Western Refining

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JUN 30 2014

NMED
Hazardous Waste Bureau

June 26, 2014

John E. Kieling, Bureau Chief
New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Bldg 1
Santa Fe, NM 87505

NMED FedEx Tracker #: 7704 4250 7880
OCD FedEx Tracker #: 7704 4224 9250

Re: Response to April 25, 2014 APPROVAL WITH MODIFICATIONS
Facility-Wide Groundwater Monitoring Plan – June 2013
Western Refining Southwest, Inc., Bloomfield Refinery
EPA ID# NMD089416416
HWB-WRB-13-005

Dear Mr. Kieling:

Western Refining Southwest, Inc. – Bloomfield Terminal (Western) has prepared the following response to NMED's comments (dated April 25, 2014) on the above referenced Facility-Wide Monitoring Plan.

Cover letter, bullet 1:

NMED's Comment: *Western proposes to remove MW-8 from the monitoring and sampling program because the casing has been damaged at the monitoring well. If the monitoring well is damaged beyond repair, Western must abandon the monitoring well in accordance with Section IX.D. (Well Abandonment) of the July 27, 2007 Order (Order) which requires approval from NMED and the New Mexico Office of the State Engineer to abandon wells in accordance with 19.27.4 NMAC "Rules and Regulations Governing Well Driller Licensing Construction, Repair, and Plugging of Wells" and submit the abandonment report for monitoring well MW-8 within thirty days upon completion.*

Western Response: Western is not planning on abandoning monitoring well MW-8 at this time. Western would like to continue collecting groundwater measurements at MW-8 for groundwater contouring efforts.

Cover letter, bullet 2:

NMED'S Comment: *Western proposes to remove monitoring wells MW-50 and MW-51 form Table 3 because the sampling requirements from Comment 2 of NMED's December 21, 2009 response to "SPH Recovery at Observation Wells and Routine Facility-Wide Groundwater Monitoring" have been met at these two monitoring wells. Western proposes to utilize MW-1, MW-67, MW-68, and MW-70 to characterize the water quality within the northwestern portion of the Bloomfield facility. NMED approves the removal of MW-50 from the sampling Program; however MW-51 must continue to be*

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sampled. In addition, MW-50 must continue to be monitored for water elevations. Provide replacement pages for the appropriate sections of the Monitoring Plan.

Western Response: Western will continue to sample MW-51 as requested by NMED. Depth-to-groundwater measurements will continue to be collected at MW-50 and MW-51. Section 5.0 and Table 3 of the Facility-Wide Monitoring Plan have been revised to reflect these changes. Replacement pages are attached.

Cover letter, bullet 3:

NMED'S Comment: *Western proposes to discontinue groundwater analysis for semi-volatile organic compounds (SVOCs) for monitoring wells MW-52, MW-53, MW-55, MW-59, MW-60, MW-62, MW-63, MW-64, MW-65, MW-67, and MW-68. However, NMED does not agree with discontinuing SVOC analysis at all of these monitoring wells. Diesel range organics (DRO) results at monitoring wells MW-59 and MW-65 continue to exceed the "unknown oil" standard of 0.2 milligrams per liter (mg/L). If results continue to exceed the DRO standard at these monitoring wells, SVOC must continue to be sampled at MW-59 and MW-65. In addition, monitoring well MW-55 has not met the minimum requirements for analyzing SVOC samples for two years because product is present in the monitoring well. Past data results indicate SVOCs and DRO exceedances in MW-55. Western must sample and analyze groundwater at MW-55 annually for two years once product is no longer present in the monitoring well. After Western has met the requirement, the sampling frequency at monitoring wells MW-55 may be reevaluated. Additionally, if monitoring wells MW-52, MW-53, MW-60, MW-62, MW-63, MW-67, and MW-68 consistently contain concentrations of DRO exceeding the "unknown oil" standard for three years, SVOCs must be analyzed at least once the following year. Provide replacement pages for the appropriate sections of the Monitoring Plan.*

Western Response: Western Refining will continue to sample and analyze for SVOCs at monitoring wells MW-59, and MW-65. Western will also sample and analyze groundwater for two years at MW-55 once separate phase in no longer present. Replacement pages have been submitted for Table 3.

Table 1, Page 1 of 3

NMED'S Comment: *The measured total depths of monitoring well MW-25 (21.31 feet)and recovery well RW-3 (25.4 feet) are above the screened interval reported in Table 1 (22-36 feet and 16.5-32.2 feet, respectively). Provide the previous monitoring data for these wells and discuss if Western plans to remove the sediment from the monitoring wells. In addition, compare the total depths of each monitoring well to the reported screened intervals and assess whether the measured total depths are above the screened intervals.*

Western Response: Western assumes NMED intended to list RW-2 and not RW-3 as a well indicating a total depth above the respective screening interval. Western reviewed Table 1 as requested and determined that the total well depths for MW-25 and RW-2 were a typo. The appropriate corrections have been made, and replacement pages are attached.

Appendix A:

NMED's Comment: *The July 27, 2007 Order does not require Western to submit well completion logs with the Work Plan. Western must only submit well completion logs for newly installed monitoring wells and recovery wells or wells that have been modified.*

Western Response: Western will submit only new well completion logs in future Work Plans.

General Comment:

NMED's Comment: *Western must include changes and modifications to the Monitoring Plan in the appropriate sections of future monitoring plans. Western must provide the replacement pages required by this letter no later than June 30, 2014.*

Western Response: Western will submit the changes in the appropriate sections of future Monitoring Plans.

If you have questions or need any additional information, please feel free to contact me at (505) 632-4171.

Sincerely,

Kelly Robinson

Kelly Robinson
Environmental Supervisor
Western Refining

cc: D. Cobrain – NMED HWB
N. Dhawan– NMED HWB
L. Tsinnajinnie – NMED HWB
C. Chavez - NMOCD
A. Hains – Western Refining, El Paso, Texas
R. Schmaltz – Western Refining, Bloomfield, NM

Former Refinery Area Wells

RW-1, MW-4, RW-9, RW-15, RW-18, MW-20, MW-21, RW-23, RW-28, MW-29, MW-30, MW-31, MW-40, RW-42, RW-43, and MW-44

Downgradient Wells

MW-11, MW-12, MW-34, MW-35, MW-37, and MW-38

RCRA Investigation Wells

MW-51, MW-52, MW-53, MW-54, MW-55, MW-56, MW-57, MW-58, MW-59, MW-60, MW-61, MW-62, MW-63, MW-64, MW-65, MW-66, MW-67, MW-68, MW-69, and MW-70

The location of the Former Refinery Complex monitor wells are shown in Figure 10. Information regarding the construction details of the monitor wells, including total well depth, screen interval, and top-of-casing elevation, is provided in Table 1.

Depth-to-groundwater and SPH thickness measurements will be collected from the seven sump wells (SW-1 through SW-7) following each major precipitation event. Any sump well where SPH is present will be equipped with an absorbent sock to prevent releases along the river bluff. Sump well monitoring activities will be included in the annual groundwater monitoring reports (NMED, 2008).

5.1.2. Sampling Frequency and Analyses

During each Annual Sampling Event (conducted in August of each year), groundwater samples will be collected from each selected well and analyzed for the following chemical constituents:

- VOCs;
- SVOCs *(for specified Downgradient and RCRA Investigation Wells Only)*
- TPH-DRO extended;
- TPH-GRO;
- Dissolved and Total Metals;
- Carbon Dioxide;
- Alkalinity (total, bicarbonate, and carbonate);
- Anions

Analyses and target analytes are listed in Table 2. The list of sample locations and monitoring frequency is provided in Table 3.

TABLE 3
Facility-Wide Monitoring Plan Summary

Well ID	Sampling Event	VOCs (EPA Method 8260)	VOCs - Target List [1] [2] (EPA Method 8260)	SVOCs (EPA Method 8270)	TPH - Diesel Range Organics Extended (EPA Method 8015B)	TPH - Gasoline Range Organics (EPA Method 8015B)	Total Recoverable Metals - Target List (EPA Method 6010/7470)	Total Dissolved Metals - Target List (EPA Method 6010/7470)	General Chemistry - Alkalinity (EPA Method 310.1)	General Chemistry - Anions (EPA Method 300.0)	Carbon Dioxide (EPA Method 310.1)	Total Dissolved Solids (TDS) (EPA Method 160.1 or Field Measurement)	Specific Conductance (EPA Method 120.1 or Field Measurement)	Temperature, pH, ORP (Field Measurement)	Dissolved Oxygen (Field Measurement)
TERMINAL COMPLEX															
Background Wells															
MW-3	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-5	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-6	Semi-Annual Event (April)		X									X	X	X	X
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
Refinery Wells															
RW-1	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-4	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
RW-9	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
RW-15	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
RW-18	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-20	Semi-Annual Event (April)		X									X	X	X	X
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-21	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
RW-23	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
RW-28	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-29	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-30	Semi-Annual Event (April)		X									X	X	X	X
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-31	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-40	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
RW-42	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
RW-43	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-44	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
Cross-Gradient Wells															
MW-1	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-13	Semi-Annual Event (April)		X									X	X	X	X
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-26	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-27	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-32	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-33	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X

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Downgradient Wells															
MW-11	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X***	X	X	X	X	X	X	X	X	X	X	X
MW-12	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)	X		X***	X	X	X	X	X	X	X	X	X	X	X
MW-34	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-35	Semi-Annual Event (April)		X									X	X	X	X
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-37	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-38	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)	X		X***	X	X	X	X	X	X	X	X	X	X	X
RCRA Investigation Wells															
MW-51	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-52	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X*	X	X	X	X	X	X	X	X	X	X
MW-53	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X*	X	X	X	X	X	X	X	X	X	X
MW-54	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-55	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-56	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-57	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-58	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-59	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-60	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X*	X	X	X	X	X	X	X	X	X	X
MW-61	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-62	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X*	X	X	X	X	X	X	X	X	X	X
MW-63	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X*	X	X	X	X	X	X	X	X	X	X
MW-64	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X	X	X	X	X	X	X	X	X	X	X
MW-65	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-66	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-67	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X*	X	X	X	X	X	X	X	X	X	X
MW-68	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X			X*	X	X	X	X	X	X	X	X	X	X
MW-69	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X
MW-70 ****	Semi-Annual Event (April)	Not Sampled													
	Annual Event (August)	X		X	X	X	X	X	X	X	X	X	X	X	X

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NORTH BOUNDARY BARRIER															
Collection Wells															
CW 0+60	Semi-Annual Event (April)		X		X							X	X	X	X
	Annual Event (August)		X		X							X	X	X	X
CW 25+95	Semi-Annual Event (April)		X		X							X	X	X	X
	Annual Event (August)		X		X							X	X	X	X
Observation Wells															
OW 0+60	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 1+50	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 3+85	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 5+50	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 6+70	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 8+10	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 11+15	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 14+10	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 16+60	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 19+50	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 22+00	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 23+10	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 23+90	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
OW 25+70	Semi-Annual Event (April)		X		X	X						X	X	X	X
	Annual Event (August)		X		X	X						X	X	X	X
Sump Wells [3]															
SW-1	Major Precipitation Event	*(No Sampling; Collection of Groundwater and SPH Levels Only)*													
SW-2	Major Precipitation Event	*(No Sampling; Collection of Groundwater and SPH Levels Only)*													
SW-3	Major Precipitation Event	*(No Sampling; Collection of Groundwater and SPH Levels Only)*													
SW-4	Major Precipitation Event	*(No Sampling; Collection of Groundwater and SPH Levels Only)*													
SW-5	Major Precipitation Event	*(No Sampling; Collection of Groundwater and SPH Levels Only)*													
SW-6	Major Precipitation Event	*(No Sampling; Collection of Groundwater and SPH Levels Only)*													
SW-7	Major Precipitation Event	*(No Sampling; Collection of Groundwater and SPH Levels Only)*													
SAN JUAN RIVER BLUFF															
Outfalls															
East Outfall #2	Semi-Annual Event (April)		X				X	X	X	X	X	X	X	X	
	Annual Event (August)		X				X	X	X	X	X	X	X	X	
East Outfall #3	Semi-Annual Event (April)		X				X	X	X	X	X	X	X	X	
	Annual Event (August)		X				X	X	X	X	X	X	X	X	
Seeps															
Seep 1	Semi-Annual Event (April)		X						X	X	X	X	X	X	
	Annual Event (August)		X						X	X	X	X	X	X	
Seep 2 [4]	Semi-Annual Event (April)		X						X	X	X	X	X	X	
	Annual Event (August)		X						X	X	X	X	X	X	
Seep 3 [4]	Semi-Annual Event (April)		X						X	X	X	X	X	X	
	Annual Event (August)		X						X	X	X	X	X	X	

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Seep 4 [4]	Semi-Annual Event (April)		X						X	X	X	X	X	X	
	Annual Event (August)		X						X	X	X	X	X	X	
Seep 5 [4]	Semi-Annual Event (April)		X						X	X	X	X	X	X	
	Annual Event (August)		X						X	X	X	X	X	X	
Seep 6	Semi-Annual Event (April)		X						X	X	X	X	X	X	
	Annual Event (August)		X						X	X	X	X	X	X	
Seep 7	Semi-Annual Event (April)		X						X	X	X	X	X	X	
	Annual Event (August)		X						X	X	X	X	X	X	
Seep 8	Semi-Annual Event (April)		X						X	X	X	X	X	X	
	Annual Event (August)		X						X	X	X	X	X	X	
Seep 9	Semi-Annual Event (April)		X						X	X	X	X	X	X	
	Annual Event (August)		X						X	X	X	X	X	X	
SAN JUAN RIVER TERRACE															
Monitoring and Dewatering Wells															
MW-49 [5]	High Flow Event		X		X	X	X						X	X	X
	Low Flow Event		X		X	X	X						X	X	X
DW-1	Bi-Annually (Starting 2011)		X		X	X	X						X	X	X
DW-3 [5]	High Flow Event		X		X	X	X						X	X	X
	Low Flow Event		X		X	X	X						X	X	X
Piezometers															
TP-3 [6]	Bi-Annually (Starting 2011)		X		X	X	X						X	X	X
TP-5 [5]	High Flow Event		X		X	X	X						X	X	X
	Low Flow Event		X		X	X	X						X	X	X
TP-6 [5]	High Flow Event		X		X	X	X						X	X	X
	Low Flow Event		X		X	X	X						X	X	X
TP-7 [6]	Bi-Annually (Starting 2011)		X		X	X	X						X	X	X
TP-8 [5]	High Flow Event		X		X	X	X						X	X	X
	Low Flow Event		X		X	X	X						X	X	X
TP-9 [5]	High Flow Event		X		X	X	X						X	X	X
	Low Flow Event		X		X	X	X						X	X	X
TP-10 [6]	Bi-Annually (Starting 2011)		X		X	X	X						X	X	X
TP-11 [6]	Bi-Annually (Starting 2011)		X		X	X	X						X	X	X
TP-12 [6]	Bi-Annually (Starting 2011)		X		X	X	X						X	X	X
TP-13 [6]	Bi-Annually (Starting 2011)		X		X	X	X						X	X	X
San Juan River															
Upstream	Semi-Annual Event (April)		X		X	X	X	X	X	X		X	X		
	Annual Event (August)		X		X	X	X	X	X	X		X	X		
North of MW#46	Semi-Annual Event (April)		X		X	X	X	X	X	X		X	X		
	Annual Event (August)		X		X	X	X	X	X	X		X	X		
North of MW#45	Semi-Annual Event (April)		X		X	X	X	X	X	X		X	X		
	Annual Event (August)		X		X	X	X	X	X	X		X	X		
Downstream	Semi-Annual Event (April)		X		X	X	X	X	X	X		X	X		
	Annual Event (August)		X		X	X	X	X	X	X		X	X		

Notes:

1. Refer to Table 2 for respective Target Analyte Lists.
2. VOC target list analytes for River Terrace sample are analyized by EPA Method 8021B, as stated in Table 1 of NMED's letter dated April 18, 2007.
3. Groundwater and SPH levels are monitored in each sump well following each major precipitation event (NMED, 2008).
4. A sample will be collected at this location during a semi-annual sampling event if an active groundwater discharge is present (NMED, 2008).
5. Samples will be collected during San Juan River low flow and high flow conditions.
6. Biannual sampling events (occuring once every two years) will be conducted during San Juan River low flow conditions.

* = If well consistently contains concentrations of DRO exceeding the "unknown oil" standard for 3 years, SVOCs will be analyzed at least once the following year (NMED, 2014).

*** = Samples for SVOC analysis will be collected every two years.

**** = Well was installed in 2012 and therefore requires sampling for two years on an annual basis.

Table 1
Facility-Wide Monitoring Program
Bloomfield Terminal - Bloomfield, New Mexico

Well Type	Well ID	Installation Date	Well Diameter *(in)*	Measuring Point Elevation (Before 2006) *(ft)*	Measuring Point Elevation (After 2006) *(ft)*	Grade Elevation [1] (before 2006) *(ft)*	Grade Elevation [1] (after 2006) *(ft)*	Total Well Depth *(ft bgs)*	Screened Interval *(ft bgs)*	Depth to Nacimiento Formation *(ft bgs)*	Elevation of Nacimiento Surface *(ft above msl)*
Background Wells											
Monitoring Well	MW-BCK1	2/1/12	2	NA	5620.14	NA	5617.508	79	60-75	See Log	See Log
Monitoring Well	MW-BCK2	2/13/12	2	NA	5517.8	NA	5516.131	60	40-60	See Log	See Log
Refinery Complex											
Monitoring Well	MW-1	2/8/84	4	5515.78	5519.21	5514.08	5517.54	22.95	2.9-22.9	22	5492.08
Monitoring Well	MW-3	2/9/84	4	5535.88	5539.27	5534.88	5538.61	38.35	18.4-38.4	40	5494.88
Monitoring Well	MW-4	2/9/84	6	5524.46	5527.78	5523.06	5526.56	31.1	11.1-31.1	32	5491.06
Monitoring Well	MW-5	2/6/84	4	5545.13	5548.56	5544.13	5547.97	50.61	30.6-50.6	47	5497.13
Monitoring Well	MW-6	2/7/84	4	5551.20	5554.61	5549.6	5553.32	48.03	28-48	49	5500.6
Monitoring Well	MW-7	2/25/86	6	5524.25	5527.66	5523.15	5526.34	61.01	49-59	32	5491.15
Monitoring Well	MW-8	2/28/86	6	5531.17	5534.58	5530.17	5533.84	33.94	11.9-31.9	34	5496.17
Monitoring Well	MW-11	7/31/87	4	5506.89	5510.31	5503.29	5507.12	21.13	6.1-16.1	10	5493.29
Monitoring Well	MW-12	8/1/87	4	5498.42	5501.61	5495.92	5499.5	11.72	1.7-11.7	10	5485.92
Monitoring Well	MW-13	9/3/88	4	5538.54	5542.04	5535.24	5539.12	49.7	28.7-44.5	45	5490.24
Monitoring Well	MW-20	9/13/91	4	5516.46	5519.9	5514.66	5517.91	25.38	8.4-23.4	24	5490.66
Monitoring Well	MW-21	9/16/91	4	5518.62	5521.99	5517.02	5520.75	29.33	12.3-27.3	24.5	5492.52
Monitoring Well	MW-25	5/11/94	6	5530.45	5533.99	5527.35	5530.92	41.20	22-36	35	5492.35
Monitoring Well	MW-26	5/12/94	6	5514.54	5517.88	5512.44	5515.73	23.15	7-21	20	5492.44
Monitoring Well	MW-27	5/18/94	4	5515.26	5518.67	5512.46	5515.78	21.69	5-20	17	5495.46
Monitoring Well	MW-29	5/12/94	4	5521.55	5524.97	5518.55	5522.07	25.74	10-24	23	5495.55
Monitoring Well	MW-30	5/13/94	4	5533.42	5536.83	5531.42	5534.81	38.16	21-36	35	5496.42
Monitoring Well	MW-31	5/15/94	4	5532.17	5536.24	5530.57	5534.66	37.62	21-35	34	5496.57
Monitoring Well	MW-32	2/23/95	4	5522.22	5525.64	5521.42	5524.95	26.74	10.7-24.7	25	5496.42
Monitoring Well	MW-33	2/23/95	4	5518.46	5521.79	5515.86	5519.85	22.95	6.9-20.9	20	5495.86
Monitoring Well	MW-34	2/23/95	4	5508.23	5511.63	5505.53	5509.21	18.32	2.3-16.3	14	5491.53
Monitoring Well	MW-35	4/29/97	2	5512.39	5518.95	N/A	5516.25	23.1	13.1-23.1	21.5	5494.75
Monitoring Well	MW-36	4/29/97	2	5510.56	5516.95	N/A	5514.16	21	11-21.2	21.5	5492.66
Monitoring Well	MW-37	5/1/97	2	5513.04	5519.62	N/A	5516.89	25	15-25	22	5494.89
Monitoring Well	MW-38	4/29/97	2	5512.87	5519.19	N/A	5516.65	23.5	13.5-23.5	22	5494.65
Monitoring Well	MW-39	9/28/98	2	5522	5520.83	N/A	5519.1	36	N/A	22	5497.1
Monitoring Well	MW-40	3/11/97	2	5526.21	5527.31	5521.45	5527.86	34.5	N/A	31.5	5496.36
Monitoring Well	MW-41	3/12/97	2	5525.13	5526.41	5529.88	5527.07	33.00	N/A	30.00	5497.07
Monitoring Well	MW-44	10/1/98	2	5536.00	5535.44	5535.94	5532.27	47.50	N/A	33.50	5498.77
Monitoring Well	MW-45	1/15/03	4	5506.36	5506.36	5496.33	5504.40	17.80	4.0-14.0	N/A	N/A
Monitoring Well	MW-46	1/16/03	4	5504.65	5504.65	5496.43	5503.03	10.39	3.2-8.2	10.50	5492.53
Monitoring Well	MW-47	3/6/03	2	5506.77	5506.77	5501.30	5504.15	12.80	6.1-11.1	11.30	5492.85
Piezometers	P-01	8/30/88	4	5524.49	N/A	5523.69	N/A	41.65	20.5-36.5	36.50	5487.19
Piezometers	P-02	8/29/88	4	5523.86	N/A	5523.06	N/A	37.53	16.9-32.2	31.50	5491.56
Piezometers	P-03	9/1/88	4	5507.31	5510.77	5506.51	5510.34	22	6.2-16.6	14	5492.51
Recovery Well	RW-1	8/31/88	4	5526.01	5529.34	5524.61	5527.93	39.58	17.4-33	32.6	5492.01
Recovery Well	RW-2	8/29/88	4	5523.61	5526.94	5523.11	5526.42	34.57	16.5-32.2	32	5491.11
Recovery Well	RW-3	3/4/86	6	5516.96	5520.35	5515.56	5519.28	32.53	10.5-30.5	23	5492.56
Recovery Well	RW-9	3/3/86	6	5519.77	5523.21	5518.07	5521.23	32.29	10.3-30.3	28.3	5489.77
Recovery Well	RW-14	8/6/90	4	5534.13	5537.5	5532.23	5535.19	41.1	21.1-39.1	38.5	5493.73

TABLE 1
Well Summary

Well Type	Well ID	Installation Date	Well Diameter *(in)*	Measuring Point Elevation (Before 2006) *(ft)*	Measuring Point Elevation (After 2006) *(ft)*	Grade Elevation [1] (before 2006) *(ft)*	Grade Elevation [1] (after 2006) *(ft)*	Total Well Depth *(ft bgs)*	Screened Interval *(ft bgs)*	Depth to Nacimiento Formation *(ft bgs)*	Elevation of Nacimiento Surface *(ft above msl)*
Recovery Well	RW-15	8/7/90	4	5533.44	5536.83	5531.74	5534.56	41.7	21.7-39.7	35	5496.74
Recovery Well	RW-16	8/7/90	4	5532.09	5535.45	5530.29	5533.22	41.3	21.3-39.3	37.5	5492.79
Recovery Well	RW-17	8/7/90	4	5530.46	5533.84	5528.86	5532.01	40.0	19.9-35.3	35.3	5493.56
Recovery Well	RW-18	8/9/90	4	5526.08	N/A	5523.48	N/A	N/A	17.3-35.3	29	5494.48
Recovery Well	RW-19	8/8/90	4	5527.27	5530.51	5525.77	5528.75	35.2	15.2-33.2	33	5492.77
Recovery Well	RW-22	7/19/93	6	5521.06	5524.44	5518.05	5521.44	35.6	14.7-30.7	27	5491.05
Recovery Well	RW-23	7/19/93	6	5517.74	5521.38	5515.74	5519.13	35.5	15.4-31.4	29	5486.74
Recovery Well	RW-28	5/13/94	4	5524.52	5527.93	5522.52	5525.69	35	18-33	32	5490.52
Recovery Well	RW-42	3/11/97	2	5527.48	5527.48	5529.80	5526.98	35	25-35	31.50	5495.98
Recovery Well	RW-43	9/25/98	2	NA	5515.74	5522.18	5519.44	25	15-25	22.80	5492.94
Monitoring Well	MW-50	9/25/08	4	NA	5518.79	NA	5515.87	20	8-18	18.50	5497.37
Monitoring Well	MW-51	9/25/08	4	NA	5515.58	NA	5512.88	20	8-18	18.50	5494.38
Monitoring Well	MW-52	10/14/08	4	NA	5538.63	NA	5535.91	41	23-38	38.00	5497.91
Monitoring Well	MW-53	9/23/08	4	NA	5541.32	NA	5538.46	42	25-40	39.00	5499.46
Monitoring Well	MW-54	9/26/08	4	NA	5530.08	NA	5527.35	38	22-37	34.00	5493.35
Monitoring Well	MW-55	4/2/09	4	NA	5519.84	NA	5519.94	27	11-26	26.00	5493.94
Monitoring Well	MW-56	4/1/09	4	NA	5519.31	NA	5516.74	24	7-22	20.00	5496.74
Monitoring Well	MW-57	3/31/09	4	NA	5521.17	NA	5518.46	24	8-23	23.00	5495.46
Monitoring Well	MW-58	4/3/09	4	NA	5520.29	NA	5520.47	27.00	10.75-25.75	25.75	5494.72
Monitoring Well	MW-59	4/6/09	4	NA	5545.20	NA	5542.37	44	28-43	42.50	5499.87
Monitoring Well	MW-60	4/5/09	4	NA	5543.71	NA	5544.01	45.50	28.75-43.75	43.75	5500.26
Monitoring Well	MW-61	4/15/09	4	NA	5539.41	NA	5539.59	40	24-39	38.00	5501.59
Monitoring Well	MW-62	4/21/09	4	NA	5561.32	NA	5558.56	58	42-57	55.50	5503.06
Monitoring Well	MW-63	4/14/09	4	NA	5547.26	NA	5544.49	46.00	29.75-44.75	44.75	5499.74
Monitoring Well	MW-64	4/7/09	4	NA	5552.29	NA	5549.11	50	34-49	48.00	5501.11
Monitoring Well	MW-65	4/16/09	4	NA	5539.52	NA	5539.90	44	28-43	42.00	5497.90
Monitoring Well	MW-66	4/20/09	4	NA	5544.63	NA	5541.98	43	27-42	41.00	5500.98
Monitoring Well	MW-67	8/26/10	4	NA	5523.31	NA	5520.54	23	12-22	21.25	5499.29
Monitoring Well	MW-68	8/27/10	4	NA	5517.37	NA	5514.30	18	7-17	17.00	5497.30
Monitoring Well	MW-69	8/31/10	4	NA	5508.51	NA	5505.20	9.8	3.5-8.5	8.00	5497.20
Monitoring Well	MW-70	01/30/12	2	NA	5527.96	NA	5524.78	26	15-25	23.80	5500.98
North Barrier Wall											
Observation Well	OW 0+60	4/2005	2	5508.75	5506.62	5505.97	5506.75	12	4-12	12	5494.62
Observation Well	OW 1+50	4/2005	2	5508	5508.03	5504.6	5505.63	12	7-12	12	5496.03
Observation Well	OW 3+85	4/2005	2	5506.81	5507.31	5503.87	5505.09	14	7.5-12.5	12.5	5494.81
Observation Well	OW 5+50	4/2005	2	5507.14	5507.59	5503.87	5504.84	10.7	5.7-10.7	9.5	5498.09
Observation Well	OW 6+70	4/2005	2	5504.23	5504.78	5501.32	5502.14	13.5	7.5-13.5	13	5491.78
Observation Well	OW 8+10	4/2005	2	5506	5506.53	5503.15	5504.27	13	7-13	7	5499.53
Observation Well	OW 11+15	4/2005	2	5506.77	5506.7	5503.67	5504.07	13.5	6-13.5	9	5497.7
Observation Well	OW 14+10	4/2005	2	5507.36	5508.14	5504.51	5505.73	10	5-10	9	5499.14
Observation Well	OW 16+60	4/2005	2	5507.8	5508.43	5504.21	5505.42	12.5	7.5-12.5	12	5496.43
Observation Well	OW 19+50	4/2005	2	5507.24	5508.03	5504.14	5505.25	10	5-10	10	5498.03
Observation Well	OW 22+00	4/2005	2	5506.32	5506.91	5506.32	5506.97	14	9-14	12	5494.91
Observation Well	OW 23+10	4/2005	2	5510.66	5514.12	5510.16	5511.24	15	5-15	14	5500.12
Observation Well	OW 23+90	4/2005	2	5511.15	5515.18	5511.15	5512.17	15	10-15	13.5	5501.68

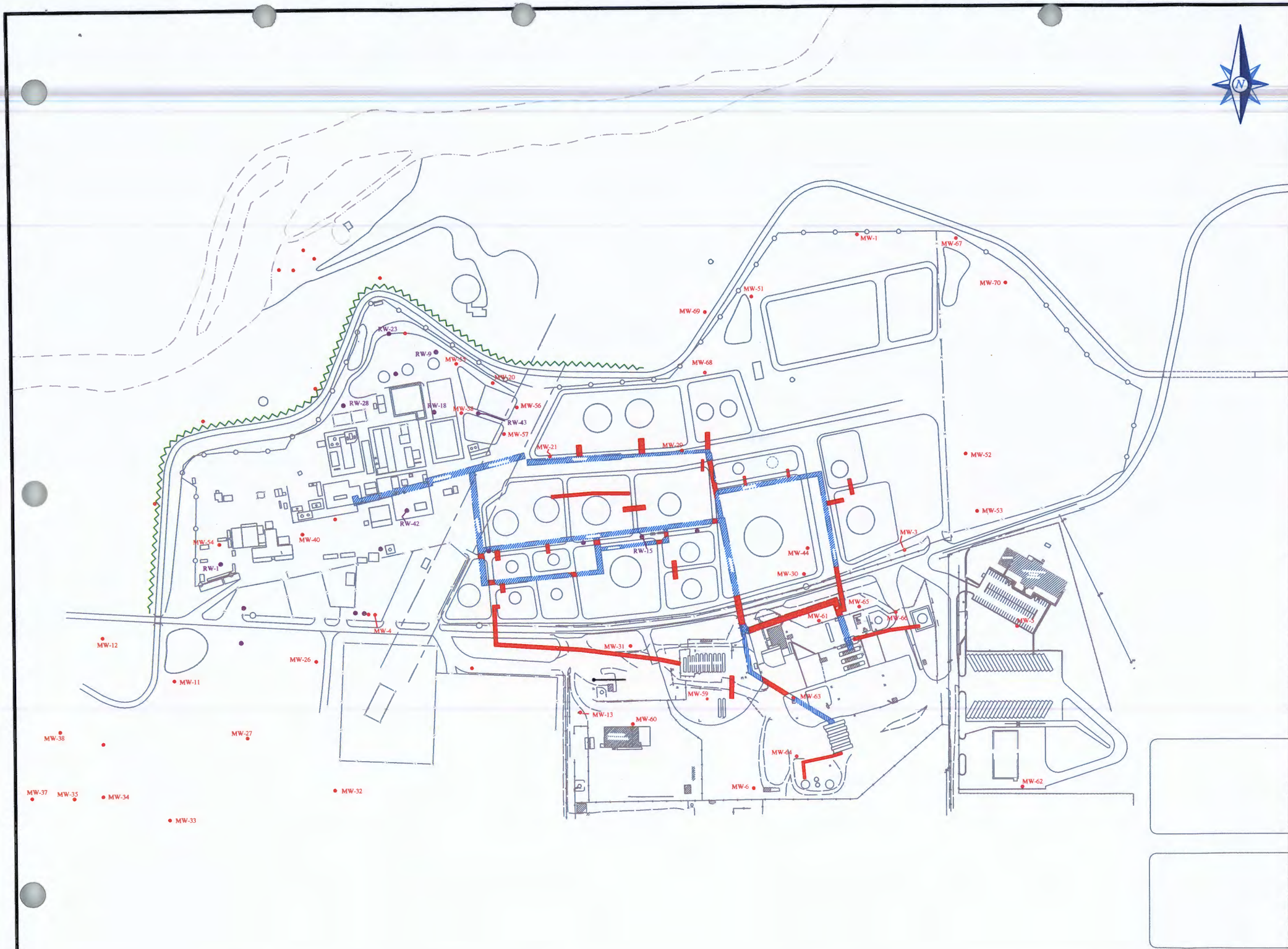
TABLE 1
Well Summary

Well Type	Well ID	Installation Date	Well Diameter *(in)*	Measuring Point Elevation (Before 2006) *(ft)*	Measuring Point Elevation (After 2006) *(ft)*	Grade Elevation (1) (before 2006) *(ft)*	Grade Elevation (1) (after 2006) *(ft)*	Total Well Depth *(ft bgs)*	Screened Interval *(ft bgs)*	Depth to Nacimiento Formation *(ft bgs)*	Elevation of Nacimiento Surface *(ft above msl)*
Observation Well	OW 25+70	4/2005	2	5508.56	5509	5508.01	5506.88	11	6-11	10	5499
Collection Well	CW 0+60	4/2005	6	5507.04	5506.68	5506.08	5507.01	14	4-14	12	5494.68
Collection Well	CW 1+50	4/2005	6	5505	5505.13	5504.4	5505.47	13	3-13	11	5494.13
Collection Well	CW 3+85	4/2005	6	5504.94	5503.87	5503.25	5504.11	13.5	3.5-13.5	11	5492.87
Collection Well	CW 5+50	4/2005	6	5503.23	5503.76	5504.17	5503.16	12.5	3.5-12.5	10	5493.76
Collection Well	CW 6+70	4/2005	6	5504.21	5503.84	5503.26	5504.11	12	4-12	9	5494.84
Collection Well	CW 8+10	4/2005	6	5503.96	5504.02	5503.33	5504.14	12	4-12	9.5	5494.52
Collection Well	CW 8+45	4/2005	6	5504.77	5503.8	5503.67	5504.09	13.3	3.3-13.3	9.5	5494.3
Collection Well	CW 11+15	4/2005	6	5504.69	5503.95	5503.73	5504.34	12.5	2.5-12.5	9	5494.95
Collection Well	CW 14+10	4/2005	6	5505.68	5504.39	5503.97	5504.69	13.5	3.5-13.5	9.5	5494.89
Collection Well	CW 16+60	4/2005	6	5505.72	5504.32	5504.02	5504.59	13.5	3.5-13.5	10	5494.32
Collection Well	CW 19+50	4/2005	6	5507.48	5504.52	5509.23	5504.75	11	3-11	8	5496.52
Collection Well	CW 22+00	4/2005	6	5510.82	5508.04	5510.16	5508.26	13.5	3.5-13.5	8	5500.04
Collection Well	CW 23+10	4/2005	6	5507.65	5510.04	5506.72	5510.27	15	5-15	13	5497.04
Collection Well	CW 23+90	4/2005	6	5507.65	5507.32	5506.72	5507.71	12	4-12	13	5494.32
Collection Well	CW 25+95	4/2005	6	5507	5505.9	5505.19	5505.89	11	3-11	13	5492.9
San Juan River Bluff											
Sump Well	SW1-0206	2/20/06	4	N/A	5508.27	N/A	5505.87	53	21-51	13.5	5494.77
Sump Well	SW2-0206	2/6/06	4	N/A	5507.75	N/A	5505.25	27	5-25	10	5497.75
Sump Well	SW3-0206	2/17/06	4	N/A	5505.29	N/A	5503.18	52	20-50	7.75	5497.54
Sump Well	SW4-0206	2/16/06	4	N/A	5504.45	N/A	5502.13	42	9.5-39.5	11	5493.45
Sump Well	SW5-0206	2/15/06	4	N/A	5514.34	N/A	5511.94	52	19-49	27.25	5487.09
Sump Well	SW6-0206	2/13/06	4	N/A	5519.72	N/A	5517.63	47	15-45	31.75	5487.97
Sump Well	SW7-0206	2/22/06	4	N/A	5508.42	N/A	5505.78	30	4-24	11	5497.42
San Juan River Terrace											
Monitoring Well	MW-48	10/28/04	4	5421.37	5424.83	5418.48	5422.21	15	5-15	N/A	N/A
Monitoring Well	MW-49	10/28/04	4	5421.22	5425.2	5418.07	5422.52	15	4-14	N/A	N/A
Dewatering Well	DW-1	8/16/05	4	5423.80	5422.97	N/A	5420.73	16	5-14	N/A	N/A
Dewatering Well	DW-2	8/18/05	4	N/A	5423.81	N/A	5422.67	14	4-14	N/A	N/A
Dewatering Well	DW-3	2/14/13	4	N/A	5424.79	N/A	5422.43	15	6-14	N/A	N/A
Temporary Piezometer	TP-1	10/28/04	2	5422.03	5422.03	5421.13	N/A	9	4-9	N/A	N/A
Temporary Piezometer	TP-2	10/28/04	2	N/A	N/A	N/A	N/A	9	4-9	N/A	N/A
Temporary Piezometer	TP-3	10/28/04	2	5423.88	5423.88	5422.66	N/A	9	4-9	N/A	N/A
Temporary Piezometer	TP-5	10/28/04	2	5422.83	5422.83	5422.00	N/A	8	3-8	N/A	N/A
Temporary Piezometer	TP-6	10/28/04	2	5422.56	5422.55	5421.40	N/A	10	5-10	N/A	N/A
Temporary Piezometer	TP-7	10/28/04	2	5422.00	5421.99.	5420.90	N/A	10	5-10	N/A	N/A
Temporary Piezometer	TP-8	10/28/04	2	5422.52	5422.52	5421.13	N/A	10	5-10	N/A	N/A
Temporary Piezometer	TP-9	4/5/05	2	5422.14	5422.14	5421.55	N/A	10	5-10	N/A	N/A
Temporary Piezometer	TP-10	4/5/05	2	5422.56	5422.56	5422.56	N/A	8.5	3.5-8.5	N/A	N/A
Temporary Piezometer	TP-11	4/5/05	2	N/A	N/A	N/A	N/A	9.5	4.5-9.5	N/A	N/A
Temporary Piezometer	TP-12	4/5/05	2	5424.97	5424.97	5424.97	N/A	12	7-12	N/A	N/A
Temporary Piezometer	TP-13	4/5/05	2	5423.88	5423.88	5423.88	N/A	14.5	4.5-14.5	N/A	N/A

Notes:

ft = feet
in = inches
bgs = below grade surface

msl = mean sea level
N/A = not available
(1) Top of casing elevations well resurveyed in 2006



Legend

- Monitor Well
- Recovery Well
- Underground Pipeway
- Above Ground Pipeway
- Slurry Wall Barrier
- Fence

0 125 250 375 500
Feet

Western Refining

Former Refinery Complex
Monitoring Well Location Map

Bloomfield Terminal
Facility-Wide Groundwater Monitoring Plan

June 2013 | Figure 10

Drawn By: TAO