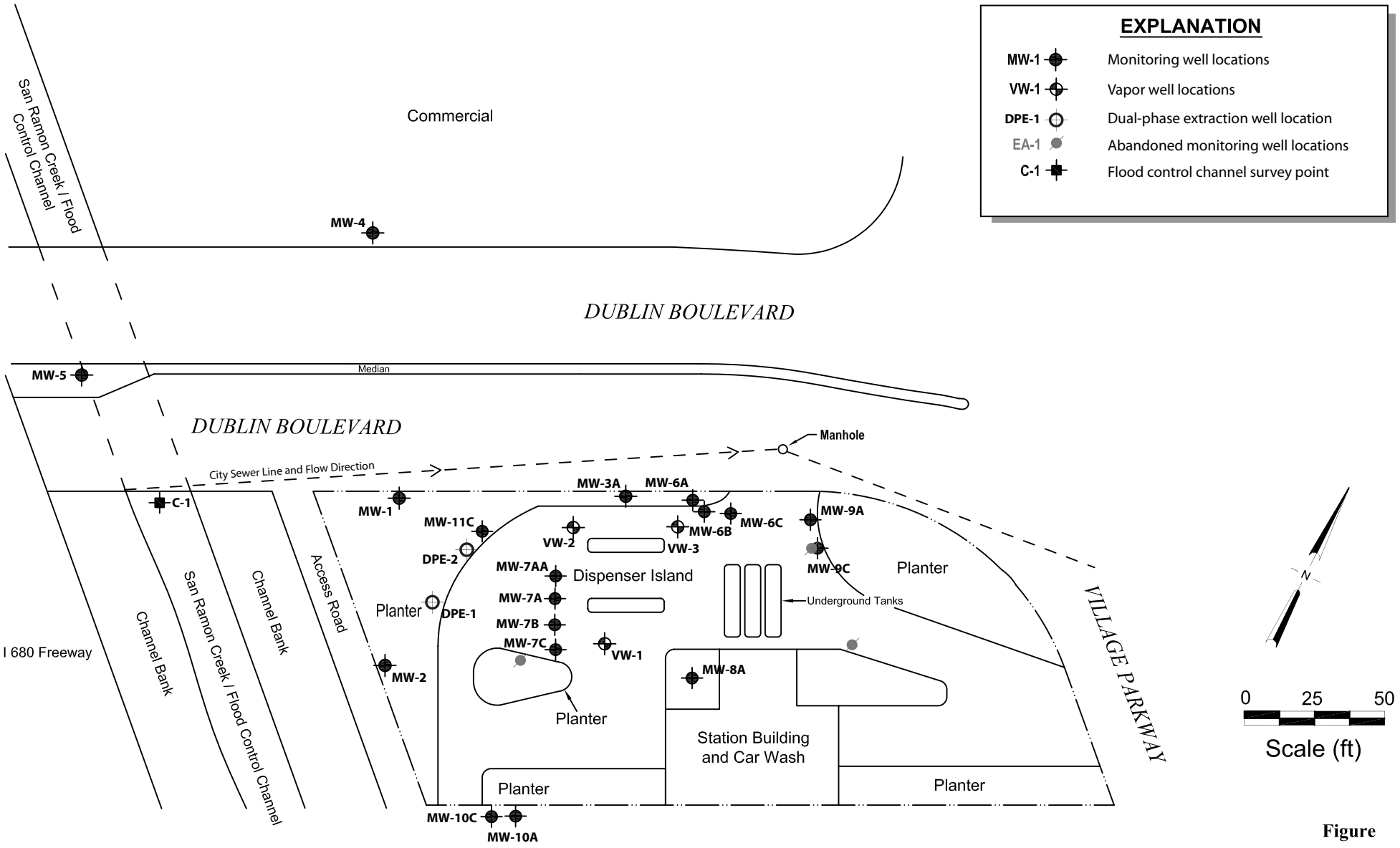
Figure 1

Dublin Auto Wash

7240 Dublin Boulevard
Dublin, California

PANGEA

Site Location Map



Figure

2

Dublin Auto Wash
7240 Dublin Boulevard
Dublin, California

PANGEA

Site Map

APPENDIX A

Regulatory Letter

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
ALEX BRISCOE, Agency Director

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

May 28, 2013

Aaron Costa
Chevron Corporation
6111 Bollinger Canyon Road, Room 3660
San Ramon, CA 94583

Hooshang Hadijian
Dublin Auto Wash
1821 Castle Gate Road.
Walnut Creek, CA 94595

Iver and Janice Hilde
c/o Lange Enterprises
6500 Dublin Boulevard., #202
Dublin, CA 94568

Subject: Fuel Leak Case No. RO0000304 and GeoTracker Global ID T0600100355, Chevron #9-2582, 7240 Dublin Boulevard, Dublin, CA 94568

Dear Mr. Costa, Mr. Hadijian, and Mr. and Ms. Hilde:

Thank you for the recently submitted document entitled, "Corrective Action Plan Addendum" (CAP Addendum), dated March 18, 2013, and prepared by Pangea Environmental Services, Inc. (Pangea) on behalf of Mr. Hadijian for the subject site. The CAP Addendum recommends conducting additional secondary source removal using enhanced biosparging utilizing existing wells and underground remediation piping.

Alameda County Environmental Health (ACEH) staff have evaluated the data and recommendations presented in the above-mentioned report, in conjunction with the case files, and the State Water Resources Control Board's (SWRCBs) Low Threat Underground Storage Tank Case Closure Policy (LTCP). Based on ACEH staff review, we have determined that the site fails to meet the LTCP General Criteria d (Free Product Removal), e (Site Conceptual Model), f (Secondary Source Removal), and h (Nuisance), and the Media-Specific Criteria for Groundwater, and Vapor Intrusion to Indoor Air.

Therefore, at this juncture, and as discussed in a meeting today with ACEH staff and Mr. Bob Clark-Riddell of Pangea, ACEH requests that prior to proceeding with the proposed corrective actions presented in the CAP Addendum, you prepare an updated SCM to address the hydrogeology and contaminant transport at and in the vicinity of the site and support the proposed corrective actions, and a brief Work Plan to conduct a bioremediation pilot test in the source area wells to evaluate the effectiveness of using the proposed bio-organic catalyst as described in the Technical Comments below.

TECHNICAL COMMENTS

1. **Updated Site Conceptual Model –** Please support the corrective actions presented in the CAP Addendum with a site conceptual model that focuses on the complex groundwater flow and contaminant transport at the site due to the combined effects of vertical gradients,

preferential flow pathways (particularly the city sewer line located beneath Dublin Boulevard), and possible influences on the gradient due to the San Ramon Creek/Flood Control Channel, on-site car wash, and irrigation practices. Please update existing cross sections to show surface features (i.e., irrigated planters, car wash facilities, asphalt, etc.), utilities, and the surface water channel. Additionally, please provide information on the construction of the channel (i.e., depth of channel, earthen or concrete) to assess potential impacts to surface water from the contaminant plume.

ACEH's review of the case file indicates that previous gradient maps depict inconsistent groundwater flow directions thereby making it difficult to delineate the lateral extent of the groundwater contaminant plume. Therefore, ACEH requests that the adequacy of the existing monitoring well network and the interpretation of groundwater elevation data be evaluated and previous gradient maps be reconstructed if appropriate. Historic data indicates that five of the Shallow (A-Zone) wells (MW-6A, MW-7A, MW-8A, MW-9A, and MW-10A) and two of the Intermediate–Depth (B-Zone) wells (MW-6B and MW-7B) have been under submerged conditions during 100 percent of the monitoring events. Therefore, please evaluate elevation data from these wells and the effect on groundwater gradient maps, bias of analytical data, and the ability to monitor free product in source area wells.

In order to expedite review, ACEH requests the SCM be presented in a tabular format that highlights the major SCM elements and associated data gaps, which need to be addressed to progress the site to case closure under the LTCP. Please see Attachment A "Site Conceptual Model Requisite Elements" for additional details.

2. **Pilot Test Work Plan** – ACEH notes that it may be possible for the site to obtain closure under the LTCP without further remediation if sufficient additional data and analysis is presented in the SCM to address the current data gaps at the site under the LTCP. However, as discussed in today's strategy meeting, Pangea proposes to collect additional data for incorporation into the SCM by conducting a pilot test in source area wells to evaluate the effectiveness of using the bio-organic catalyst NONTOX-TPH Eliminator to accelerate the biodegradation of petroleum hydrocarbons in the source area wells. ACEH concurs that collection of this data will likely be useful and therefore requests that you prepare a work plan with details of the proposed pilot test.

TECHNICAL REPORT REQUEST

Please submit technical reports to ACEH (Attention: Dilan Roe), according to Attachment 1 and the following naming convention and schedule:

- **June 14, 2013** – Bioremediation Pilot Test Work Plan
  (File to be named: WP_R_yyyy-mm-dd)

- **July 12, 2013** – Updated Site Conceptual Model
  (File to be named: SCM_R_yyyy-mm-dd)

Thank you for your cooperation. Should you have any questions or concerns regarding this correspondence or your case, please call me at (510) 567-6767 or send me an electronic mail message at dilan.roe@acgov.org.

Sincerely,

Dilan Roe
Program Manager – Local Oversight Program

Enclosure: Attachment 1 - Responsible Party(ies) Legal Requirements/Obligations &
ACEH Electronic Report Upload (ftp) Instructions
Attachment A – Site Conceptual Model Requisite Elements

cc: Bob Clark-Riddell, Pangea Environmental Services, Inc., 1710 Franklin Street, Suite 200, Oakland, CA 94568
Cheryl Dizon (QIC 8021), Zone 7 Water Agency, 100 North Canyons Pkwy, Livermore, CA 94551
Donna Drogos, ACEH (*Sent via E-mail to: donna.drogos@acgov.org*)
Dilan Roe, ACEH (*Sent via E-mail to: dilan.roe@acgov.org*)
GeoTracker
File