Timothy L. Bishop, P.G.
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Chevron Environmental Management Company
6101 Bollinger Canyon Road
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TimBishop@chevron.com

March 31, 2014

Mr. Keith Nowell
Alameda County Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

RE: Response to Comments and Focused Conceptual Site Model Submittal
15008 East 14th Street, San Leandro, California
Fuel Leak Case No.: RO0000366

Dear Mr. Nowell,

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

If you have any questions or need additional information, please contact me at (925) 790-6463.

Sincerely,

Timothy Bishop
Union Oil of California – Project Manager

Attachment
Response to Comments and Focused Conceptual Site Model

ARCADIS U.S., Inc.
2000 Powell Street
7th Floor
Emeryville
California 94608
Tel 510.652.4500
Fax 510.652.4906
www.arcadis-us.com

ENVIRONMENT

Mr. Keith Nowell
Alameda County Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502

Subject:
Response to Comments and Focused Conceptual Site Model
15008 East 14th Street, San Leandro, California
Fuel Leak Case No.: RO0000366

Date:
March 31, 2014

Contact:
Katherine Brandt

Phone:
510.596.9675

Email:
Katherine.Brandt@arcadis-us.com

Our ref:
B0047945

Dear Mr. Nowell:

On behalf of Chevron Environmental Management Company's affiliate, Union Oil Company of California ("Union Oil"), ARCADIS U.S., Inc. (ARCADIS) is pleased to submit the response to comments and Focused Conceptual Site Model (CSM) for the following facility (site):

Facility No.	**Case No.**	**Location**
3292	RO0000366	15008 East 14th Street San Leandro, California

Alameda County Department of Environmental Health (ACEH), Union Oil, and ARCADIS attended a joint meeting on January 21, 2014 to discuss action items to move this case towards closure. In an email to Union Oil dated January 28, 2014, ACEH requested a Focused CSM to address technical comments. A response to comments is provided in this letter with Focused CSM figures and tables included as an attachment. The Focused CSM tables and figures provide additional or updated information to the CSM and Closure Request submitted on March 29, 2013 to the ACEH.

Response to Comments

Comment 1: *Beneficial Use Wells*
ACEH presented a figure taken from the nearby down gradient former Chevron station #9-2013 case file (ACEH case file RO950) located at 15002 Hesperian Boulevard in San Leandro. The figure was copied from the well survey for the former Chevron site and depicts nearby supply wells down gradient of Unocal #3292. These wells were not identified in the June 29, 2007 sensitive receptor survey conducted for the subject site.

Response:
Figure 1 of the Focused CSM includes the additional wells. Table 1 includes the following well information for all wells shown on Figure 1: state well identification, owner, use, screen interval, and approximate distance and direction from the site.

Comment 2: *Contaminant Plume Length*
The Low Threat Closure Policy (LTCP) Media-Specific Criteria for Groundwater includes criteria for plume length that exceeds the Water Quality Objectives (WQOs), for distance from the leading edge of the plume to the nearest supply well, and for distance form the leading edge of the plume to the nearest surface water body. ACEH noted the farthest down gradient monitoring well, MW-2(SP), most recently (December 3, 2012) contained 73 micrograms per liter (µg/L) total petroleum hydrocarbons as gasoline (TPHg) and exhibits periodic TPHg concentrations over 100 µg/L. It is also unclear to ACEH that the plume has been defined to the southeast of the site.

Response:
To evaluate the plume length, the TPHg plume travel time was estimated using the BIOSCREEN-AT model. BIOSCREEN-AT is a screening model that simulates remediation by natural attenuation of dissolved hydrocarbons at petroleum fuel release sites. The software is programmed in the Microsoft Excel spreadsheet environment and based on the Domenico Analytical Solute Transport Model, as modified by Karanovic et al. 2007. It was developed for the Air Force Center for Environmental Excellence (AFCEE) Technology Transfer Division at Brooks Air Force Base by Groundwater Services, Inc., Houston, Texas. It has the ability to simulate advection, dispersion, adsorption, and aerobic decay as well as anaerobic reactions that have been shown to be the dominant biodegradation processes at many petroleum release sites. BIOSCREEN-AT includes three different model types:

1. Solute transport without decay
2. Solute transport with biodegradation modeled as a first-order decay process
3. Solute transport with biodegradation modeled as an instantaneous biodegradation reaction.

Model type 2 was selected to evaluate the TPHg plume length and travel time; this model is most representative of site conditions. Various parameters can be used to calibrate this model. Biodegradation exhibited the most variability across the site; therefore, biodegradation was the selected parameter for calibration. The estimated biodegradation time of 15 years is consistent with linear regression analysis that was completed as described in the CSM and Closure Request submitted on March 29, 2013 to the ACEH. Additionally, since there is not an established organic partition coefficient (K_{oc}) for TPHg, the K_{oc} for methyl tertiary butyl ether (MTBE) was used to be conservative. All model input parameters and a summary of the results are

provided in Table 2. The projected plume length is depicted on Figure 2 and Figure 3.

A rose diagram indicating the dominant groundwater flow direction to the south is also provided on Figure 2. The plume is delineated down gradient by well MW-2(SP). Any receptors located southeast of the site are considered to be cross-gradient. Additionally, the nearest well receptor or surface water body located southeast of the plume boundary is a well identified as number 26 in Table 1 and on Figure 3 which is located approximately 1,319 feet away. This distance meets the Low Threat Closure Policy groundwater criteria 4c: the nearest existing water supply well or surface water body is greater than 1,000 feet from the defined plume boundary.

Comment 3: *Distance to Surface Water*
It is unclear to ACEH how the distance to the nearest surface water body can be determined if the contaminant plume is not adequately defined.

Based on analytical data and modeling results, the plume is delineated down gradient by well MW-2(SP). The nearest surface water body (Estudillo Canal) is located approximately 2,800 feet south (down gradient) of the site or approximately 2,400 feet down gradient of the leading plume edge. The distance from the leading plume edge to the Estudillo Canal is greater than 1,000 feet which meets the Low Threat Closure Policy groundwater criteria 4c.

Conclusions

Based on the Focused CSM, including the BIOSCREEN modeling results, the site continues to meet the Low Threat Closure Policy Class 4 criteria for groundwater.

- ***4a. The contaminant plume that exceeds water quality objectives is less than 1000 feet in length***

  In the CSM and Closure Request, the TPHg plume length was estimated to be 410 feet based on analytical data. The BIOSCREEN-AT model estimates the plume length to be 396 feet. Both results indicate a plume length less than 1,000 feet.

- ***4b. There is no free product***

  Free product has not been historically observed at the site, nor is it currently observed at the site.

- ***4c. The nearest existing water supply well or surface-water body is greater than 1,000 feet from the defined plume boundary***

  The plume map submitted in the CSM and Closure Request, as well as the plume map created using the modeling results, indicate the leading edge of the projected TPHg plume extends to near monitoring well MW-2(SP). The distance from the leading edge of the plume to the nearest down gradient well receptor number 22 and surface water body (Estudillo Canal) is greater than 1,000 feet.

- ***4d. The dissolved concentration of benzene is less than 1,000 µg/L, and the dissolved concentration of MTBE is less than 1,000 µg/L***

  Benzene was not detected above the laboratory reporting limit during the fourth quarter 2012 groundwater monitoring event. MTBE was detected at a maximum concentration of 10 µg/L (MW-1) during the fourth quarter 2012 groundwater monitoring event. Thus, concentrations of benzene and MTBE are below the 1,000 µg/L limit.

If you have any questions, please contact Katherine Brandt at 510.596.9675.

Sincerely,

ARCADIS

Katherine Brandt
Certified Project Manager

David W. Lay, P.G.,C.P.G.
Principal Geologist

Copies:

Mr. Timothy Bishop, Union Oil (electronic copy only)
Netaj LLC, Property Owners

Attachments:

Focused Conceptual Site Model:

- Table 1: Well Survey Data
- Table 2: Bioscreen Fate and Transport Model
- Figure 1: Well Survey Data Map
- Figure 2: TPH-G Plume Projection Calculation Estimates
- Figure 3: TPH-G Plume Projection Calculation Estimates and Well Receptors

Reference:

Karanovic, M., C.J. Neville, and C.B. Andrews, 2007, "BIOSCREEN-AT: BIOSCREEN with an exact Analytical Solution," Groundwater 45 (2), pp.242-244.

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Union Oil Company of California

Focused Conceptual Site Model

15008 East 14th Street, San Leandro, California
Fuel Leak Case No.: RO0000366

March 31, 2014

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Tables

Table 1
Well Survey Data
15008 East 14th Street, San Leandro, California

Map Identifier	State Well Identification	Owner	Use	Screen Interval (ft bgs)	Approx. Distance from Site (ft)	Address
1	2S/2W-31M1	Robert W. Bennet	Irrigation	27 - 42	1917 NW	NA
2	2S/2W-31M3	Howard E. Green	Irrigation	20 - 35	1845.7 NW	NA
3	2S/2W-31N1	Carl McElroy	Irrigation	20 - 40	1268.7 NW	NA
4	2S/2W-31P1	August Farias	Irrigation	20 - 40	1537.6 N	NA
5	2S/2W-31P2	John Deborn	Irrigation	NA	1404.8 N	NA
6	3S/3W-01A5	Wm McCabe	Domestic	25 - 45	2038.2 W	1261 Margery Avenue
7	3S/3W-01A4	Aaron Geiser	Irrigation	20 - 48	1738.2 W	1268 Margery Avenue
8	3S/2W-06B1	NA	NA	32 - 42	1883.1 E	NA
9	3S/2W-06E1	Adams	NA	NA	1666.2 W	988 Dillo Street
10	3S/2W-06E6	Wm Dennis	Irrigation & Domestic	24 - 56	1399.2 SW	NA
11	3S/2W-06B4	Paul M. Fearon	Irrigation	10 - 30	1464.8 E	1576 153rd Avenue
12	3S/2W-06E5	Herbert Howard	Irrigation	17 - 37	1695.7 SW	NA
13	3S/2W-06E4	Stanley M. Boone	Irrigation	20 - 40	1569.8 SW	14978 Western Avenue
14	NA	McCutheron	Irrigation	NA	2,321.4 W	14941 Western Avenue
15	NA	Edmund Botelilo	Irrigation	NA	2,099.6 SW	14982 Western Avenue
16	NA	John Tenante	Irrigation	NA	2,207.8 W	1227 148th Avenue
17	NA	Frank Freitus	Irrigation	NA	1,870.4 W	1264 Margery Avenue
18	NA	Roberts	Irrigation	NA	1,496.8 W	1252 Dorothy Street
19	NA	N.F. Nunes	Irrigation	NA	1,687 NW	14830 E. 14th Street
20	NA	NA	NA	NA	1,485.7 NW	14860 E. 14th Street
21	NA	Frank Miguel	Irrigation	NA	1,037.7 W	1268 Betty Street
22	NA	NA	Irrigation	NA	1,397.9 SW	Western & Dillo Street
23	NA	B.J. Moore	Irrigation	NA	2,515.5 SW	479 Nabor Street
24	NA	Monte Moore	Irrigation	NA	3,033.2 SW	15241 Upton Avenue
25	NA	NA	Irrigation	NA	121 E	15030 E. 14 Street
26	NA	NA	NA	NA	1,649.8 SE	Bayfair Drive
27	NA	Allen	Irrigation	NA	925.9 E	152nd Avenuenue
28	NA	NA	NA	NA	1,741.7 NE	Freedom Avenue
29	NA	NA	Irrigation	NA	1,762.4 E	Criole Avenue

Abbreviations:

NA Not Available
ft bgs feet below ground surface
E east
N north
NE northeast
NW northwest
S south
SE southeast
SW southwest
W west

Table 2
Bioscreen Fate and Transport Model
15008 East 14th Street, San Leandro, California

Bioscreen Model Input Parameters		
Variable Description	**Estimated Value**	**Comments / References**
Hydraulic Conductivity (K)	1 x 10^{-4} centimeters per second (cm/sec)	*Freeze, R. Allan and John A. Cherry. Groundwater. Upper Saddle River, NJ: Prentice Hall, 1979. Print.*
Hydraulic Gradient (dH/dx)	0.004 feet per foot (ft/ft)	Based on groundwater monitoring results (1992 - 2012)
Porosity (η)	0.1	*Payne, F., J. Quinnan, T. Potter. Remediation Hydraulics. Boca Raton, FL: CRC press, 2008. Print.*
Dispersivity	15.1 (length) and 1.5 (width)	Conservative estimate
	10 (length) and 1 (width)	Probable estimate
Retardation Factor (R)	2.1	Calculated
Biodegradation	15 years	Based on linear regression of total petroleum hydrocarbons - gasoline, TPH-G, (1.7 – 30 year range)
Simulation Time	500 years	Steady-state model
Source Concentration	56,750 micrograms per liter (µg/L)	Average first 2 years of TPH-G concentrations at MW-5 (maximum historic site concentrations)
Bulk Soil Density	1.7 kilograms per liter (kg/L)	*American Society for Testing and Materials (ASTM). 1996. Standard Guide to Risk-Based Corrective Action Applied at Petroleum Release Sites, ASTM E1739-95, Philadelphia, PA.*
Organic Partition Coefficient (K_{oc})	11.2 liters per kilogram (L/kg)	*U.S. Environmental Protection Agency's Office of Ground Water and Drinking Water. 2008. Regulatory Determinations Support Document for Selected Contaminants from the Second Drinking Water Contaminant Candidate List (CCL 2), Chapter 13. EPA Report 815-R-08-012. June.*
Organic Content (F_{oc})	0.005	*American Society for Testing and Materials (ASTM). 1996. Standard Guide to Risk-Based Corrective Action Applied at Petroleum Release Sites, ASTM E1739-95, Philadelphia, PA.*

Bioscreen Model Results		
Approximate Velocity	~16.5 feet/year	Based on model results, approximate distance from MW-7 to MW-2(SP), original release UST release in 1991, and most recent TPH-g concentrations (2012).
Probable Result *Dispersivity 10 [length] and 1 [width]*	Approximate plume length of **330 feet**, originating at MW-5, with less than 100 feet in lateral dispersion. Cross gradient concentrations above the standard most likely due to changes in hydraulic gradient and direction.	
Conservative Result *Dispersivity 15.1 [length] and 1.5 [width]*	Approximate plume length of **350 feet**, originating at MW-5, with less than 100 feet in lateral dispersion. Cross gradient concentrations above the standard most likely due to changes in hydraulic gradient and direction.	

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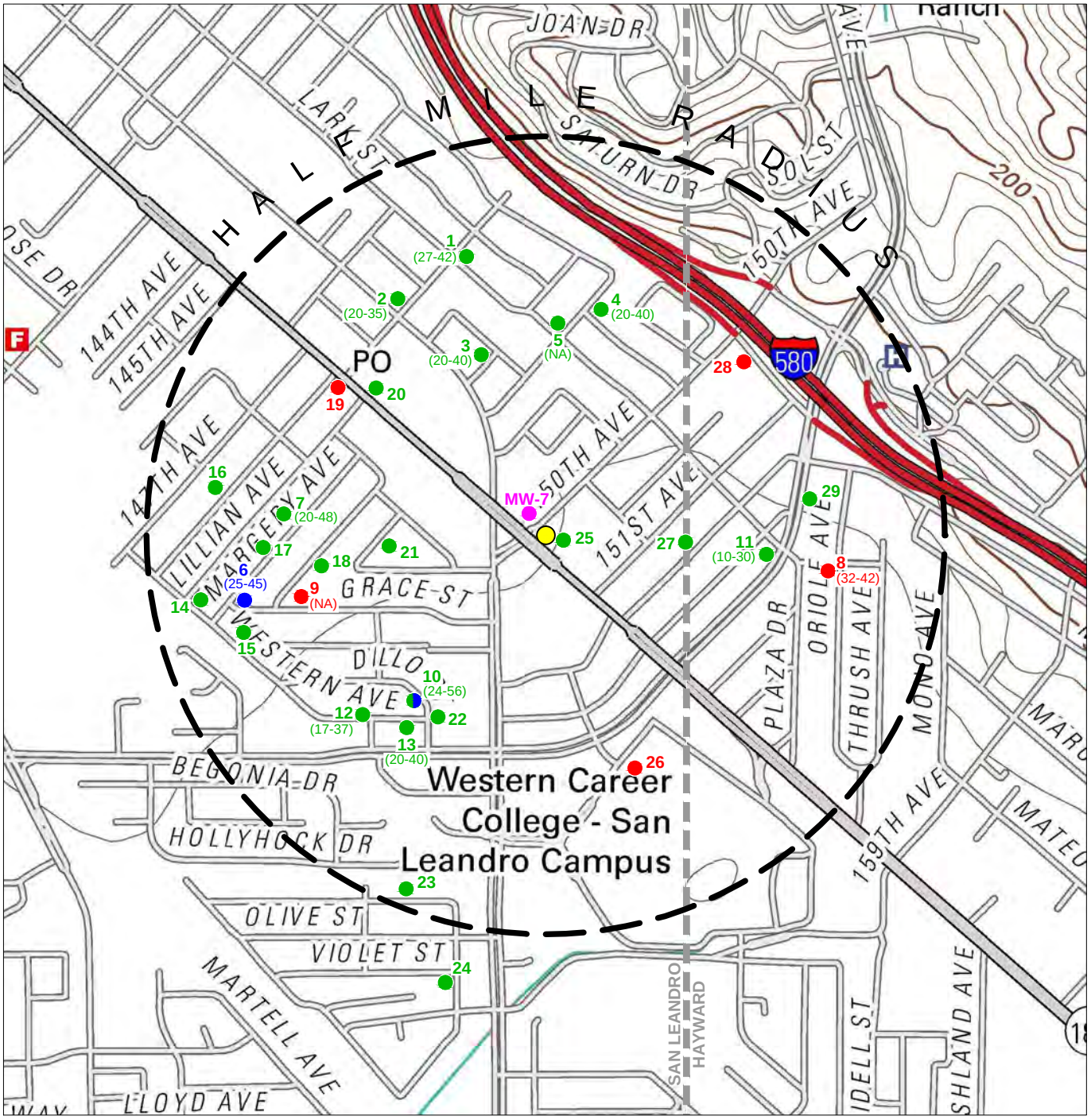
Figures



REFERENCE: BASE MAP USGS 7.5. MIN. TOPO. QUAD., SAN LEANDRO AND HAYWARD, CALIFORNIA, 2012.

LEGEND:

- SITE LOCATION
- IRRIGATION WELL
- DOMESTIC WELL
- IRRIGATION AND DOMESTIC WELL
- GROUNDWATER MONITORING WELL
- UNKNOWN WELL DESIGNATION
- (27-42) WELL SCREEN INTERVAL (FT BGS)
- FT BGS FEET BELOW GROUND SURFACE

NOTES:

1. WELL LOCATIONS PROVIDED BY STATE OF CALIFORNIA DEPARTMENT OF WATER RESOURCES.
2. ALL FEATURES AND LOCATIONS ARE APPROXIMATE.
3. ADDITIONAL WELL INFORMATION IS PROVIDED IN TABLE 1.

0 1000' 2000'

Approximate Scale: 1 in. = 1000 ft.

UNION OIL COMPANY OF CALIFORNIA
76 SERVICE STATION 35-1565
15008 EAST 14TH STREET
SAN LEANDRO, CALIFORNIA

WELL SURVEY DATA MAP

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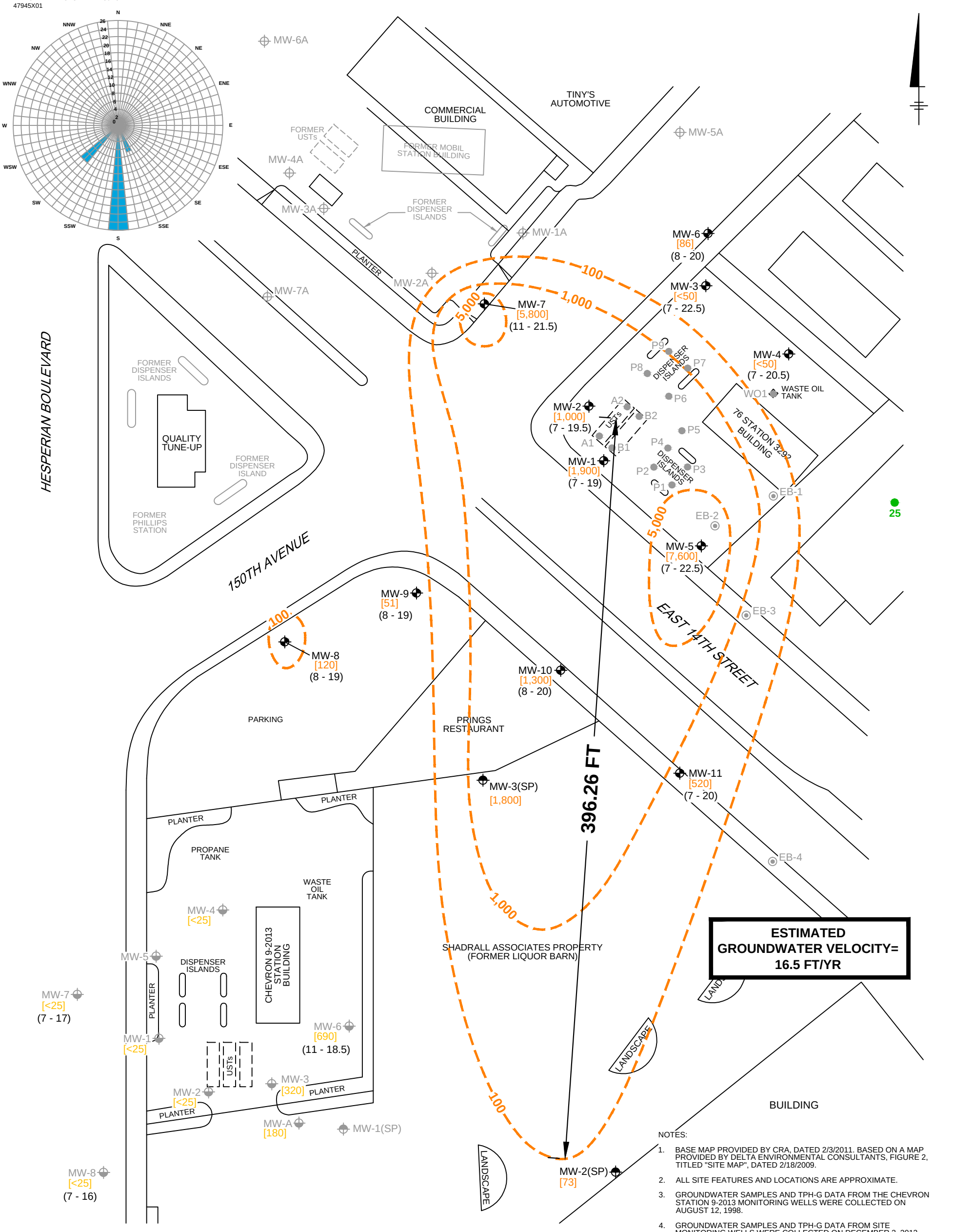
FIGURE 1

CITY: SAN RAFAEL, CA (PETALUMA) DIV/GROUP: ENVCAD DB: J. HARRIS
C:\Users\jharris\Desktop\ENVCAD\B0047945\2014\0002\CSM\DWG\47945N01.dwg
LAYOUT: 1 SAVED: 3/7/2014 8:33 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: SETUP1 PLOTSTYLETABLE: ARCADIS.CTB PLOTTED: 3/21/2014 8:27 AM BY: HARRIS, JESSICA

CITY: SAN RAFAEL, CA (PETALUMA) DIV/GROUP: ENVCAD DB: J. HARRIS
C:\Users\jharris\Desktop\ENVCAD\B0047945\2014\00002\CSM\DWG\47945C01.dwg LAYOUT: 2 SAVED: 3/21/2014 8:30 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: SETUP1 PLOTSTYLETABLE: ARCADIS.CTB PLOTTED: 3/21/2014 8:31 AM BY: HARRIS, JESSICA
XREFS: IMAGES: PROJECTNAME: ----
47945X01



NOTES:

1. BASE MAP PROVIDED BY CRA, DATED 2/3/2011. BASED ON A MAP PROVIDED BY DELTA ENVIRONMENTAL CONSULTANTS, FIGURE 2, TITLED "SITE MAP", DATED 2/18/2009.
2. ALL SITE FEATURES AND LOCATIONS ARE APPROXIMATE.
3. GROUNDWATER SAMPLES AND TPH-G DATA FROM THE CHEVRON STATION 9-2013 MONITORING WELLS WERE COLLECTED ON AUGUST 12, 1998.
4. GROUNDWATER SAMPLES AND TPH-G DATA FROM SITE MONITORING WELLS WERE COLLECTED ON DECEMBER 3, 2012.

0 50' 100'
GRAPHIC SCALE

LEGEND

MW-1	76 STATION MONITORING WELL
MW-2(SP)	SHADRALL MONITORING WELL
MW-1	CHEVRON MONITORING WELL
MW-1A	FORMER MOBIL STATION WELL
EB-1	SOIL BORING
P1	SOIL SAMPLE LOCATION
25	IRRIGATION WELL

[520]	TPH-G CONCENTRATION (µg/L) (12/3/2012)
	TPH-G CONCENTRATION CONTOUR (µg/L)
[690]	CHEVRON 9-2013 STATION TPH-G CONCENTRATION (µg/L) (8/12/1998)
(11 - 18.5)	SCREEN INTERVAL (FT BGS)
TPH-G	TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
µg/L	MICROGRAMS PER LITER
FT BGS	FEET BELOW GROUND SURFACE

UNION OIL COMPANY OF CALIFORNIA
76 SERVICE STATION 35-1565
15008 EAST 14TH STREET
SAN LEANDRO, CALIFORNIA

TPH-G PLUME PROJECTION CALCULATION ESTIMATES

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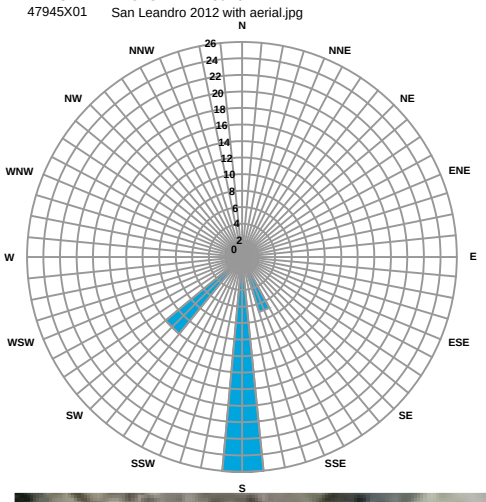
FIGURE 2

CITY: SAN RAFAEL, CA (PETALUMA) DIV/GROUP: ENVCAD DB: J. HARRIS
C:\Users\jharris\Desktop\ENVCAD\B0047945\2014\00002\CSM\DWG\47945C04.dwg LAYOUT: 3 SAVED: 3/24/2014 10:12 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: SETUP1 PLOTSTYLETABLE: ARCADIS.CTB PLOTTED: 3/28/2014 8:57 AM BY: HARRIS, JESSICA

XREFS: IMAGES: PROJECTNAME: ----
47945X01 San Leandro 2012 with aerial.jpg



EAST 14TH STREET
150TH AVENUE
BETTY AVENUE
LOUISE STREET
DILLO STREET
WESTERN AVENUE
HALCYON DRIVE
HESPERIAN BOULEVARD
EAST 14TH STREET
5,000
5,000
1,000
100
100
ESTIMATED GROUNDWATER VELOCITY= 16.5 FT/YR
1035 FEET
1319 FEET
21
25
10
12
22
13
26

REFERENCE: BASE MAP USGS 7.5. MIN. TOPO. QUAD., SAN LEANDRO, CALIFORNIA, 2012.

0 200' 400'
GRAPHIC SCALE

LEGEND

- SITE BOUNDARY
- IRRIGATION WELL
- IRRIGATION AND DOMESTIC WELL
- UNKNOWN WELL DESIGNATION
- TPH-G CONCENTRATION CONTOUR (µg/L)
- TPH-G TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
- µg/L MICROGRAMS PER LITER

NOTES:

1. BASE MAP PROVIDED BY CRA, DATED 2/3/2011. BASED ON A MAP PROVIDED BY DELTA ENVIRONMENTAL CONSULTANTS, FIGURE 2, TITLED "SITE MAP", DATED 2/18/2009.
2. ALL SITE FEATURES AND LOCATIONS ARE APPROXIMATE.

UNION OIL COMPANY OF CALIFORNIA
76 SERVICE STATION 35-1565
15008 EAST 14TH STREET
SAN LEANDRO, CALIFORNIA

TPH-G PLUME PROJECTION CALCULATION ESTIMATES AND WELL RECEPTORS

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FIGURE
3