October 23, 2013

Mr. Jan Alfson
California Regional Water Quality Control Board, Central Valley Region
1685 E Street
Fresno, California 93706

Re: Study Section 5 Groundwater Monitoring Well Network Evaluation
Bakersfield Refinery, Bakersfield, California

Dear Mr. Alfson:

On behalf of Shell Oil Products US (Shell), URS Corporation (URS) has conducted an evaluation of the current groundwater monitoring well network (evaluation) within and surrounding Study Section 5 of the Bakersfield Refinery, in Bakersfield, California (Figure 1 and Figure 2). This evaluation has been conducted in accordance with a request from the Central Valley region of the California Regional Water Quality Board (RWQCB) to conduct an assessment of the adequacy of the monitoring well network in Study Section 5, as outlined in their letter dated April 30, 2013[1].

PURPOSE AND OBJECTIVE

This evaluation was conducted to assess the adequacy of the existing groundwater monitoring well network to delineate the lateral and vertical limits of dissolved hydrocarbon constituents in groundwater within the Study Section 5 area of the site. This evaluation encompasses the Study Section 5 area and directly adjoining areas to the south, southeast, west, and southwest. Current monitoring well coverage in areas north of Study Section 5 is considered adequate, and is not addressed in this evaluation.

The groundwater constituents of concern (COC) evaluated includes methyl tert butyl ether (MTBE), benzene, total petroleum hydrocarbons as diesel (THP-d), and total petroleum hydrocarbons as gasoline (TPH-g). The existing monitoring network was evaluated in regard to its adequacy to assess potential groundwater impacts that may be attributable to the former East Landfill, the former Coke Settling Ponds and Acid Caustic area and existing Tank 67M02.

[1] Letter from the Central Valley RWQCB to Equilon Enterprises, LLC, and Alon Bakersfield Property, Inc. dated April 30, 2013 and titled *Study Section 5 Remedial Options Report, Bakersfield Refinery, 6451 Rosedale Highway, Bakersfield, Kern County*.

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EVALUATION METHODS AND FINDINGS

Groundwater elevation and flow conditions as of the second quarter 2013 are presented in Figures 3 through 5, and the interpreted extents of dissolved COCs in each of the three hydrostratigrahic zones as of the second quarter 2013 are presented in Figures 6 through 8. Most recent analytical results (third quarter 2013) for the groundwater monitoring wells within this portion of the site are summarized by zone along with historical data for these wells in Tables 1 through 3. Jointly, these data were used to assess the adequacy of the current groundwater monitoring well network, and develop recommendations for where additional monitoring wells may assist in filling data gaps.

The task of evaluating the adequacy of plume delineation was performed using the same screening levels used to define the minimum isoconcentration contours for the COCs presented in each quarterly groundwater monitoring report for the site, as follows:

Constituent	Screening Level
MTBE	13 µg/L
Benzene	1 µg/L
TPH-d	100 µg/L
TPH-g	100 µg/L

Review of available analytical results for the existing monitoring well network indicates that the maximum extent of dissolved hydrocarbons in each of the three hydrostratigraphic zones is defined by the TPH-d plume; meaning that the limits of other dissolved COCs in groundwater are encompassed within that of the TPH-d dissolved plume area. For this reason TPH-d has been used as the principal constituent with which to assess the extent of dissolved constituents within and surrounding the Study Section 5 area.

As discussed further in the recommendations section below, it is important to recognize that the California Water Resources Control Board has published literature[2] that describes how groundwater samples analyzed for TPH-d should include a Silica Gel Cleanup (SGC) preparation method to ensure accurate and representative results for groundwater samples. We feel it is important to consider these factors when reviewing the evaluation presented below.

[2] *Technical Justification for Groundwater Plume Lengths, Indicator Constituents, Concentrations, and Buffer Distances (Separation Distances) to Receptors*. UST Stakeholder Group, July 12, 2011. http://www.swrcb.ca.gov/water_issues/programs/ust/policy/techjust071211.pdf.

The following sections summarize the findings of the monitoring well network evaluation for each of the three recognized hydrostratigraphic zones.

Upper Zone

Groundwater conditions as of second quarter 2013 and existing monitoring well coverage within the Upper Zone are presented in Figures 3 and 6, and applicable data through third quarter 2013 are summarized in Table 1.

A large number of Upper Zone monitoring wells are currently present within and surrounding Study Section 5 (Figure 6). The lateral extent of dissolved constituents east and southeast of Study Section 5 and along the southeast refinery border may be characterized by the following Upper Zone monitoring wells:

- B-248U
- BWM-7U
- BWM-1U
- BWM-42U
- BWM-43U
- BWM-44U
- BWM-41U
- PW-U4 (Upper/Middle Zone)

As many of these wells are relatively recent installations, available analytical data in this area encompass only two to three sampling rounds completed during 2013, with the majority of results being non-detect (Table 1). For example, second quarter 2013 data for Upper Zone well BWM-7U indicated concentrations of TPH-d and TPH-g of 150 µg/L and 91 µg/L, respectively; whereas most recent data for this well (third quarter 2013) are non-detect or below above-listed screening levels for all COCs. Continued monitoring of the existing Upper zone wells in this area will provide adequate delineation of dissolved constituents along the eastern and southeastern limits of the site.

The lateral extent of dissolved constituents along the southern and southwestern margins of Study Section 5 may be characterized by the following Upper Zone monitoring wells:

- D3
- D4
- SIMW-2
- SIMW-2C
- SIMW-1B
- SIWM-2B
- SIMW-4B
- SIMW-4C
- PW-U5 (Upper/Middle Zone)

While historical data for Upper Zone monitoring wells in this area of the site indicate TPH-d and TPH–g concentrations have varied through time, all recent results for these wells indicate low to non-detect concentrations for COCs (Table 1).

The lateral extent of dissolved constituents along the western margin of Study Section 5 may be characterized by the following Upper Zone monitoring wells:

- B-103M
- B-103U
- B-104M
- B-104U
- B-114MR
- B-114UR
- B-115UR
- B-115MR
- B-213U
- DP2
- SE-MW-25 (Sunland Well – Upper through Lower Zone)
- MW-10R (Sunland Well – Upper through Lower Zone)

As groundwater levels continue to drop, many Upper Zone wells within the western half of the site have recently become dry, so the most recent results available for many wells in the western portion of the site are limited to the second quarter 2013 (Figure 3, Figure 6, and Table 1). Analytical data for wells in this area indicate the TPH-g dissolved plume is adequately defined inboard of the site boundary to the west. Most recent available data for TPH-d in this portion of the site, however, indicate that concentrations in several wells lie in excess of 100 µg/L (wells B-103M, B-114MR, B-115MR, and B-213U). Notably, however, recent results for several wells along the western site boundary are non-detect for TPH-d, including wells B-104U, DP2, and Sunland refinery monitoring wells MW-10R and MW-SE-25 (Figure 6 and Table 1).

A sufficient number of monitoring wells are currently present to characterize Upper Zone groundwater conditions in proximity to historical facilities/features of interest, including the East landfill (wells L26, L27, L28, L30, and PW-L28), Tank 67M02 (wells L25, B-203TC and B-204TC), and the Coke Settling Ponds and Acid Caustic Area (wells A4, A5, D3, D4, BWM-19U, and BWM-20U) (Figure 6).

Middle Zone

Groundwater conditions and existing monitoring well coverage within the Middle Zone are presented in Figures 4 and 7, and applicable data are summarized in Table 2.

The lateral extent of dissolved constituents east and southeast of Study Section 5 and along the southeast refinery border may be characterized by the following Middle Zone monitoring wells:

- B-248M
- BWM-1M
- BWM-7M
- BWM-41M
- BWM-42M
- BWM-43M
- BWM-44M
- PW-U4 (Upper/Middle Zone)

Similar to Upper zone wells, many Middle Zone wells in this area of the site were installed relatively recently, and therefore do not have a long monitoring history. While results from some of the wells in this area indicated local exceedances of screening levels for TPH-d and TPH-g during first quarter 2013, subsequent data collected during second and/or third quarters 2013 indicate dissolved COCs are either non-detect (at locally elevated detection limits) or below screening levels along the eastern and southeastern margin of Study Section 5 (Figure 7 and Table 2). It is anticipated that continued monitoring of the existing Middle Zone wells in this area will provide adequate delineation of dissolved constituents along the eastern and southeastern limits of the site.

The lateral extent of dissolved constituents along the southern and southwestern margins of Study Section 5 may be characterized by the following Middle Zone monitoring wells:

- PW-L23
- PW-U5 (Upper/Middle Zone)
- RS-MS2.5C
- SIWM-5B

Data available for all these wells since at least second quarter 2013 have been non-detect for all COCs (Table 2).

The lateral extent of dissolved constituents along the western margin of Study Section 5 may be characterized by the following Middle Zone monitoring wells:

- B-099L
- B-100L
- B-103L
- B-104L
- B-213M (on Sunland Refinery)
- RS-BW4
- MW-10R (Sunland Well – Upper through Lower Zone)
- SE-MW-25 (Sunland Well – Upper through Lower Zone)

Results for well B-104L were non-detect for all COCs in second and third quarter 2013, and also for wells B-099L, B-100L, and B-103L during third quarter 2013 (Table 2). While second quarter 2013 results for wells RS-BW4 and well B-213M (offsite) were non-detect for all COCs, most recent data (third quarter 2013) indicate TPH-d is present at concentrations in excess of the 100 µg/L screening level in these wells. While recent (third quarter 2013) data indicate TPH-d concentrations in excess of the 100 µg/L screening level in some Middle Zone wells lying west of Study Section 5, time-equivalent data for other Middle Zone wells proximal to the downgradient site boundary report non-detect for TPH-d, indicating that the dissolved hydrocarbon plume is adequately defined in this area.

Sufficient Middle Zone wells are currently present to characterize groundwater conditions in proximity to historical facilities/features of interest, within Study Section 5, including the East landfill (well PW-L23), Tank 67M02 (wells PW-A and PW-L26) and the Coke Settling Ponds and Acid Caustic Area (wells B-024U, B-111L, BWM-19M, BWM-20M, RS-DP5, and RS-MS2.5C) (Figure 7).

Lower Zone

Groundwater conditions and existing monitoring well coverage within the Lower Zone are presented in Figures 5 and 8, and applicable data are summarized in Table 3.

The lateral extent of dissolved constituents east and southeast of Study Section 5 and along the southeast refinery border may be characterized by the following Lower Zone monitoring wells:

- B-105L2
- B-247L
- B-248L

Similar to Upper and Middle Zone wells in this area of the site, Lower Zone monitoring wells lying east of Study Section 5 were only installed relatively recently, and therefore do not have a long monitoring history. While the majority of results for these Lower Zone wells indicate non-detect results for COCs, most recent results (third quarter 2013) indicate exceedances of screening levels in wells B-105L2 and B-247L for TPH-g and TPH-d, respectively (Table 3). Benzene was reported slightly above its screening level on only one occasion in well B-248L (second quarter 2013), and has not been detected in other surrounding Lower Zone wells (Figure 8 and Table 3). All other COCs were either non-detect or reported below applicable screening levels in these Lower Zone wells. It is anticipated that continued monitoring of the existing Lower Zone wells in this area will provide adequate delineation of dissolved constituents along the eastern and southeastern limits of the site.

There currently are no Lower Zone monitoring wells located within the southern half of Study Section 5 with which to delineate the southern extent of the dissolved hydrocarbon plumed present in the northern and central portions of the site, nor to assess the potential for groundwater impacts that may possibly be attributable to the identified historical facilities/features of interest in the southern portion of this area (Figure 8). Additionally, recent sampling (third quarter 2013) of a deep Lower Zone well completed at depth of 250 feet bgs as part of the Well R3 Area investigation (well URS-05L2) detected several hydrocarbon constituents in excess of screening levels, including TPG-d at 830 µg/L, TPH-g at 2,700 µg/L, and benzene at 3.9 µg/L (Figure 8 and Table 3). As described in the following section, additional Lower Zone wells are necessary to adequately define dissolved constituents within the southern portion of Study Section 5.

The lateral extent of dissolved constituents along the western margin of Study Section 5 is currently characterized by numerous Lower Zone monitoring wells, including the following:

- B-007
- B-009
- B-010
- B-024L
- B-114L1
- B-114L2
- B-115L2
- B-114LR
- B-115L1
- B-115LR
- B-213L
- MW-10R (Sunland Well – Upper through Lower Zone)
- SE-MW-25 (Sunland Well – Upper through Lower Zone)

With the exception of the multi-level Lower Zone well cluster at B-115 and well B-114L1, all recent and historical analytical results for Lower Zone wells located west of Study Section 5 and along the western site boundary are reported as non-detect or below screening levels for all COCs (Table 3). Most recent reported TPH-d concentrations in well cluster B-115 and well B-114L1 range from 390 to 1,300 µg/L. Despite these local exceedances, off-site Lower Zone well B-213L and Sunland refinery wells MW-SE-25 and MW-10R have been non-detect for all COCs since at least second quarter 2013 (Figure 8 and Table 3), effectively defining the limits of the Lower Zone dissolved plume along the western boundary of the site.

There are currently no existing Lower Zone wells in positions suitable to assess groundwater conditions in proximity to the East Landfill. Lower Zone groundwater conditions downgradient of the former Coke Settling Ponds and Acid Caustic Area are characterized by

existing well B-010. While this well is located a distance from these former facilities/ features, as there are no groundwater impacts in overlying Middle Zone wells in this area this existing coverage is considered sufficient.

DISCUSSION AND RECOMMENDATIONS

A representative selection of wells were chosen during the third quarter 2013 groundwater monitoring event for analysis of TPH-d following both the standard preparation method, as well as preparation using silica gel cleanup (SGC – EPA Method 3630C(M)) in advance of conducting the TPH-d analysis. Results of these sample pairs showed a significant reduction in reported TPH-d concentration for those samples prepared using SCG, in many cases by a magnitude or more, as compared to those using standard preparation (Table 4). As previously referenced, the California Water Resources Control Board has published literature that describes how groundwater samples analyzed for TPH-d should include a SGC preparation method, for the following reasons:

- TPH-d analysis is not specific to hydrocarbons unless a SGC is used
- Reported TPH-d concentrations can include polar non-hydrocarbons if a SGC is not used
- At sites with biodegrading petroleum, the majority of organics being measured as TPH-d (without SGC) can be polar non-hydrocarbon compounds, not dissolved hydrocarbon compounds
- Water quality objectives for TPH-d are based on properties of dissolved hydrocarbons, not polar non-hydrocarbon compounds

It is important to recognize that the existing TPH-d analytical data used to evaluate plume delineation may likely be affected by polar non-hydrocarbon compounds produced by biodegradation of low concentration hydrocarbons, resulting in higher reported TPH-d concentrations than are actually present. Based on the site-specific comparative analysis presented in Table 4, we feel it is important to consider the effect SGC preparation has on TPH-d analyses when reviewing the evaluation and recommendations presented.

Considering that many of the wells used in this evaluation have only a limited monitoring history (many wells have only three rounds of sampling data available), it is important to note that the following recommendations are considered contingent upon collection of additional groundwater analytical data over the course of the next year (i.e., through 2014). Moreover, beginning with the fourth quarter 2013, and in accordance with California State Water Resources Control Board guidance, it is planned that analyses for TPH-d in groundwater from many existing monitoring wells be conducted using both the SGC preparation method and the standard TPH-d preparation method historically used at the site.

These additional data will be used to develop a comparative history of results from these two preparation methods over the next year, thereby providing more truly and accurately defined limits of dissolved THP-d in groundwater at the site.

Recommendations are presented below for each hydrostratigraphic zone.

Upper Zone

Upper Zone groundwater conditions surrounding the eastern, southern, and western limits of Study Section 5 are considered adequately characterized by the existing monitoring well network. Existing coverage is also considered sufficient to assess Upper Zone groundwater conditions in proximity to the historical facilities/features of interest in the southern portion of Study Section 5.

Upper Zone wells in this area should continue to be monitored on a regular basis, and include analysis of TPH-d using the SGC preparation method. Data collected over the next one year will be used to confirm that the Upper Zone dissolved hydrocarbon plume is adequately delineated in this area of the site.

Middle Zone

Middle Zone groundwater conditions surrounding the eastern and western limits of Study Section 5 are considered adequately characterized by the existing monitoring well network. Existing coverage is also considered sufficient to assess Middle Zone groundwater conditions in proximity to the historical facilities/features of interest in the southern portion of Study Section 5.

Preliminary recommendations for the Middle Zone include the possible addition of one monitoring well located in the south-central portion of the site, just north of the Westside Parkway (well MZ-1 on Figure 7). The need for this well is contingent upon the collection of additional monitoring data from Upper Zone and Middle Zone wells in this area of the site, including samples analyzed using the SGC preparation method. Data collected over the next one year will be used to confirm that the Middle Zone dissolved hydrocarbon plume is adequately delineated in this area of the site.

Lower Zone

Lower Zone groundwater conditions surrounding the eastern and western limits of Study Section 5 are considered adequately characterized by the existing monitoring well network. Existing coverage is also considered sufficient to assess Lower Zone groundwater conditions

downgradient of the Former Coke Settling Ponds in the southwestern portion of Study Section 5.

Preliminary recommendations for the Lower Zone include the possible addition of three wells in the southern portion of Study Section 5 (wells LZ-1, LZ-2, and LZ-3 on Figure 8). Well LZ-1 would be intended to assess the potential of groundwater impacts that may possibly be attributable to the Former East Landfill and/or documented releases from existing Tank 67M02. Wells LZ-2 and LZ-3 would be intended to assess the lateral limits of deep Lower Zone (i.e., depths of 250 feet bgs) impacts documented in well URS-05L2, recently completed as part of the Well R3 Area investigation. The need for these wells is contingent upon the collection of additional monitoring data from Middle and Upper Zone wells in this area of the site, including samples analyzed using the SGC preparation method. Data collected over the next one year will be used to confirm that the Lower Zone dissolved hydrocarbon plume is adequately delineated in this area of the site.

Please contact Doug Weimer (805) 692-0609 with your response, or with any questions or comments you may have.

Sincerely,
URS Corporation

Gib Fates, P.G. 6123
Principal Geologist

cc: Doug Weimer, Shell Oil Products US
Kevin Dyer, Shell Oil Products US
Helen Ordway, Alon USA

Attachments

Tables 1 through 4
Figures 1 through 8

TABLES

Table 1
Summary of Analytical Results in Upper Zone Wells
Study Section 5 Monitoring Well Network Evaluation
Bakersfield Refinery, CA

Well ID Zone Screen Interval - ft bgs	Depth to Groundwater (ft btoc)*	Date Sampled	TPH (as Diesel)	TPH (as Gasoline)	Benzene	Ethylbenzene	Methyl Tert-butyl ether (MTBE)	Toluene	Xylenes (Total)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
A4	DRY	04/03/2012	No data available in database						
Upper Zone	DRY	07/09/2012							
(28-58)									
A5	DRY	04/03/2012	No data available in database						
Upper Zone	DRY	07/09/2012							
(28-58)									
B-103U	Dry since 11/12/2007								
Upper Zone									
(58.9-88.9)									
B-103M	88.78	11/15/2011	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Upper Zone	84.60	01/24/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(89.15-119.15)	83.77	04/12/2012	83	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	89.16	07/11/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	95.21	10/10/2012	95	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	111.99	02/26/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	113.82	04/04/2013	410	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	DRY	07/15/2013	--	--	--	--	--	--	--
B-104U	70.20	11/09/2011	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Upper Zone	68.83	01/18/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(50-80)	71.49	04/04/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	DRY	07/09/2012	--	--	--	--	--	--	--
	DRY	07/15/2013	--	--	--	--	--	--	--
B-104M	71.81	11/09/2011	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Upper Zone	70.11	01/18/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(80.25-110.25)	72.51	04/04/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	82.92	07/11/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	93.32	10/10/2012	99	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	98.65	01/16/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	102.19	04/04/2013	890	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	DRY	07/15/2013	--	--	--	--	--	--	--

Table 1
Summary of Analytical Results in Upper Zone Wells
Study Section 5 Monitoring Well Network Evaluation
Bakersfield Refinery, CA

Well ID Zone Screen Interval - ft bgs	Depth to Groundwater (ft btoc)*	Date Sampled	TPH (as Diesel)	TPH (as Gasoline)	Benzene	Ethylbenzene	Methyl Tert-butyl ether (MTBE)	Toluene	Xylenes (Total)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
B-114UR	Dry since installation on 12/10/2012. B-114U (replaced by B-114UR) was dry from 4Q2007 until it was abandoned								
Upper Zone									
(50.3-80.3)									
B-114MR	104.85	01/14/2013	230	50	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Upper Zone	108.41	04/09/2013	110	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(95.2-115.2)	116.47	07/15/2013	Insufficient water to sample						
B-115UR	Dry since installation on 12/20/12. B-115U (replaced by B-115UR) was dry from 4Q2007 until it was abandoned								
Upper Zone									
(49-79)									
B-115MR	107.53	01/14/2013	100	ND(50)	ND(0.50)	ND(1.0)	0.55	ND(1.0)	ND(1.0)
Upper Zone	109.30	04/09/2013	590	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(90-110)	DRY	07/15/2013	--	--	--	--	--	--	--
B-203TC	58.53	04/11/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Upper Zone	--	04/11/2012 (Dup)	34	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(68-98)	68.66	07/17/2012	640	210	0.27	2.4	ND(1.0)	0.99	37
	75.10	10/11/2012	1600	3700	29	68	ND(1.0)	ND(1.0)	64
	83.81	01/21/2013	470	620	0.95	0.32	ND(1.0)	ND(1.0)	4.9
	89.52	04/11/2013	92	ND(50)	ND(0.50)	0.16	ND(1.0)	ND(1.0)	ND(1.0)
	DRY	07/16/2013	--	--	--	--	--	--	--
B-204TC	59.27	04/11/2012	5600	21000	13	1000	ND(1.0)	2700	6200
Upper Zone	68.99	07/17/2012	4700	8500	ND(2.5)	110	ND(5.0)	9.9	620
(77-102)	75.12	10/11/2012	4800	8600	7.0	66	ND(1.0)	70	380
	83.65	01/22/2013	180	670	2.1	3.5	ND(1.0)	3.3	290
	89.83	04/11/2013	70	330	3.1	25	ND(1.0)	68	120
	DRY	07/16/2013	--	--	--	--	--	--	--

Table 1
Summary of Analytical Results in Upper Zone Wells
Study Section 5 Monitoring Well Network Evaluation
Bakersfield Refinery, CA

Well ID Zone Screen Interval - ft bgs	Depth to Groundwater (ft btoc)*	Date Sampled	TPH (as Diesel)	TPH (as Gasoline)	Benzene	Ethylbenzene	Methyl Tert-butyl ether (MTBE)	Toluene	Xylenes (Total)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
B-213U	94.67	11/17/2011	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Upper Zone	89.02	01/26/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(79-104)	86.55	04/10/2012	120	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	91.48	07/13/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	96.86	10/09/2012	260	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	102.18	01/16/2013	290	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	DRY	07/15/2013	--	--	--	--	--	--	--
B-248U	71.40	01/23/2013	ND(50)	78	ND(0.50)	1.6	ND(0.50)	0.64	3.7
Upper Zone	81.92	04/19/2013	ND(50)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	1.5
(80-110)	89.93	07/31/2013	ND(230)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
BWM-1U	41.86	11/14/2011	ND(200)	28	ND(0.50)	0.29	ND(0.50)	ND(0.50)	ND(1.0)
Upper Zone	40.33	01/23/2012	ND(200)	340	11	7.9	ND(0.50)	88	41
(55-88)	45.06	04/19/2012	120	65	ND(0.50)	1.9	ND(0.50)	ND(0.50)	ND(1.0)
	53.30	07/10/2012	ND(50)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	0.71	ND(1.0)
	58.49	10/12/2012	ND(50)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
	68.79	01/15/2013	ND(50)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
	DRY	07/16/2013	--	--	--	--	--	--	--
BWM-7U	43.00	11/15/2011	ND(200)	220	ND(0.50)	3.6	ND(0.50)	1.5	15
Upper Zone	41.27	01/23/2012	ND(200)	300	8.4	6.6	ND(0.50)	93	59
(63-103)	45.80	04/19/2012	97	84	ND(0.50)	2.7	ND(0.50)	ND(0.50)	1.0
	54.01	07/10/2012	ND(50)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	1.7	ND(1.0)
	59.48	10/12/2012	ND(50)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
	67.69	01/15/2013	ND(50)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
	82.09	04/26/2013	150	91	ND(0.50)	4.5	ND(0.50)	ND(0.50)	9.8
	93.56	07/26/2013	ND(200)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)

Table 1
Summary of Analytical Results in Upper Zone Wells
Study Section 5 Monitoring Well Network Evaluation
Bakersfield Refinery, CA

Well ID Zone Screen Interval - ft bgs	Depth to Groundwater (ft btoc)*	Date Sampled	TPH (as Diesel)	TPH (as Gasoline)	Benzene	Ethylbenzene	Methyl Tert-butyl ether (MTBE)	Toluene	Xylenes (Total)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BWM-19U	58.75	11/17/2011	210	78	0.37	0.88	ND(0.50)	5.0	3.5
Upper Zone	57.38	01/26/2012	6300	200	0.57	2.4	ND(0.50)	2.8	14
(Unknown-105.1)	61.95	04/26/2012	190	1200	1.0	3.4	ND(0.50)	1.9	12
	70.95	07/17/2012	200	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	1.1
	78.53	10/11/2012	210	190	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
	85.09	01/22/2013	470	760	ND(0.50)	16	ND(0.50)	19	73
	91.20	04/23/2013	20000	410	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
	DRY	07/17/2013	--	--	--	--	--	--	--
BWM-20U	60.68	11/17/2011	13000	64	0.61	1.5	ND(0.50)	1.9	6.2
Upper Zone	58.86	01/26/2012	ND(200)	230	1.7	7.2	ND(0.50)	9.8	33
(Unkown-109.9)	62.49	04/26/2012	1100	210	0.85	4.4	ND(0.50)	1.9	15
	71.01	07/16/2012	640	230	3.1	5.7	ND(0.50)	5.9	14
	78.60	10/11/2012	ND(50)	140	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
	85.19	01/22/2013	ND(50)	62	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
	91.03	04/23/2013	200	ND(50)	1.3	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
	100.93	08/02/2013	ND(220)	ND(50)	ND(0.50)	0.21 J	ND(0.50)	ND(0.50)	0.67 J
BWM-41U	82.18	04/11/2013	ND(200)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
Upper Zone	91.38	07/30/2013	ND(200)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
(80-110)	--								
BWM-42U	83.20	04/11/2013	ND(200)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	0.16	ND(1.0)
Upper Zone	92.20	07/30/2013	ND(200)	48 J	ND(0.50)	0.92	ND(0.50)	ND(0.50)	2.3
(80-110)	--								
BWM-43U	80.30	04/11/2013	ND(200)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
Upper Zone	--	04/11/2013	ND(200)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
(80-110)	89.55	07/31/2013	ND(220)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)

Table 1
Summary of Analytical Results in Upper Zone Wells
Study Section 5 Monitoring Well Network Evaluation
Bakersfield Refinery, CA

Well ID Zone Screen Interval - ft bgs	Depth to Groundwater (ft btoc)*	Date Sampled	TPH (as Diesel)	TPH (as Gasoline)	Benzene	Ethylbenzene	Methyl Tert-butyl ether (MTBE)	Toluene	Xylenes (Total)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BWM-44U	83.53	04/10/2013	ND(220)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
Upper Zone	92.39	07/29/2013	ND(200)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
(80-110)									
D3	59.58	11/17/2011	50	76	ND(0.50)	3.6	ND(1.0)	0.25	16
Upper Zone	59.02	01/26/2012	ND(50)	ND(50)	ND(0.50)	0.43	ND(1.0)	ND(1.0)	2.2
(40-60)	66.04	04/20/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(80-100) second screen	72.49	07/18/2012	160	470	ND(0.50)	24	ND(1.0)	1.1	130
	80.48	10/11/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	86.11	01/10/2013	130	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	90.27	04/10/2013	43	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	100.30	07/24/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	--	07/24/2013	ND(50) (SGC Shake)	--	--	--	--	--	--
	--	07/24/2013	ND(50) (SGC Column)	--	--	--	--	--	--
D4	71.78	07/19/2012	83	ND(50)	ND(0.50)	0.31	ND(1.0)	ND(1.0)	ND(1.0)
Upper Zone	102.62	07/24/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(62-82)									
(102-122) second screen									
DP2	86.70	11/22/2011	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Upper Zone	83.70	01/30/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(92-105)	83.65	04/11/2012	64	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	91.11	07/20/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	97.21	10/11/2012	58	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	--	10/11/2012 (Dup)	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	102.10	01/15/2013	68	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	105.89	04/10/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	DRY	07/15/2013	--	--	--	--	--	--	--
L25	55.66	04/11/2012	55	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Upper Zone	DRY	07/09/2013	--	--	--	--	--	--	--
(Unknown) Total Depth: 57.80									

Table 1
Summary of Analytical Results in Upper Zone Wells
Study Section 5 Monitoring Well Network Evaluation
Bakersfield Refinery, CA

Well ID Zone Screen Interval - ft bgs	Depth to Groundwater (ft btoc)*	Date Sampled	TPH (as Diesel)	TPH (as Gasoline)	Benzene	Ethylbenzene	Methyl Tert-butyl ether (MTBE)	Toluene	Xylenes (Total)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
L26	DRY	04/03/2012	No data available in database						
Upper Zone	DRY	07/09/2012	No data available in database						
(30-60)									
L27	DRY	04/03/2012	No data available in database						
Upper Zone	DRY	07/09/2012	No data available in database						
(24-54)									
L28	DRY	04/03/2012	No data available in database						
Upper Zone	DRY	07/09/2012	No data available in database						
(Unknown) Total Depth: 45.87									
L30	DRY	04/03/2012	No data available in database						
Upper Zone	DRY	07/09/2012	No data available in database						
(Unknown) Total Depth: 45.34									
PW-L28	58.50	06/06/2011	430	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Upper Zone	45.38	11/09/2011	1000	ND(50)	1.5	0.15	ND(1.0)	ND(1.0)	1.5
(76.7-106)	45.00	01/18/2012	91	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	50.42	04/04/2012	35	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	63.88	07/11/2012	830	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	76.86	01/16/2013	490	ND(50)	ND(0.50)	0.26	ND(1.0)	ND(1.0)	0.58
	74.91	07/24/2013	1200	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
PW-U4	58.11	11/17/2011	52	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Upper/Middle Zone	55.72	01/26/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(100-138)	67.68	07/12/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	81.28	01/22/2013	1000	870	6.7	26	ND(1.0)	270	160
	98.05	07/25/2013	89	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
PW-U5	46.75	04/13/2012	360	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Upper/Middle Zone	56.30	07/19/2012	96	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(88-138)	61.40	10/16/2012	350	140	0.61	2.4	ND(1.0)	26	21
	71.86	01/23/2013	320	49	ND(0.50)	0.61	ND(1.0)	5.4	4.0
	79.13	04/09/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	88.68	07/17/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)

Table 1
Summary of Analytical Results in Upper Zone Wells
Study Section 5 Monitoring Well Network Evaluation
Bakersfield Refinery, CA

Well ID Zone Screen Interval - ft bgs	Depth to Groundwater (ft btoc)*	Date Sampled	TPH (as Diesel)	TPH (as Gasoline)	Benzene	Ethylbenzene	Methyl Tert-butyl ether (MTBE)	Toluene	Xylenes (Total)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
SIMW-1B	54.00	07/19/2012	54	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Upper Zone	58.74	10/17/2012	230	ND(50)	1.5	2.8	ND(1.0)	ND(1.0)	2.7
(75-95)	67.62	01/17/2013	110	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	74.22	04/04/2013	7700	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	89.34	07/26/2013	37 J	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	--	07/26/2013	ND(50) (SGC Shake)	--	--	--	--	--	--
	--	07/26/2013	ND(50) (SGC Column)	--	--	--	--	--	--
SIMW-2	--	04/02/2012	Obstruction at ~20' btoc. No data available in data base						
Upper Zone	--	10/08/2012	Obstruction at ~18.5' btoc. No data available in data base						
(65-80)									
SIMW-2B	47.58	04/02/2012	No data available in database						
Upper Zone	58.84	07/09/2012							
(65-80)	63.90	10/08/2012							
SIMW-2C	75.95	07/19/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Upper Zone	82.97	10/17/2012	650	79	0.42	2.7	ND(1.0)	23	13
(97-112)	87.62	01/17/2013	130	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	92.90	04/09/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	102.44	07/17/2013	110	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
SIMW-4B	51.42	07/19/2012	360	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Upper Zone	56.61	10/16/2012	45	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(69.1-88.4)	59.87	01/17/2013	280	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	65.73	04/04/2013	83	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	70.70	07/23/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
SIMW-4C	85.91	10/16/2012	170	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Upper Zone	89.20	01/17/2013	930	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(97.3-117)	94.71	04/04/2013	600	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	103.28	07/23/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)

Table 1
Summary of Analytical Results in Upper Zone Wells
Study Section 5 Monitoring Well Network Evaluation
Bakersfield Refinery, CA

Well ID Zone Screen Interval - ft bgs	Depth to Groundwater (ft btoc)*	Date Sampled	TPH (as Diesel)	TPH (as Gasoline)	Benzene	Ethylbenzene	Methyl Tert-butyl ether (MTBE)	Toluene	Xylenes (Total)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
SIMW-6	73.37	07/19/2012	190	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Upper Zone	79.84	10/17/2012	380	ND(50)	ND(0.50)	0.57	ND(1.0)	ND(1.0)	0.70
(91-111)	--	10/17/2012 (Dup)	290	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	85.78	01/17/2013	300	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	91.41	04/04/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	101.51	07/17/2013	160	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)

Sunland Wells			TEPH (C6-C44)	TPH (as Gasoline)	Benzene	Ethylbenzene	Methyl Tert-butyl ether (MTBE)	Toluene	m,p-Xylene
			mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
MW-10R	103.62	9/20/2011	ND(0.10)	ND(0.1)	ND(0.0005)	ND(0.0005)	ND(0.002)	ND(0.0005)	ND(0.001)
Multiple Zones	90.5	3/15/2012	ND(0.10)	ND(0.1)	ND(0.0005)	ND(0.0005)	ND(0.002)	ND(0.0005)	ND(0.001)
(60-160)	98.97	9/26/2012	ND(0.10)	ND(0.1)	ND(0.0005)	ND(0.0005)	ND(0.002)	ND(0.0005)	ND(0.001)
	108.42	4/11/2013	ND(0.10)	ND(0.10)	ND(0.0005)	ND(0.0005)	ND(0.002)	0.00053	ND(0.001)
SE-MW-25	90.02	9/23/2011	ND(0.10)	ND(0.1)	ND(0.0005)	ND(0.0005)	ND(0.002)	ND(0.0005)	ND(0.001)
Multiple Zones	81.68	3/21/2012	ND(0.10)	ND(0.1)	ND(0.0005)	ND(0.0005)	ND(0.002)	ND(0.0005)	ND(0.001)
(60-165)	95.78	9/26/2012	0.16	ND(0.1)	ND(0.0005)	ND(0.0005)	ND(0.002)	ND(0.0005)	ND(0.001)
	105.75	4/11/2013	ND(0.10)	ND(0.10)	ND(0.00050)	ND(0.00050)	ND(0.002)	ND(0.00050)	ND(0.001)

ft bgs - feet below ground surface
ft btoc - feet below top of casing
TPH -Total Petroleum Hydrocarbons
µg/L - micrograms per liter
mg/L - milligrams per liter
DRY - well dry
DUP - duplicate sample result
ND - non detect. Sample result below indicated reporting limit
SGC - Silica Gel Cleanup
* Depth to groundwater measurements were collected during the same quarterly monitoring event in which wells were sampled.

Laboratory Qualifier Definitions from CalScience Environmental Laboratories, Glossary of Terms and Qualifiers:
J - Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

Table 2
Summary of Analytical Results in Middle Zone Wells
Study Section 5 Monitoring Well Network Evaluation
Bakersfield Refinery, CA

Well ID Zone Screen Interval - ft bgs	Depth to Groundwater (ft btoc)*	Date Sampled	TPH (as Diesel)	TPH (as Gasoline)	Benzene	Ethylbenzene	Methyl Tert-butyl ether (MTBE)	Toluene	Xylenes (Total)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
B-024U	70.73	11/15/2011	140	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Middle Zone	68.74	01/24/2012	50	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(120-150)	81.04	07/10/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	94.64	01/16/2013	260	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	109.03	07/22/2013	300	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
B-099L	96.84	11/15/2011	110	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Middle Zone	91.04	01/24/2012	47	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(110-140)	89.32	04/09/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	83.86	07/18/2012	1900	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	98.83	10/10/2012	620	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	103.89	01/09/2013	42	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	107.49	04/03/2013	550	ND(50)	ND(0.50)	ND(1.0)	0.83	ND(1.0)	ND(1.0)
	115.35	07/23/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	1.1	ND(1.0)	ND(1.0)
	--	07/23/2013	ND(50) (SGC Shake)	--	--	--	--	--	--
	--	07/23/2013	ND(50) (SGC Column	--	--	--	--	--	--
B-100L	88.75	11/15/2011	80	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Middle Zone	84.81	01/24/2012	81	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(110-140)	89.38	07/11/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	100.98	01/09/2013	620	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	113.52	07/23/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
B-103L	88.27	11/15/2011	70	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Middle Zone	84.18	01/24/2012	140	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(118.9-148.9)	83.67	04/12/2012	150	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	89.25	07/11/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	95.14	10/10/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	112.08	02/26/2013	150	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	113.90	04/09/2013	250	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	122.29	07/24/2013	ND(50)	ND(50)	ND(0.50)	0.67 J	ND(1.0)	ND(1.0)	ND(1.0)

Table 2
Summary of Analytical Results in Middle Zone Wells
Study Section 5 Monitoring Well Network Evaluation
Bakersfield Refinery, CA

Well ID Zone Screen Interval - ft bgs	Depth to Groundwater (ft btoc)*	Date Sampled	TPH (as Diesel)	TPH (as Gasoline)	Benzene	Ethylbenzene	Methyl Tert-butyl ether (MTBE)	Toluene	Xylenes (Total)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
B-104L	77.31	11/09/2011	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Middle Zone	74.80	01/18/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(110-140)	76.92	04/04/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	85.82	07/11/2012	110	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	93.12	10/10/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	98.53	01/16/2013	240	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	102.12	04/04/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	112.20	07/17/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
B-111L	61.64	11/09/2011	91	ND(50)	0.45	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Middle Zone	59.90	01/18/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(100-130)	71.72	07/18/2012	2800	ND(50)	ND(0.50)	0.41	ND(1.0)	ND(1.0)	1.1
	85.66	01/10/2013	75	180	4.7	11	ND(1.0)	0.54	42
	100.68	07/24/2013	180	240	ND(0.50)	37	ND(1.0)	ND(1.0)	0.30 J
B-213M	94.78	11/17/2011	43	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Middle Zone	89.52	01/26/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(108-138)	87.59	04/10/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	91.52	07/13/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	97.24	10/09/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	102.14	01/16/2013	170	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	105.56	04/02/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	113.58	07/17/2013	240	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
B-248M	76.91	01/23/2013	ND(50)	180	ND(0.50)	2.9	ND(0.50)	0.58	6.3
Middle Zone	86.25	04/19/2013	ND(50)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	1.6
(110-135)	93.97	07/31/2013	ND(230)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
BWM-1M	79.39	01/21/2013	ND(50)	220	ND(0.50)	4.5	ND(0.50)	26	24
Middle Zone	86.02	04/25/2013	ND(50)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
(110-140)	95.76	07/31/2013	ND(230)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)

Table 2
Summary of Analytical Results in Middle Zone Wells
Study Section 5 Monitoring Well Network Evaluation
Bakersfield Refinery, CA

Well ID Zone Screen Interval - ft bgs	Depth to Groundwater (ft btoc)*	Date Sampled	TPH (as Diesel)	TPH (as Gasoline)	Benzene	Ethylbenzene	Methyl Tert-butyl ether (MTBE)	Toluene	Xylenes (Total)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BWM-7M	78.86	01/21/2013	ND(50)	140	ND(0.50)	4.0	ND(0.50)	20	22
Middle Zone	85.64	04/26/2013	310	220	ND(0.50)	12	ND(0.50)	ND(0.50)	34
(110-140)	95.10	07/31/2013	ND(230)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
BWM-19M	63.93	11/17/2011	ND(200)	68	1.3	2.7	ND(0.50)	3.4	8.6
Middle Zone	61.88	01/26/2012	160	370	1.8	9.9	ND(0.50)	14	49
(110-140)	66.09	04/26/2012	110	260	1.6	4.9	ND(0.50)	2.7	16
	74.51	07/17/2012	440	72	0.92	1.6	ND(0.50)	1.7	5.0
	81.61	10/10/2012	ND(50)	71	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
	87.36	01/22/2013	ND(50)	79	ND(0.50)	0.81	ND(0.50)	2.9	4.5
	93.60	04/23/2013	ND(50)	69	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
	102.36	08/02/2013	ND(200)	300	ND(0.50)	5.1	ND(0.50)	0.11 J	10
BWM-20M	64.92	11/17/2011	180	54	0.78	1.9	ND(0.50)	2.8	6.7
Middle Zone	62.56	01/26/2012	320	200	1.1	4.0	ND(0.50)	5.1	19
(110-140)	66.00	04/26/2012	94	160	0.71	4.9	ND(0.50)	1.8	16
	74.00	07/16/2012	2000	870	37	29	ND(0.50)	27	85
	81.10	10/11/2012	220	110	9.2	ND(0.50)	ND(0.50)	ND(0.50)	4.1
	87.00	01/22/2013	89	65	ND(0.50)	0.71	ND(0.50)	2.0	4.2
	92.97	04/23/2013	ND(50)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
	101.73	08/02/2013	ND(200)	100	ND(0.50)	18	ND(0.50)	0.20 J	2.1
BWM-41M	82.83	04/11/2013	ND(200)	ND(50)	0.18	ND(0.50)	ND(0.50)	0.38	ND(1.0)
Middle Zone	92.03	07/30/2013	ND(200)	78	ND(0.50)	0.96	ND(0.50)	ND(0.50)	1.9
(110-140)									
BWM-42M	83.11	04/11/2013	ND(200)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	0.31	ND(1.0)
Middle Zone	91.90	07/30/2013	ND(200)	78	ND(0.50)	1.2	ND(0.50)	ND(0.50)	2.9
(110-140)									
BWM-43M	80.66	04/11/2013	ND(200)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	0.22	ND(1.0)
Middle Zone	89.79	07/31/2013	ND(220)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
(110-140)									

Table 2
Summary of Analytical Results in Middle Zone Wells
Study Section 5 Monitoring Well Network Evaluation
Bakersfield Refinery, CA

Well ID Zone Screen Interval - ft bgs	Depth to Groundwater (ft btoc)*	Date Sampled	TPH (as Diesel)	TPH (as Gasoline)	Benzene	Ethylbenzene	Methyl Tert-butyl ether (MTBE)	Toluene	Xylenes (Total)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
BWM-44M	92.38	04/10/2013	120	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
Middle Zone	100.94	07/29/2013	ND(200)	ND(50)	ND(0.50)	0.52	ND(0.50)	ND(0.50)	1.6
(110-140)									
PW-A	60.57	04/13/2012	220	2300	2.3	150	ND(1.0)	20	1000
Middle Zone	--	04/13/2012 (Dup)	230	2500	2.3	150	ND(1.0)	19	970
(116.6-148.6)	70.73	07/16/2012	210	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	77.04	10/17/2012	1200	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	84.43	01/23/2013	2800	63	ND(0.50)	0.54	ND(1.0)	5.5	3.1
	--	01/23/2013 (Dup)	600	49	ND(0.50)	0.48	ND(1.0)	5.2	3.3
	90.60	04/09/2013	210	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	101.42	07/22/2013	230	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
PW-L23	54.03	11/09/2011	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Middle Zone	51.68	01/18/2012	320	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(100-144.5)	55.15	04/04/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	64.64	07/11/2012	310	ND(50)	0.17	1.5	ND(1.0)	7.2	9.6
	78.24	01/16/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	95.30	07/24/2013	ND(50)	ND(50)	ND(0.50)	0.53 J	ND(1.0)	ND(1.0)	0.65 J
PW-U4	58.11	11/17/2011	52	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Upper/Middle Zone	55.72	01/26/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(100-138)	67.68	07/12/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	81.28	01/22/2013	1000	870	6.7	26	ND(1.0)	270	160
	98.05	07/25/2013	89	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
PW-U5	46.75	04/13/2012	360	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Upper/Middle Zone	56.30	07/19/2012	96	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(88-138)	61.40	10/16/2012	350	140	0.61	2.4	ND(1.0)	26	21
	71.86	01/23/2013	320	49	ND(0.50)	0.61	ND(1.0)	5.4	4.0
	79.13	04/09/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	88.68	07/17/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)

Table 2
Summary of Analytical Results in Middle Zone Wells
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Well ID Zone Screen Interval - ft bgs	Depth to Groundwater (ft btoc)*	Date Sampled	TPH (as Diesel)	TPH (as Gasoline)	Benzene	Ethylbenzene	Methyl Tert-butyl ether (MTBE)	Toluene	Xylenes (Total)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
RS-BW4	85.35	11/09/2011	48	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Middle Zone	82.12	01/18/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(105-134)	82.61	04/04/2012	120	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	89.29	07/12/2012	230	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	95.48	10/11/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	100.82	01/15/2013	99	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	104.35	04/09/2013	59	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	113.82	07/18/2013	1400	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	--	07/18/2013	620 (SGC Shake)	--	--	--	--	--	--
	--	07/18/2013	140 (SGC Column)	--	--	--	--	--	--
RS-DP5	67.45	11/14/2011	100	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Middle Zone	65.10	01/23/2012	250	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(98-138)	75.78	07/17/2012	620	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	0.25
	85.56	01/10/2013	170	ND(50)	2.1	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	103.61	07/19/2013	150	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
RS-MS2.5C	66.99	11/09/2011	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Middle Zone	65.49	01/18/2012	170	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(100-149.5)	79.62	07/17/2012	430	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	93.58	01/17/2013	91	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	108.50	07/18/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)

Table 2
Summary of Analytical Results in Middle Zone Wells
Study Section 5 Monitoring Well Network Evaluation
Bakersfield Refinery, CA

Well ID Zone Screen Interval - ft bgs	Depth to Groundwater (ft btoc)*	Date Sampled	TPH (as Diesel)	TPH (as Gasoline)	Benzene	Ethylbenzene	Methyl Tert-butyl ether (MTBE)	Toluene	Xylenes (Total)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
SIMW-5B	76.05	07/19/2012	41	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Middle Zone	82.74	10/17/2012	270	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(108-130)									

Sunland Wells			TEPH (C6-C44)	TPH (as Gasoline)	Benzene	Ethylbenzene	Methyl Tert-butyl ether (MTBE)	Toluene	m,p-Xylene
			mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
MW-10R	103.62	9/20/2011	ND(0.10)	ND(0.1)	ND(0.0005)	ND(0.0005)	ND(0.002)	ND(0.0005)	ND(0.001)
Multiple Zones	90.5	3/15/2012	ND(0.10)	ND(0.1)	ND(0.0005)	ND(0.0005)	ND(0.002)	ND(0.0005)	ND(0.001)
(60-160)	98.97	9/26/2012	ND(0.10)	ND(0.1)	ND(0.0005)	ND(0.0005)	ND(0.002)	ND(0.0005)	ND(0.001)
	108.42	4/11/2013	ND(0.10)	ND(0.10)	ND(0.0005)	ND(0.0005)	ND(0.002)	0.00053	ND(0.001)
SE-MW-25	90.02	9/23/2011	ND(0.10)	ND(0.1)	ND(0.0005)	ND(0.0005)	ND(0.002)	ND(0.0005)	ND(0.001)
Multiple Zones	81.68	3/21/2012	ND(0.10)	ND(0.1)	ND(0.0005)	ND(0.0005)	ND(0.002)	ND(0.0005)	ND(0.001)
(60-165)	95.78	9/26/2012	0.16	ND(0.1)	ND(0.0005)	ND(0.0005)	ND(0.002)	ND(0.0005)	ND(0.001)
	105.75	4/11/2013	ND(0.10)	ND(0.10)	ND(0.00050)	ND(0.00050)	ND(0.002)	ND(0.00050)	ND(0.001)

ft bgs - feet below ground surface
ft btoc - feet below top of casing
TPH -Total Petroleum Hydrocarbons
µg/L - micrograms per liter
mg/L - milligrams per liter
DRY - well dry
DUP - duplicate sample result
ND - non detect. Sample result below indicated reporting limit
SGC - Silica Gel Cleanup
* Depth to groundwater measurements were collected during the same quarterly monitoring event in which wells were sampled.

Laboratory Qualifier Definitions from CalScience Environmental Laboratories, Glossary of Terms and Qualifiers:
J - Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

Table 3
Summary of Analytical Results in Lower Zone Wells
Study Section 5 Monitoring Well Network Evaluation
Bakersfield Refinery, CA

Well ID Zone Screen Interval - ft bgs	Depth to Groundwater (ft btoc)*	Date Sampled	TPH (as Diesel)	TPH (as Gasoline)	Benzene	Ethylbenzene	Methyl Tert-butyl ether (MTBE)	Toluene	Xylenes (Total)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
B-007	107.84	11/09/2011	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Lower Zone	102.50	01/20/2012	44	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(153-193)	102.54	04/04/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	107.02	07/12/2012	76	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	86.42	10/10/2012	210	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	127.08	02/26/2013	66	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	127.42	04/03/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	138.21	07/24/2013	ND(50)	ND(50)	ND(0.50)	0.84 J	ND(1.0)	ND(1.0)	0.95 J
B-009	98.23	11/09/2011	ND(50)	ND(50)	ND(0.50)	0.17	ND(1.0)	ND(1.0)	ND(1.0)
Lower Zone	93.21	01/18/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(143-183)	--	01/18/2012 (Dup)	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	94.72	04/04/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	102.48	07/12/2012	220	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	0.27
	108.64	01/10/2013	46	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	123.92	07/24/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
B-010	110.24	11/09/2011	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Lower Zone	105.00	01/18/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(163-203)	--	01/18/2012 (Dup)	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	112.67	07/17/2012	390	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	86.24	10/17/2012	510	ND(50)	ND(0.50)	0.77	ND(1.0)	0.45	0.54
	127.52	02/26/2013	160	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	146.12	07/23/2013	ND(50)	ND(50)	ND(0.50)	1.0	ND(1.0)	ND(1.0)	1.9

Table 3
Summary of Analytical Results in Lower Zone Wells
Study Section 5 Monitoring Well Network Evaluation
Bakersfield Refinery, CA

Well ID Zone Screen Interval - ft bgs	Depth to Groundwater (ft btoc)*	Date Sampled	TPH (as Diesel)	TPH (as Gasoline)	Benzene	Ethylbenzene	Methyl Tert-butyl ether (MTBE)	Toluene	Xylenes (Total)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
B-024L	108.84	11/15/2011	110	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Lower Zone	103.44	01/24/2012	81	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(162.7-182.7)	110.89	07/10/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	99.34	01/23/2013	900	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	--	01/23/2013 (Dup)	160	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	132.36	07/23/2013	47 J	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
B-105L2	93.81	01/24/2013	ND(50)	ND(50)	ND(0.50)	1.2	ND(0.50)	0.76	4.0
Lower Zone	101.44	04/24/2013	230	220	ND(0.50)	5.0	ND(0.50)	0.75	9.6
(140-160)	109.39	07/31/2013	ND(200)	100	ND(0.50)	1.6	ND(0.50)	0.10 J	5.8
B-114LR	105.5	01/14/2013	88	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Lower Zone	108.88	04/09/2013	83	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(139.6-154.6)	117.01	07/24/2013	ND(50)	ND(50)	ND(0.50)	1.3	ND(1.0)	ND(1.0)	ND(1.0)
	--	07/24/2013	ND(50) SGC Shake	--	--	--	--	--	--
	--	07/24/2013	ND(50) SGC Column	--	--	--	--	--	--
B-114L1	120.56	01/14/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	8.7	ND(1.0)	ND(1.0)
Lower Zone	--	01/14/2013 (Dup)	ND(50)	ND(50)	ND(0.50)	ND(1.0)	9.3	ND(1.0)	ND(1.0)
(184.7-199.7)	122.78	04/09/2013	64	ND(50)	0.43	0.23	0.94	1.1	1.1
	133.18	07/18/2013	1100	ND(50)	ND(0.50)	ND(1.0)	1.1	ND(1.0)	ND(1.0)
B-114L2	120.98	01/14/2013	46	ND(50)	ND(0.50)	ND(1.0)	3.7	ND(1.0)	ND(1.0)
Lower Zone	123.40	04/09/2013	38	ND(50)	ND(0.50)	ND(1.0)	3.0	ND(1.0)	ND(1.0)
(242.2-252.2)	133.92	07/17/2013	40 J	ND(50)	ND(0.50)	ND(1.0)	2.7	ND(1.0)	ND(1.0)
	--	07/17/2013	ND(50) (SGC Shake)	--	--	--	--	--	--
	--	07/17/2013	ND(50) (SGC Column)	--	--	--	--	--	--

Table 3
Summary of Analytical Results in Lower Zone Wells
Study Section 5 Monitoring Well Network Evaluation
Bakersfield Refinery, CA

Well ID Zone Screen Interval - ft bgs	Depth to Groundwater (ft btoc)*	Date Sampled	TPH (as Diesel)	TPH (as Gasoline)	Benzene	Ethylbenzene	Methyl Tert-butyl ether (MTBE)	Toluene	Xylenes (Total)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
B-115LR	109.39	01/14/2013	290	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Lower Zone	112.09	04/09/2013	86	ND(50)	0.34	0.17	ND(1.0)	0.73	0.73
(135-150)	118.87	07/18/2013	390	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
B-115L1	120.30	01/14/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Lower Zone	122.49	04/09/2013	96	ND(50)	0.30	ND(1.0)	ND(1.0)	0.60	0.36
(185.3-200.3)	132.41	07/18/2013	490	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
B-115L2	120.64	01/14/2013	40	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Lower Zone	122.95	04/09/2013	320	ND(50)	0.26	0.17	0.75	0.51	0.67
(240-250)	132.92	07/22/2013	1000	ND(50)	ND(0.50)	ND(1.0)	0.31 J	ND(1.0)	ND(1.0)
	--	07/22/2013 (Dup)	1300	ND(50)	ND(0.50)	ND(1.0)	0.34 J	ND(1.0)	ND(1.0)
B-213L	95.11	11/17/2011	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Lower Zone	89.95	01/26/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
(141.5-156.5)	87.91	04/10/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	91.78	07/13/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	97.43	10/09/2012	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	--	10/09/2012 (Dup)	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	102.34	01/16/2013	120	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	105.63	04/02/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	--	04/02/2013 (Dup)	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
	113.61	07/17/2013	ND(50)	ND(50)	ND(0.50)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
B-247L	88.05	01/24/2013	ND(50)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	1.2
Lower Zone	82.88	04/24/2013	ND(50)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)
(140-160)	103.24	08/01/2013	170 J	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)

Table 3
Summary of Analytical Results in Lower Zone Wells
Study Section 5 Monitoring Well Network Evaluation
Bakersfield Refinery, CA

Well ID / Zone / Screen Interval - ft bgs	Depth to Groundwater (ft btoc)*	Date Sampled	TPH (as Diesel)	TPH (as Gasoline)	Benzene	Ethylbenzene	Methyl Tert-butyl ether (MTBE)	Toluene	Xylenes (Total)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
B-248L	83.69	01/23/2013	ND(50)	ND(50)	ND(0.50)	1.1	ND(0.50)	ND(0.50)	2.4
Lower Zone	90.48	04/19/2013	ND(50)	ND(50)	1.4	3.7	ND(0.50)	2.8	17
(140-160)	97.98	07/31/2013	ND(240)	ND(50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(1.0)

Sunland Wells			TEPH (C6-C44)	TPH (as Gasoline)	Benzene	Ethylbenzene	Methyl Tert-butyl ether (MTBE)	Toluene	m,p-Xylene
			mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
MW-10R	103.62	09/20/2011	ND(0.10)	ND(0.1)	ND(0.0005)	ND(0.0005)	ND(0.002)	ND(0.0005)	ND(0.001)
Multiple Zones	90.5	03/15/2012	ND(0.10)	ND(0.1)	ND(0.0005)	ND(0.0005)	ND(0.002)	ND(0.0005)	ND(0.001)
(60-160)	98.97	09/26/2012	ND(0.10)	ND(0.1)	ND(0.0005)	ND(0.0005)	ND(0.002)	ND(0.0005)	ND(0.001)
	108.42	04/11/2013	ND(0.10)	ND(0.10)	ND(0.0005)	ND(0.0005)	ND(0.002)	0.00053	ND(0.001)
SE-MW-25	90.02	09/23/2011	ND(0.10)	ND(0.1)	ND(0.0005)	ND(0.0005)	ND(0.002)	ND(0.0005)	ND(0.001)
Multiple Zones	81.68	03/21/2012	ND(0.10)	ND(0.1)	ND(0.0005)	ND(0.0005)	ND(0.002)	ND(0.0005)	ND(0.001)
(60-165)	95.78	09/26/2012	0.16	ND(0.1)	ND(0.0005)	ND(0.0005)	ND(0.002)	ND(0.0005)	ND(0.001)
	105.75	04/11/2013	ND(0.10)	ND(0.10)	ND(0.00050)	ND(0.00050)	ND(0.002)	ND(0.00050)	ND(0.001)

ft bgs - feet below ground surface
ft btoc - feet below top of casing
TPH -Total Petroleum Hydrocarbons
µg/L - micrograms per liter
mg/L - milligrams per liter
DRY - well dry
DUP - duplicate sample result
ND - non detect. Sample result below indicated reporting limit
SGC - Silica Gel Cleanup
* Depth to groundwater measurements were collected during the same quarterly monitoring event in which wells were sampled.

Laboratory Qualifier Definitions from CalScience Environmental Laboratories, Glossary of Terms and Qualifiers:
J - Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

TABLE 4

COMPARISON OF TPH-d ANALYSES USING VARIOUS PREPARATION METHODS
BAKERSFIELD REFINERY, BAKERSFIELD, CALIFORNIA

Location	Zone	Date Sampled	ANALYTICAL RESULTS		
			TPH-d Standard Preparation Method	TPH-d Shake SGC Method	TPH-d Column SGC Method
			µg/L	µg/L	µg/L
B-030M	Middle	07/18/2013	150	64	ND(50)
B-099L	Middle	07/23/2013	ND(50)	ND(50)	ND(50)
B-108M	Upper	07/24/2013	3200	2600	2400
B-109L	Middle	07/24/2013	190000	120000	94000
B-114LR	Lower	07/24/2013	ND(50)	ND(50)	ND(50)
B-114L2	Lower	07/17/2013	40 J	ND(50)	ND(50)
B-118L	Lower	07/24/2013	1800	1300	68
B-179U	Upper	07/26/2013	810	69	ND(50)
D3	Upper	07/24/2013	ND(50)	ND(50)	ND(50)
R-1L	Lower	07/22/2013	2300	1900	1600
R-4L	Lower	07/24/2013	330	180	120
R-4M	Middle	07/25/2013	4300	1700	590
RS-BW4	Middle	07/18/2013	1400	620	140
RS-HC8	Upper	07/26/2013	4300	1300	320
SIMW-1B	Upper	07/26/2013	37 J	ND(50)	ND(50)

TPH-d Total Petroleum Hydrocarbons as Diesel (EPA Method 8015M)
SGC Silica Gel Cleanup Preparation (EPA Method 3630C(M))
µg/L Micrograms per Liter
ND Non Detect. Sample result below indicated reporting limit

Laboratory Qualifier Definitions from CalScience Environmental Laboratories, Glossary of Terms and Qualifiers:
J - Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.

FIGURES

1:24,000

0 0.25 0.5

Miles

Source: Bing Maps Aerial Imagery Web Mapping Service - (c) 2010 Microsoft Corporation and its data suppliers (Image Date: Mar. 2011).

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Figure 1

SITE VICINITY MAP

Study Section 5 Monitoring Well Network Evaluation
Bakersfield Refinery, Bakersfield California

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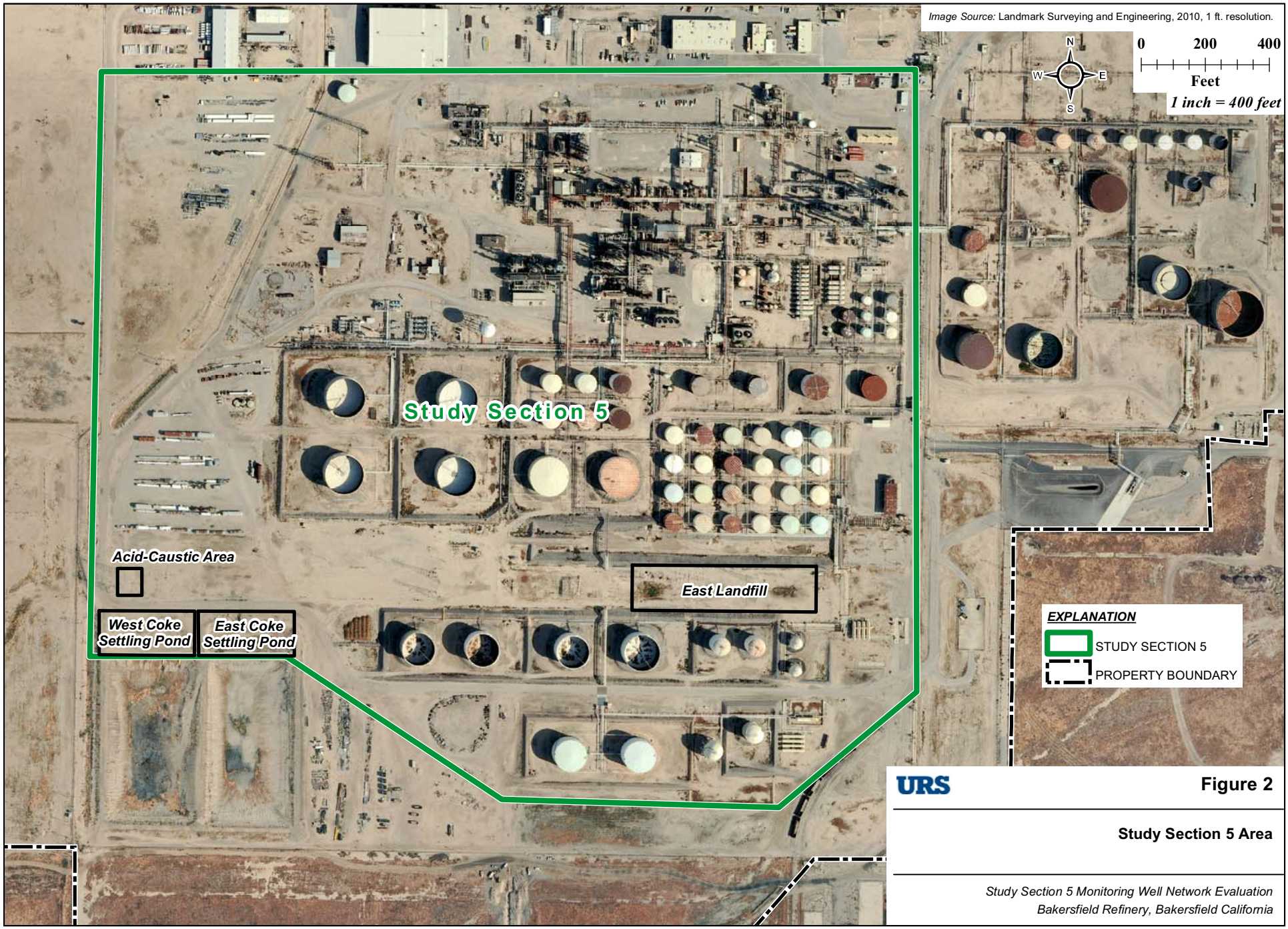

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Figure 2

Study Section 5 Area

Study Section 5 Monitoring Well Network Evaluation
Bakersfield Refinery, Bakersfield California

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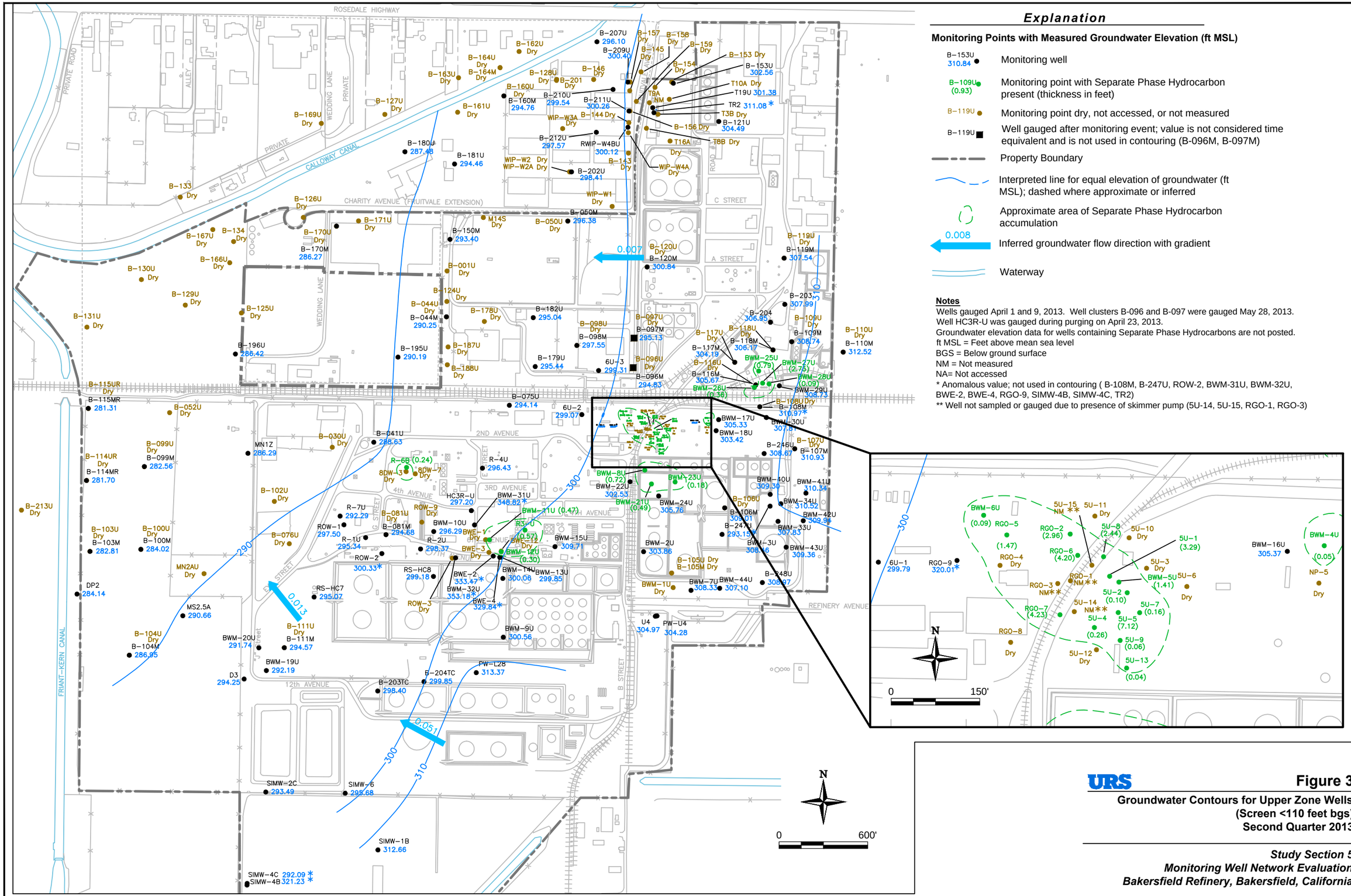

Explanation

Monitoring Points with Measured Groundwater Elevation (ft MSL)

- B-153U 310.84 — Monitoring well
- B-109U (0.93) — Monitoring point with Separate Phase Hydrocarbon present (thickness in feet)
- B-119U — Monitoring point dry, not accessed, or not measured
- B-119U — Well gauged after monitoring event; value is not considered time equivalent and is not used in contouring (B-096M, B-097M)
- Property Boundary
- Interpreted line for equal elevation of groundwater (ft MSL); dashed where approximate or inferred
- Approximate area of Separate Phase Hydrocarbon accumulation
- 0.008 — Inferred groundwater flow direction with gradient
- Waterway

Notes

Wells gauged April 1 and 9, 2013. Well clusters B-096 and B-097 were gauged May 28, 2013.
Well HC3R-U was gauged during purging on April 23, 2013.
Groundwater elevation data for wells containing Separate Phase Hydrocarbons are not posted.
ft MSL = Feet above mean sea level
BGS = Below ground surface
NM = Not measured
NA= Not accessed
* Anomalous value; not used in contouring (B-108M, B-247U, ROW-2, BWM-31U, BWM-32U, BWE-2, BWE-4, RGO-9, SIMW-4B, SIMW-4C, TR2)
** Well not sampled or gauged due to presence of skimmer pump (5U-14, 5U-15, RGO-1, RGO-3)

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Figure 3

Groundwater Contours for Upper Zone Wells (Screen <110 feet bgs) Second Quarter 2013

Study Section 5
Monitoring Well Network Evaluation
Bakersfield Refinery, Bakersfield, California

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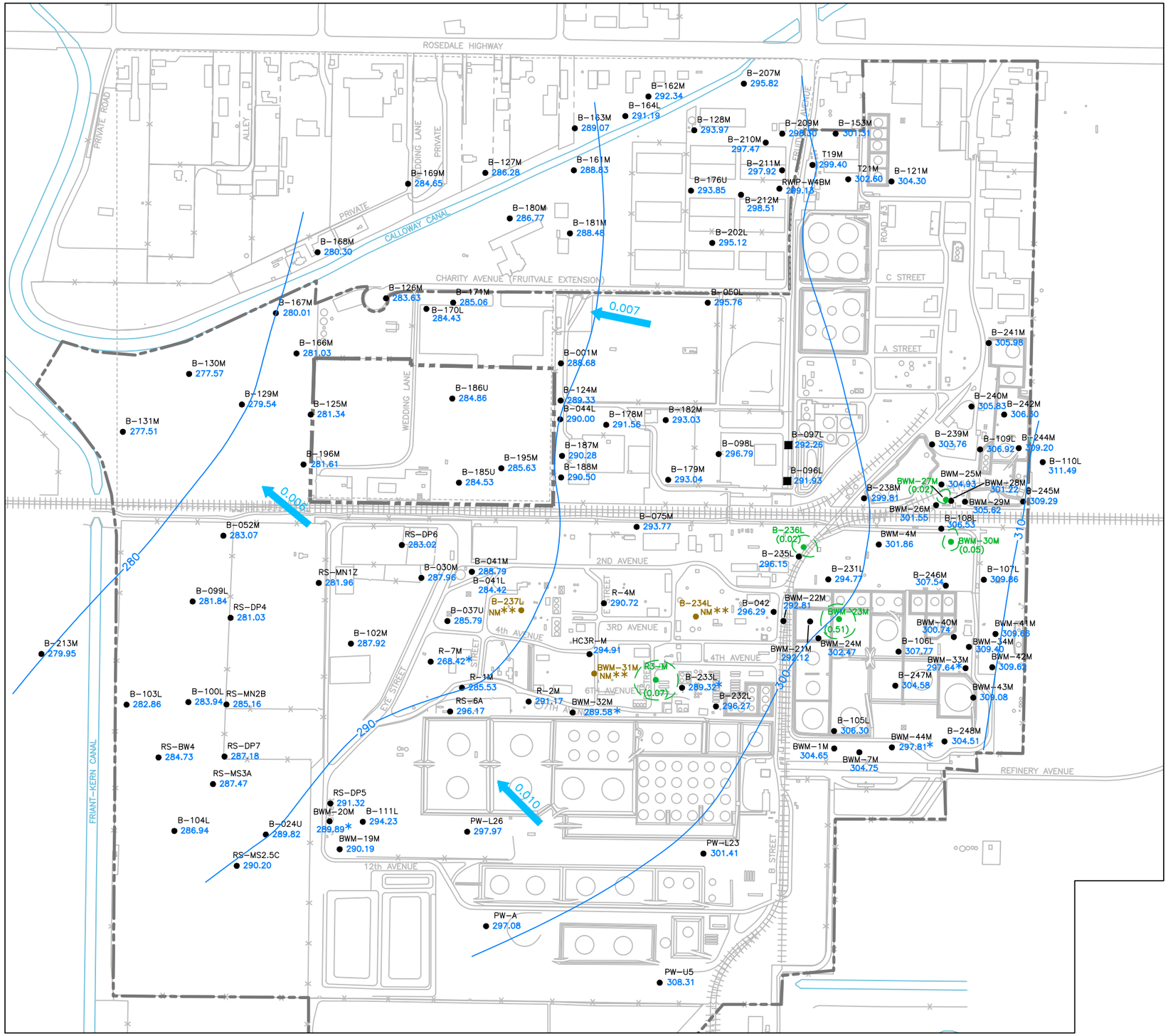

Explanation

Monitoring Points with Measured Groundwater Elevation (ft MSL)

- B-121M 321.86 — Monitoring well
- B-234L (0.06) — Monitoring point with Separate Phase Hydrocarbon present (thickness in feet)
- BWM-31M — Monitoring point dry or not measured
- BWM-31M — Well gauged after monitoring event; value is not considered time-equivalent and is not used in contouring (B-096L, B-097L)
- Property Boundary
- Interpreted line for equal elevation of groundwater (ft MSL); dashed where approximate or inferred
- Approximate area of Separate Phase Hydrocarbon accumulation
- 0.006 — Inferred groundwater flow direction with gradient
- Waterway

Notes

Wells gauged April 1 and 9, 2013. Well HC3R-M was gauged during purging on April 23, 2013. Well clusters B-096 and B-097 were gauged May 28, 2013.
Groundwater elevation data for wells containing Separate Phase Hydrocarbons are not posted
ft MSL = Feet above mean sea level
BGS = Below ground surface
* Anomalous value; not used in contouring (R-7M, BWM-20M, BWM-32M, BWM-33M, BWM-44M, B-233L)
** Well not measured due to pressurized casing (B-234L, B-237L, BWM-31M)

N

0 600'

URS

Figure 4

Groundwater Contours for Middle Zone Wells (Screen 110 to 140 feet bgs) Second Quarter 2013

Study Section 5
Monitoring Well Network Evaluation
Bakersfield Refinery, Bakersfield, California

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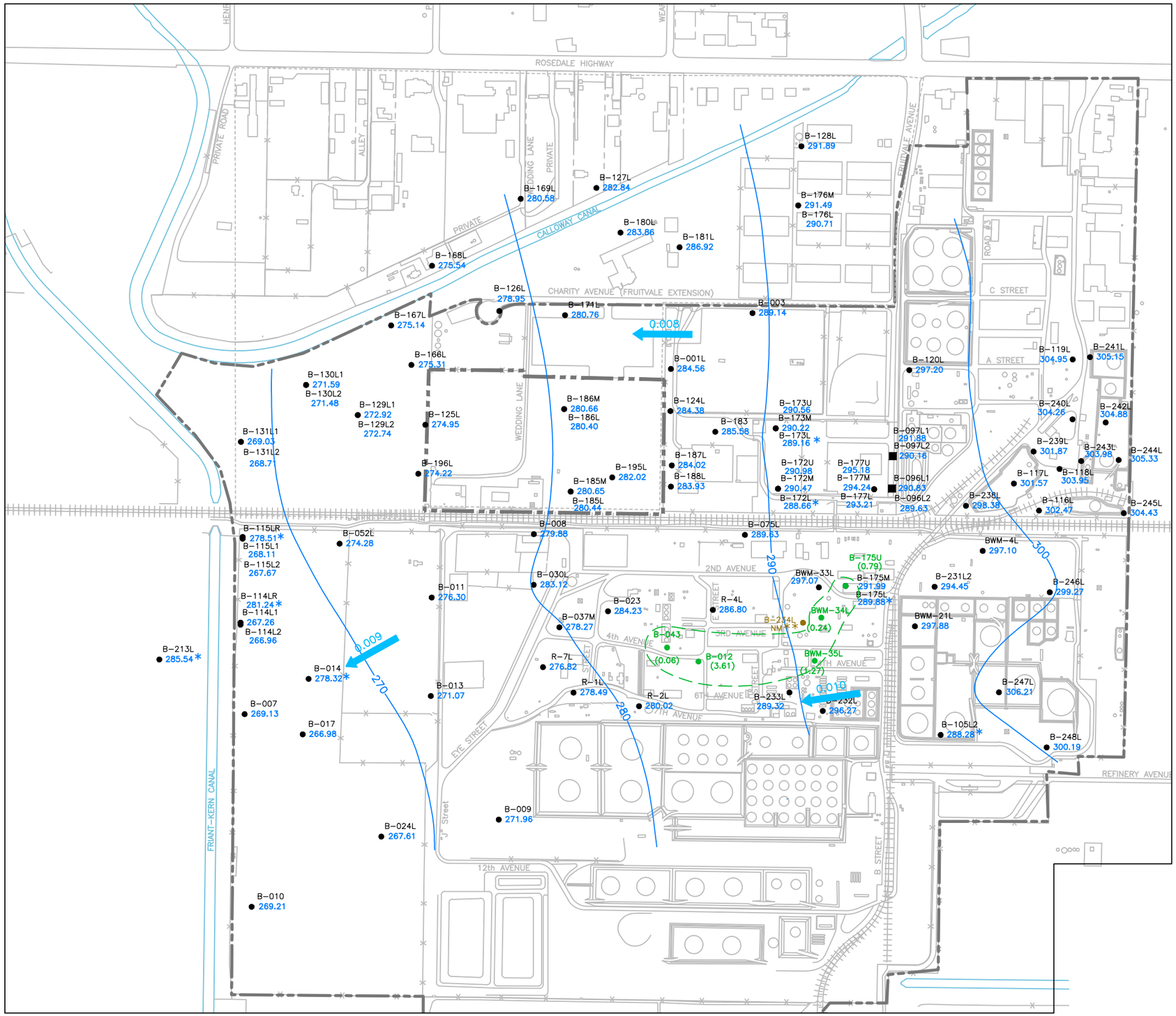

Explanation

Monitoring Points with Measured Groundwater Elevation (ft MSL)

- B-128L 298.63 — Monitoring well
- B-175U (0.73) — Monitoring point with Separate Phase Hydrocarbon present (thickness in feet)
- B-052L — Monitoring point dry or not measured
- BWM-31M — Well gauged after monitoring event; value is not considered time-equivalent and is not used in contouring (B-096L1, B-096L2, B-097L1, B-097L2)
- Property Boundary
- Interpreted line for equal elevation of groundwater (ft MSL); dashed where approximate or inferred
- Approximate area of Separate Phase Hydrocarbon accumulation
- 0.009 — Inferred groundwater flow direction with gradient
- Waterway

Notes

Wells gauged April 1 and 9, 2013. Well clusters B-096 and B-097 were gauged May 28, 2013.
Groundwater elevation data for wells containing Separate Phase Hydrocarbons are not posted
ft MSL = Feet Above Mean Sea Level
BGS = Below Ground Surface
NM = Not Measured
* Anomalous value: not used in contouring (B-014, B-105L, B-114LR, B-115LR, B-172L, B-173L, B-175L, B-213L).
** Well not measured due to pressurized casing (B-234L).

N

0 600'

URS

Figure 5

Groundwater Contours for Lower Zone Wells (Screen >140 feet bgs) Second Quarter 2013

Study Section 5
Monitoring Well Network Evaluation
Bakersfield Refinery, Bakersfield, California

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Explanation

Monitoring Points with Reported Analytical Concentration (µg/L) (Well Symbol)

- Monitoring Well
- Former Extraction Well
- Air Sparge Well

URS-07U <1.0 0.47J 470 1200 — Third Quarter 2013 Analytical Results (All other results posted are from Second Quarter 2013.)

B-103M <1.0 <0.50 410 <50 — Well Used in Evaluation

Reported Analytical Concentration (µg/L) (Color Code)

- 1.6 MTBE
- 0.17 Benzene
- 36 Diesel Range Organics
- 50 Gasoline Range Organics

Isoconcentration Contours for Reported Analytes (µg/L); Dashed Where Approximate or Inferred (Color Code)

- MTBE (13 µg/L)
- Benzene (1 µg/L)
- Diesel Range Organics (100 µg/L)
- Gasoline Range Organics (100 µg/L)

- Monitoring Point with Separate Phase Hydrocarbon Present (Thickness in Feet)
- Approximate Area of Separate Phase Hydrocarbon Accumulation
- Sunland Refinery Monitoring Well (April 2013)

Well Locations within Study Section 5 Area of Interest

- Groundwater Monitoring Well
- Air Sparge
- Extraction Well
- Injection Well
- Passive Venting Well
- Refinery WS Well
- Vapor Extraction Well

Abandoned Wells

- GW Monitoring Well
- Study Section 5
- Property Boundary

N W E S

1 inch = 350 feet

0 175 350 Feet

URS **Figure 6**

Interpreted Plume Extent for Upper Zone Wells (Screen <110 feet bgs)

Study Section 5
Monitoring Well Network Evaluation
Bakersfield Refinery, Bakersfield CA

Notes

Groundwater analytical results posted on the map are from Second Quarter 2013, with the exception of URS-07U, which displays data from Third Quarter 2013.

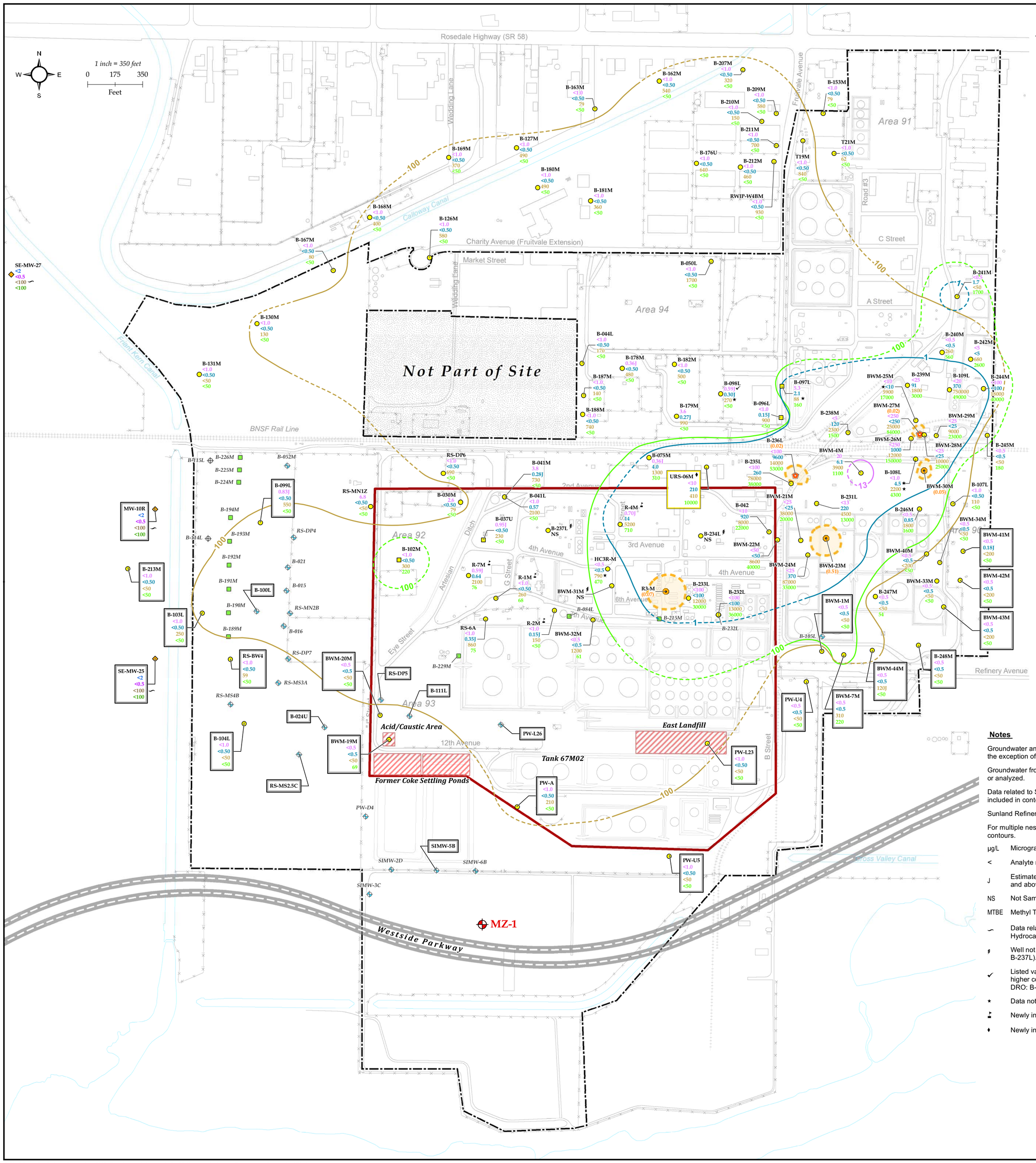
Groundwater from wells containing Separate Phase Hydrocarbons was not sampled or analyzed.

Data related to Sunland Refinery wells are not time-equivalent, and therefore not included in contouring.

Sunland Refinery wells are screened through all zones.

For multiple nested wells in the same location, highest value is used for isoconcentration contours.

µg/L	Micrograms per Liter
<	Analyte not detected above indicated reporting limit.
J	Estimated value below method reporting limit (MRL) and above method detection limit (MDL).
NS	Not Sampled (Inaccessible, Not Found, etc.)
Dry	Well Dry
MTBE	Methyl Tert-Butyl Ether
**	Well not sampled or gauged due to presence of skimmer pump (5U-14, 5U-15, RGO-1, RGO-3).
~	Data related to Sunland Refinery wells represent Total Extractable Petroleum Hydrocarbons (C6-C44).
✓	Listed value is result for duplicate sample which was reported at a higher concentration than primary sample (DRO and GRO: B-075U).
★	Data not used in contouring. MTBE: RGO-9; Benzene: B-108M, BWM-17U; DRO: BWM-14U, RS-HC7, B-100M, B-099M, 6U-3, SIMW-4B; GRO: 6U-2.
⚑	Newly installed well--2013 Q2 data posted (R-1U, R-2U, R-4U, and R-7U).
♦	Newly installed well--2013 Q3 data posted (URS-07U).
TD	Field measurements indicate upper zone completion.



Explanation

Proposed Groundwater Monitoring Well

- Preliminary New Well Location

Monitoring Points with Reported Analytical Concentration (µg/L) (Well Symbol)

- Monitoring Well
- Former Extraction Well
- Air Sparge Well

PW-L23 <1.0 <0.50 <50 <50 — Third Quarter 2013 Analytical Results (All other results posted are from Second Quarter 2013.)

B-010 <1.0 <0.50 <50 <50 — Well Used in Evaluation

Reported Analytical Concentration (µg/L) (Color Code)

- 1.6 MTBE
- 0.17 Benzene
- 36 Diesel Range Organics
- 50 Gasoline Range Organics

Isoconcentration Contours for Reported Analytes (µg/L); Dashed Where Approximate or Inferred (Color Code)

- MTBE (13 µg/L)
- Benzene (1 µg/L)
- Diesel Range Organics (100 µg/L)
- Gasoline Range Organics (100 µg/L)

- Monitoring Point with Separate Phase Hydrocarbon Present (Thickness in Feet)
- Monitoring Point with Separate Phase Hydrocarbon Present (Thickness in Feet) and Reported Analyte Concentration (µg/L)
- Approximate Area of Separate Phase Hydrocarbon Accumulation
- Sunland Refinery Monitoring Well (April 2013)

Well Locations within Study Section 5 Area of Interest

- Groundwater Monitoring Well
- Air Sparge
- Extraction Well
- Injection Well
- Passive Venting Well
- Refinery WS Well
- Vapor Extraction Well

Abandoned Wells

- GW Monitoring Well
- Study Section 5
- Property Boundary

Notes

Groundwater analytical results posted on the map are from Second Quarter 2013, with the exception of URS-06M and PW-L23, which display data from Third Quarter 2013.

Groundwater from wells containing Separate Phase Hydrocarbons was not sampled or analyzed.

Data related to Sunland Refinery wells are not time-equivalent, and therefore not included in contouring.

Sunland Refinery wells are screened through all zones.

For multiple nested wells in the same location, highest value is used for isoconcentration contours.

µg/L	Micrograms per Liter
<	Analyte not detected above indicated reporting limit.
J	Estimated value below method reporting limit (MRL) and above method detection limit (MDL).
NS	Not Sampled (Inaccessible, Not Found, etc.)
MTBE	Methyl Tert-Butyl Ether
⌒	Data related to Sunland Refinery wells represent Total Extractable Petroleum Hydrocarbons (C6-C44).
⚡	Well not gauged or sampled due to pressurized casing (BWM-31M, B-234L, B-237L).
✓	Listed value is result for duplicate sample which was reported at a higher concentration than primary sample. MTBE: B-098L; Benzene: B-108L; DRO: B-098L, B-108L.
★	Data not used in contouring. Benzene: BWM-25M; DRO: B-097L, HC3R-M.
⚑	Newly installed well--2013 Q2 data posted (R-1M, R-2M, R-4M, and R-7M).
♦	Newly installed well--2013 Q3 data posted (URS-06M).

URS

Figure 7

Interpreted Plume Extent for Middle Zone Wells (Screen 110 to 140 feet bgs)

Study Section 5
Monitoring Well Network Evaluation
Bakersfield Refinery, Bakersfield CA

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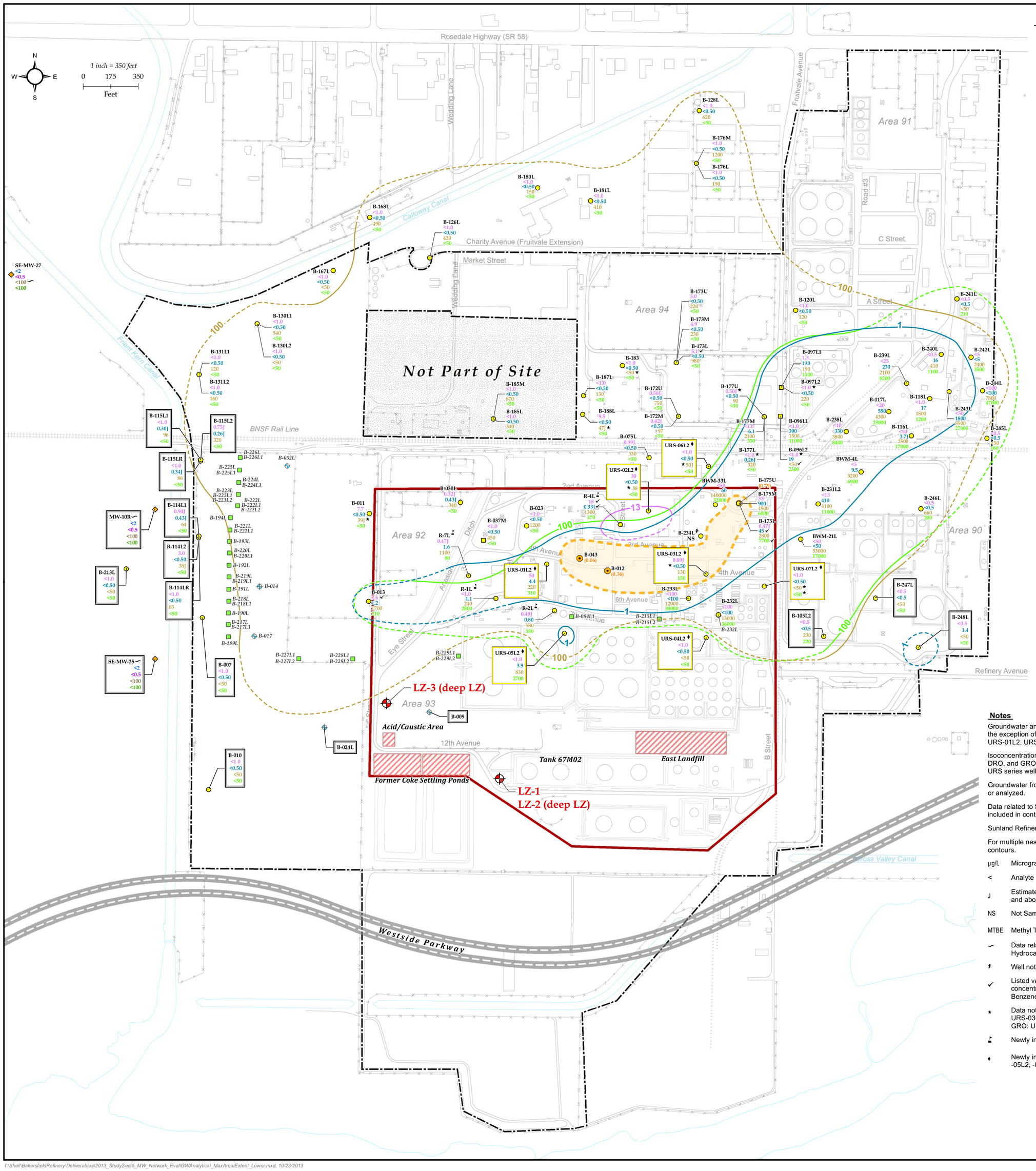

Explanation

Proposed Groundwater Monitoring Well

Preliminary New Well Location

Monitoring Points with Reported Analytical Concentration (µg/L) (Well Symbol)

Monitoring Well

Former Extraction Well

Air Sparge Well

B-010 <1.0 <0.50 <50 <50 — Third Quarter 2013 Analytical Results (All other results posted are from Second Quarter 2013.)

B-010 <1.0 <0.50 <50 <50 — Well Used in Evaluation

Reported Analytical Concentration (µg/L) (Color Code)

1.6 MTBE

0.17 Benzene

36 Diesel Range Organics

50 Gasoline Range Organics

Isoconcentration Contours for Reported Analytes (µg/L); Dashed Where Approximate or Inferred (Color Code)

MTBE (13 µg/L)

Benzene (1 µg/L)

Diesel Range Organics (100 µg/L)

Gasoline Range Organics (100 µg/L)

Monitoring Point with Separate Phase Hydrocarbon Present (Thickness in Feet)

Approximate Area of Separate Phase Hydrocarbon Accumulation

Sunland Refinery Monitoring Well (April 2013)

Well Locations within Study Section 5 Area of Interest

Groundwater Monitoring Well

Air Sparge

Extraction Well

Injection Well

Passive Venting Well

Refinery WS Well

Vapor Extraction Well

Study Section 5

Property Boundary

Notes

Groundwater analytical results posted on the map are from Second Quarter 2013, with the exception of the following wells, which display data from Third Quarter 2013: URS-01L2, URS-02L2, URS-03L2, URS-04L2, URS-05L2, URS-06L2, URS-07L2, B-010.

Isoconcentration contours were derived using 2013 Q2 groundwater data. Benzene, DRO, and GRO contours were adjusted using 2013 Q3 data from the newly installed URS series wells listed above.

Groundwater from wells containing Separate Phase Hydrocarbons was not sampled or analyzed.

Data related to Sunland Refinery wells are not time-equivalent, and therefore not included in contouring.

Sunland Refinery wells are screened through all zones.

For multiple nested wells in the same location, highest value is used for isoconcentration contours.

µg/L	Micrograms per Liter
<	Analyte not detected above indicated reporting limit.
J	Estimated value below method reporting limit (MRL) and above method detection limit (MDL).
NS	Not Sampled (Inaccessible, Not Found, etc.)
MTBE	Methyl Tert-Butyl Ether
⌒	Data related to Sunland Refinery wells represent Total Extractable Petroleum Hydrocarbons (C6-C44).
⸸	Well not gauged or sampled due to pressurized casing (B-234L).
✓	Listed value is result for duplicate sample which was reported at a higher concentration than primary sample. MTBE: B-013, B-173L, R-4L; Benzene: B-175L, R-4L; DRO: B-096L2; GRO: B-175L.
★	Data not used in contouring. Benzene: B-096L2, B-097L2, B-177U, B-177L, URS-03L2; DRO: B-011, B-183, B-188L, URS-02L2, URS-06L2, URS-07L2; GRO: URS-07L2
⸸	Newly installed well--2013 Q2 data posted (R-1L, R-2L, R-4L, and R-7L).
♦	Newly installed well--2013 Q3 data posted (URS-01L2, -02L2, -03L2, -04L2, -05L2, -06L2, -07L2).

URS

Figure 8

Interpreted Plume Extent for Lower Zone Wells (Screen >140 feet bgs)

Study Section 5
Monitoring Well Network Evaluation
Bakersfield Refinery, Bakersfield CA

T:\Shell\BakersfieldRefinery\Deliverables\2013_StudySect5_MW_Network_Eval\GWAnalytical_MaxArealExtent_Lower.mxd, 10/23/2013