AP - 111

ANNUAL GW MONITORING REPORT (1 of 29)

2016

State of New Mexico
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6313
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www.env.nm.gov

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JOHN A. SANCHEZ
Lieutenant Governor

BUTCH TONGATE
Cabinet Secretary
J. C. BORREGO
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

March 2, 2018

Mr. William Bailey
Environmental Supervisor
Western Refining, Southwest Inc., Gallup Refinery
92 Giant Crossing Road
Gallup, New Mexico 87301

RE: APPROVAL WITH MODIFICATIONS
HYDROCARBON SEEP INTERIM MEASURES
2017 4TH QUARTER STATUS REPORT
WESTERN REFINING SOUTHWEST INC., GALLUP REFINERY
EPA ID # NMD000333211
HWB-WRG-18-001

Dear Mr. Bailey:

The New Mexico Environment Department (NMED) has reviewed the *Hydrocarbon Seep Interim Measures 2017 4th Quarter Status Report* (Report), dated January 31, 2018, submitted on behalf of Western Refining Southwest Inc., Gallup Refinery (the Permittee). NMED hereby issues this Approval with Modifications. The Permittee must address the following comments.

Comment 1
In *Stand Pipes Recovery Records*, the volume of recovered hydrocarbons and water is recorded to an accuracy of one-gallon during the fourth quarter measurements. For example, the volume of recovered hydrocarbons and water for November 9, 2017 is recorded as 24 and 4,976 gallons, respectively. Previously, the measured volumes were recorded to an accuracy of five-gallons. Provide an explanation regarding the variance of the measuring techniques in a response letter.

Comment 2
In the first bullet of the list of activities conducted during fourth quarter 2017, the Permittee states, "[a]pproximately 38,400 gallons of groundwater/hydrocarbon mixture were recovered during the fourth quarter. That represents a reduction from the previous quarter at 59,400 gallons. An estimated volume of 1,145 gallons of SPH was recovered from the retention ditch in comparison to 535 gallons in the third quarter." Despite the reduction in total fluid recovery, oil recovery volume more than doubled during the fourth quarter compared to the oil recovery volume during the third quarter. Overall, the trend in oil recovery appears to be increasing throughout 2017. A variance in field measurement or collection techniques may have caused the apparent increase in recovered oil. Explain whether there was a variation in measurement or collection techniques. If there are other potential causes for the presence and increase in volume of recovered oil (e.g., spills or releases), then the Permittee must propose to investigate the cause. Provide an explanation in a response letter.

Comment 3
In the second bullet of the list of activities conducted during fourth quarter 2017, the Permittee states, "[a] [camera survey] contract has not yet been secured with the preferred vendor." In a response letter, describe whether the contracting issue has been resolved. If not, the Permittee must explain the nature of the issues or investigate the availability of alternative vendors. The Permittee must investigate potential on-going leaks and potential sources for releases to the environment through camera surveys as required in a timely manner.

Comment 4
In the third bullet of the list of activities conducted during fourth quarter 2017, the Permittee states, "[a]s the sumps are located beneath the truck loading rack that is constantly in service, any additional testing in this immediate area will require extensive internal coordination." Dye tracer may be introduced from locations other than the immediate sumps as long as the release origin is directly connected to the sumps. Investigate the possibility of introducing the dye from alternative locations that are more accessible. If the test can be conducted, the Permittee must include a proposal for the dye test in any future 2018 reports. If not, the Permittee must provide a more detailed explanation why the test cannot be conducted from other release location in a response letter. The Permittee must address all potential on-going leaks and potential sources of releases to the environment.

The Permittee must address all comments in this Approval with Modifications, and submit a response letter, cross-referencing NMED's numbered comments by **September 30, 2018**.

If you have questions regarding this Approval with Modifications, please contact Michiya Suzuki of my staff at 505-476-6059.

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: K. Van Horn NMED HWB
M. Suzuki NMED HWB
C. Chavez OCD
A. Hains WRG
C. Johnson WRG
L. King EPA Region 6

File: Reading File and WRG 2018 File
HWB-WRG-18-001

Chavez, Carl J, EMNRD

From: O'Brien, Jessica L <Jessica.L.OBrien@andeavor.com>
Sent: Thursday, January 25, 2018 5:46 PM
To: VanHorn, Kristen, NMENV; Chavez, Carl J, EMNRD
Subject: Gallup Refinery Response to Approval with Modifications
Attachments: 2018-01-25 Gallup Response to Comments 2 and 4.pdf; SMW-2 Area MW Locations.pdf; OW-59.pdf; OW-60.pdf; 2017-09-29 Approval with Mods Annual GW Monitoring Rpt, Rev 2.pdf

All,
Please find the attached correspondence being sent to satisfy requests communicated in the September 29, 2017 letter from NMED HWB to the Gallup Refinery. We hope this response will address Comments 2 and 4 in accordance with the due dates **January 26** and **March 1, 2018**, respectively. If you have any questions, please do not hesitate to contact me via the information provided below.

Sincerely,

Jessica O'Brien
Gallup Refinery – Environmental Supervisor
Jessica.L.Obrien@andeavor.com

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Gallup, NM 87301
o: 505 722 0287
c: 409 454 3777
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Certified Return Receipt: #7016 2710 0000 5955 3766

January 25, 2018

Mr. John E. Kieling, Chief
New Mexico Environmental Department
2905 Rodeo Park Drive East, Bldg 1
Santa Fe, NM 87505-6303

RE: RESPONSE TO APPROVAL WITH MODIFICATIONS
ANNUAL GROUNDWATER MONITORING REPORT: GALLUP REFINERY-2014, REVISION 2
WESTERN REFINING SOUTHWEST INC, GALLUP REFINERY
EPA ID# NMD000333211
HWB-WRG-15-004

Dear Mr. Keiling:

You will find our response below to Comment No. 2 of your referenced letter of September 29, 2017.

NMED Comment 2

In the Permittee's response to NMED's Disapproval Comment 3, the Permittee states, "[i]t is apparent that the New API Separator is a likely source of these elevated [chloride and nitrate] concentrations," and "Old API Separator was a likely source of elevated chlorides to groundwater in the area." NMED concurs that releases from NAPIS and OAPIS may be sources of chloride in the groundwater sample collected from well STP1-NW; however, the potential source(s) may not be limited to the releases from NAPIS and OAPIS. Well STP1-NW is located on the perimeter of Sanitary Treatment Pond 1 (STP1); STP1 may be a source of chloride in well STP1-NW. The chloride concentration in the sample collected from outfall STP1 is recorded as 4,100 mg/L in the November 2014 sampling event, which is comparable to the chloride concentration in well STP1-NW. Evaluate whether STP1 liner remains intact. Submit a work plan to evaluate whether STP1 is leaking. In addition, the chloride concentration in the sample collected from Pond EP-2 is recorded as 2,400 mg/L during the November 2014 sampling event. Leaking from the eastern perimeter or bottom of Pond EP-2 may cause wastewater to overcome the natural gradient and affect the chloride concentrations in upgradient wells (STP1-NW and GMW-1). The chloride concentrations in the samples from wells STP1-NW and GMW-1 are recorded as 1,800 and 1,000 mg/L, respectively. Evaluate whether water in Pond EP-2 is infiltrating to the water table beneath the eastern portion of Pond EP-2. Propose a work plan to investigate leakage from Pond EP-2 for NMED review.

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Western Response

The focus of comment No. 2 appears to be identifying the source(s) of elevated chloride concentrations detected in the shallow groundwater that occurs above the Chinle Formation. As noted in NMED's most recent comment and earlier comments on this same matter, there are numerous wells in the vicinity of the subject areas with elevated chloride concentrations. In addition, there are multiple potential sources as the same wastewater has been handled in several nearby Solid Waste Management Units and Areas of Concern.

NMED previously requested a work plan (Disapproval Annual Groundwater Monitoring Report: Gallup Refinery – 2014, dated June 20, 2016) for the investigation of elevated chlorides observed in monitoring well SMW-2, which is located down-gradient of the aforementioned wells and potential sources. This work plan was approved by NMED on March 17, 2017 and subsequently implemented with the installation of new monitoring wells OW-59 and OW-60, as shown on the enclosed map. Chloride was reported at concentrations of 2,000 mg/l and 1,600 mg/l in OW-59 and OW-60, respectively. The well completion logs for OW-59 and OW-60 are also enclosed. As shown in the 2014 Annual Groundwater Monitoring Report, the elevated chloride concentrations reported in SMW-2 date back to at least 2008, well before construction of STP1. With the installation of wells OW-59 and OW-60, it appears the area of elevated chloride concentrations extends from at least the Old API Separator to SMW-2.

Western proposes to discuss this matter with NMED in the upcoming meeting that both parties recently agreed to with the goal of developing a holistic approach to investigating chlorides over this area. As opposed to multiple work plans, we believe a single work plan, as necessary, will be more effective in identifying any active releases of chloride.

NMED Comment 4

In the Permittee's response to NMED's Disapproval Comment 9, the Permittee states, "[a] separate shallow well would be necessary to appropriately screen across the upper saturated interval present above the confining layer and allow hydrocarbons to enter the well from this upper interval." Evaluate the construction of each monitoring well to determine whether the installation of separate shallow well is necessary to screen across the upper saturated interval. Submit a work plan to install separate shallow wells to monitor the aquifer above the confining layer for applicable wells. Well MKTF-18 may require a separate shallow well as stated by the Permittee; however, other wells (e.g., MKTF-1) with submerged screened intervals may need to be replaced because the screens are inappropriately installed without crossing the confining layer. Evaluate the construction of each monitoring well to determine whether the well screen is appropriately installed across the upper saturated intervals. Propose a work plan to evaluate and replace wells having inappropriate screened intervals that are pertinent to delineating SPH plume as necessary.

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Gallup, NM 87301

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Western Response

Western requests an extension to respond to Comment No. 4. The issue of well screen placement has been previously discussed in earlier correspondence; however, it appears that questions remain regarding proper well screen placement. We propose to evaluate the construction of the monitoring wells as requested by NMED and intend to discuss this information with NMED during the up-coming meeting. Based on the results of the meeting, Western will submit any required work plans per an agreed upon new schedule.

If you have any questions regarding Western's responses, please do not hesitate to contact me at (505) 722-0287.

Sincerely,

Jessica O'Brien

Ms. Jessica O'Brien
Environmental Supervisor

Enclosure

cc: K. Van Horn, NMED HWB (*via e-mail*)
C. Chavez, OCD (*via e-mail)*
A. Hains, Andeavor (*via e-mail)*
D. Pruner, Andeavor (*via e-mail)*

State of New Mexico
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

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Cabinet Secretary
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Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

September 29, 2017

William Bailey
Environmental Supervisor
Western Refining, Southwest Inc., Gallup Refinery
92 Giant Crossing Road
Gallup, New Mexico 87301

RE: APPROVAL WITH MODIFICATIONS
ANNUAL GROUNDWATER MONITORING REPORT: GALLUP REFINERY – 2014, REVISION 2
WESTERN REFINING SOUTHWEST INC., GALLUP REFINERY
EPA ID # NMD000333211
HWB-WRG-15-004

Dear Mr. Bailey:

The New Mexico Environment Department (NMED) has reviewed the *Annual Groundwater Monitoring Report: Gallup Refinery – 2014, Revision 2* (Report), submitted September 2017, on behalf of Western Refining Southwest Inc., Gallup Refinery (Permittee) and hereby issues this *Approval with Modifications* with the following comments.

Comment 1

In the Permittee's response to NMED's *Disapproval* (dated June 1, 2017) Comment 2, the Permittee states, "[t]he numbering in the Table of Contents has been corrected..." The Table of Contents still contains errors. For example, although the page number for Section 1.1, *Facility Ownership, Operation and Location* is indicated as 12 in Table of Contents, the page number is 11 in the Report. No revisions to this Report are necessary.

Comment 2

In the Permittee's response to NMED's *Disapproval* Comment 3, the Permittee states, "[i]t is apparent that the New API Separator is a likely source of these elevated [chloride and nitrate] concentrations," and "Old API Separator was a likely source of elevated chlorides to groundwater in the area." NMED concurs that releases from NAPIS and OAPIS may be sources of chloride in the groundwater sample collected from well STP1-NW; however, the potential source(s) may not be limited to the releases from NAPIS and OAPIS. Well STP1-NW is located on the perimeter of Sanitary Treatment Pond 1 (STP1); STP1 may be a source of chloride in well STP1-NW. The chloride concentration in the sample collected from outfall STP1 is recorded as 4,100 mg/L in the November 2014 sampling event, which is comparable to the chloride concentration in well STP1-NW. Evaluate whether STP1 liner remains intact. Submit a work plan to evaluate whether STP1 is leaking. In addition, the chloride concentration in the sample collected from Pond EP-2 is recorded as 2,400 mg/L during the November 2014 sampling event. Leaking from the eastern perimeter or bottom of Pond EP-2 may cause wastewater to overcome the natural gradient and affect the chloride concentrations in upgradient wells (STP1-NW and GMW-1). The chloride concentrations in the samples from wells STP1-NW and GMW-1 are recorded as 1,800 and 1,000 mg/L, respectively. Evaluate whether water in Pond EP-2 is infiltrating to the water table beneath the eastern portion of Pond EP-2. Propose a work plan to investigate leakage from Pond EP-2 for NMED review.

Comment 3

In the Permittee's response to NMED's *Disapproval* Comment 5, the Permittee states, "[a] new product sample was collected during the second quarterly sampling event and the results are attached on Hall Report 31706C54, dated July 21, 2017 (pages 7-8) and included as Attachment 1 to this response." The analytical results of the product collected from well RW-1 indicates that the fractions of GRO, DRO and MRO are 61, 9.7 and 0%, respectively. Explain the fraction of remaining 29% in the product in a response letter.

Comment 4

In the Permittee's response to NMED's *Disapproval* Comment 9, the Permittee states, "[a] separate shallow well would be necessary to appropriately screen across the upper saturated interval present above the confining layer and allow hydrocarbons to enter the well from this upper interval." Evaluate the construction of each monitoring well to determine whether the installation of separate shallow well is necessary to screen across the upper saturated interval. Submit a work plan to install separate shallow wells to monitor the aquifer above the confining layer for applicable wells. Well MKTF-18 may require a separate shallow well as stated by the Permittee; however, other wells (e.g., MKTF-1) with submerged screened intervals may need to be replaced because the screens are inappropriately installed without crossing the confining layer. Evaluate the construction of each monitoring well to determine whether the well screen is appropriately installed across the upper saturated intervals. Propose a work plan to evaluate and replace wells having inappropriate screened intervals that are pertinent to delineating SPH plume as necessary.

Submit work plans to address Comments 2 and 4 for NMED review no later than **January 26, 2018** and **March 1, 2018**, respectively. Also, submit a response letter regarding Comment 3 no later than **November 6, 2017**.

If you have questions regarding this *Approval with Modifications*, please contact Kristen Van Horn of my staff at 505-476-6046.

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: K. Van Horn NMED HWB
M. Suzuki NMED HWB
C. Chavez OCD
A. Hains WRG
L. King EPA Region 6

File: Reading File and WRG 2017 File
HWB-WRG-15-004

Aerial Map Source: Google Map, 03/18/2016.

N

0 300

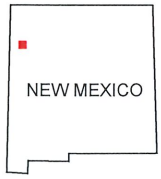
SCALE IN FEET

LEGEND

NEW MONITORING WELL LOCATION

MKTF-43 MONITORING WELL LOCATION (CHINLE / ALLUVIAL) AND IDENTIFICATION NUMBER

OW-01 MONITORING WELL LOCATION (SONSELA) AND IDENTIFICATION NUMBER



SITE LOCATION

Western Refining
GALLUP REFINERY

PROJ. NO.:Western Refining | DATE: 10/4/16 | FILE:WestRef-dA76

SMW-2 AREA
NEW
MONITORING WELL LOCATIONS

DiSorbo
Environmental Consulting Firm
8501 N. MoPac Expy.
Suite 300
Austin, Texas 78759

DiSorbo
Environmental Consulting Firm

Western Refining SW, Inc
Gallup Refinery
Job No. WEST17020

Geologist	: Tracy Payne
Driller	: Enviro-Drill Inc/Cohagan
Drilling Rig	: CME75
Drilling Method	: Hollow Stem Auger 7 1/4"
Sampling Method	: 2' Split Spoon
Comments	: Hand Auger to 5 BGL
Total Depth	: 40'
Ground Water	: 26'
Start Date	: 06/12/2017
Finish Date	: 06/12/2017

WELL NO. OW-59

(Sheet 1 of 3)

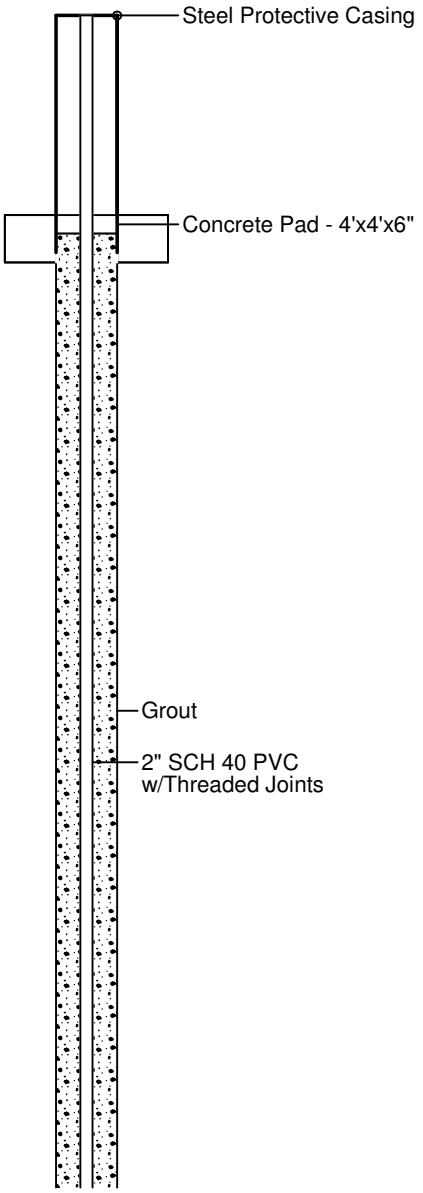
Elev., TOC (ft.msl)	:
Elev., PAD (ft. msl)	:
Elev., GL (ft. msl)	:
Site Coordinates	:
N	: N35° 29.622'
E	: W108° 25.971'

Saturation
▼ Saturation

Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Recovery (%)	Sample	DESCRIPTION
0							
1	0.0			CL	100		SILTY CLAY, low, firm, damp, brown, no odor,
2							
3	0.0			CL	100		SILTY CLAY, SIMILAR TO ABOVE (STA),
4							
5	0.0			CL	100		SILTY CLAY, STA,
6							
7	2.0			CH	70		CLAY, high, stiff, damp, brown, no odor,
8							
9	1.0			CL	80		SILTY CLAY, low, stiff, damp, light brown, no odor, sandy at base,
10							
11	0.3			ML	70		SILT, low, compact, damp, brown, no odor,
12							
13	0.5			CL			SILTY CLAY, low, very stiff, damp, brown, no odor, trace sand,

Completion Results

Well No. OW-59



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512-693-4190

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Environmental Consulting Firm

Western Refining SW, Inc
Gallup Refinery
Job No. WEST17020

Geologist	: Tracy Payne
Driller	: Enviro-Drill Inc/Cohagan
Drilling Rig	: CME75
Drilling Method	: Hollow Stem Auger 7 1/4"
Sampling Method	: 2' Split Spoon
Comments	: Hand Auger to 5 BGL
Total Depth	: 40'
Ground Water	: 26'
Start Date	: 06/12/2017
Finish Date	: 06/12/2017

WELL NO. OW-59

(Sheet 2 of 3)

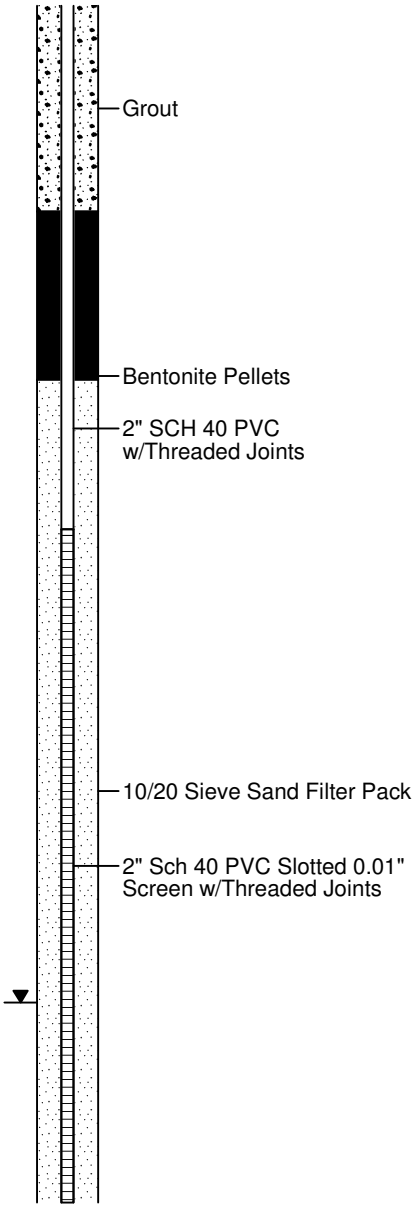
Elev., TOC (ft.msl)	:
Elev., PAD (ft. msl)	:
Elev., GL (ft. msl)	:
Site Coordinates	:
N	: N35° 29.622'
E	: W108° 25.971'

Saturation
▼ Saturation

Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Recovery (%)	Sample	DESCRIPTION
13							
	0.5			CL	50		
14							SILTY CLAY, high, very stiff, damp, brown, no odor,
15	1.3			CH	50		
16							SILTY CLAY, STA, no odor,
17	1.7			CH	60		
18							SILTY CLAY, low to moderate, stiff, damp, brown, no odor,
19	1.1			CL	50		
20							SANDY SILTY CLAY, low, firm to soft, damp, brown, no odor,
21	1.2			CL	50		
22							SANDY CLAY, low, soft, damp, brown, no odor,
23	0.2			CL	60		
24							SILTY CLAY, low, soft, damp, brown, no odor,
25	3.3			CL	70		
26		▼					SANDY SILT, very fine, very moist, brown, no odor,
27	10.9			ML	80		
28							SANDY SILT, STA, very moist, no odor,
	11.6			ML			
29							

Completion Results

Well No. OW-59



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Environmental Consulting Firm

Western Refining SW, Inc
Gallup Refinery
Job No. WEST17020

Geologist	: Tracy Payne
Driller	: Enviro-Drill Inc/Cohagan
Drilling Rig	: CME75
Drilling Method	: Hollow Stem Auger 7 1/4"
Sampling Method	: 2' Split Spoon
Comments	: Hand Auger to 5 BGL
Total Depth	: 40'
Ground Water	: 26'
Start Date	: 06/12/2017
Finish Date	: 06/12/2017

WELL NO. OW-59

(Sheet 3 of 3)

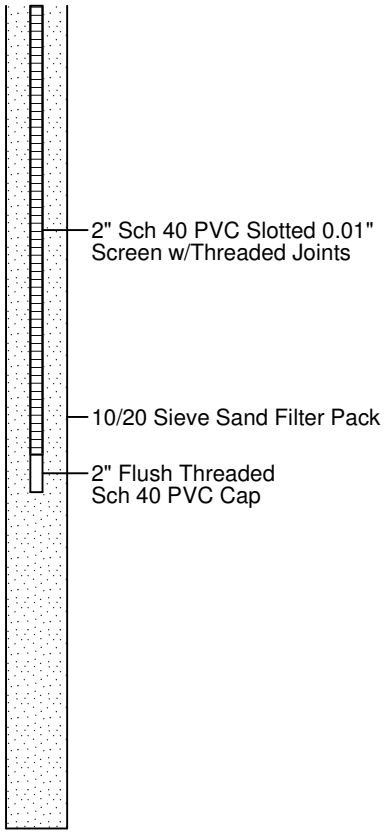
Elev., TOC (ft.msl)	:
Elev., PAD (ft. msl)	:
Elev., GL (ft. msl)	:
Site Coordinates	:
N	: N35° 29.622'
E	: W108° 25.971'

Saturation
▼ Saturation

Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Recovery (%)	Sample	DESCRIPTION
29	11.6			ML	80		
30							SILTY CLAY, low, firm, damp, brown, no odor,
31	11.4			CL	90		
32	14.9			CL	90		SILTY CLAY, STA, no odor,
33	16.3			SM	90	X	SILTY SAND, very fine, compact, saturated, brown, no odor,
34							SILTY CLAY, low, firm, damp, brown, no odor,
35	10.5			CL	60		
36							SILTY CLAY, STA, no odor,
37	7.3			CL	70		
38				CH	70		CLAY, high, firm, damp, brown, no odor,
39	10.0			CL	70		SILTY CLAY, low, firm to soft, grey and white, no odor, trace sand and white nodules.
40							
41							
42							
43							
44							
45							

Completion Results

Well No. OW-59



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Western Refining SW, Inc
Gallup Refinery
Job No. WEST17020

Geologist	: Tracy Payne
Driller	: Enviro-Drill Inc/Cohagan
Drilling Rig	: CME75
Drilling Method	: Hollow Stem Auger 7 1/4"
Sampling Method	: 2' Split Spoon
Comments	: Hand Auger to 5' BGL
Total Depth	: 48'
Ground Water	: Not Encountered
Start Date	: 6/13/2017
Finish Date	: 6/13/2017

WELL NO. OW-60

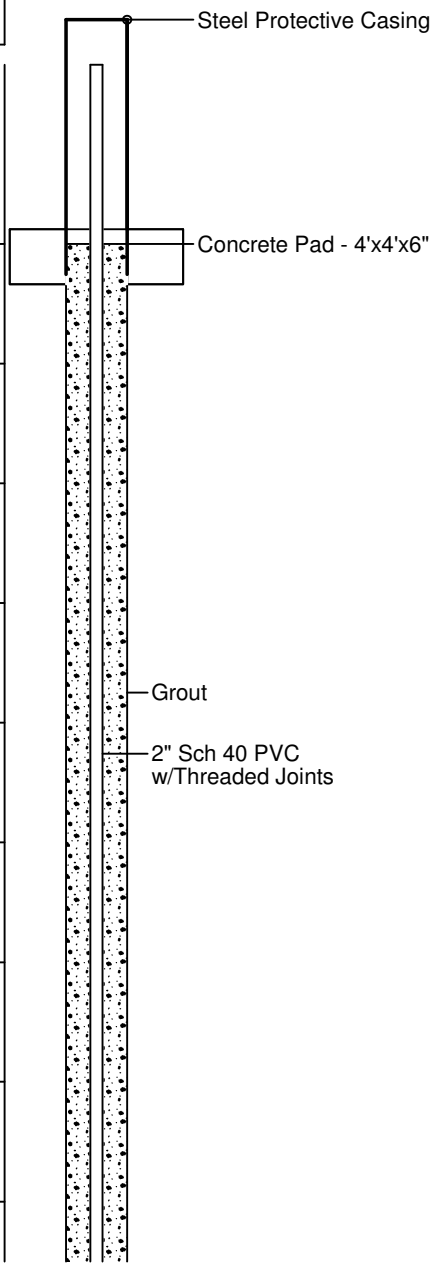
(Sheet 1 of 3)

Elev., TOC (ft.msl)	:
Elev., PAD (ft. msl)	:
Elev., GL (ft. msl)	:
Site Coordinates	:
N	: N35° 29.588'
E	: W108° 25.984'

Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Recovery (%)	Sample	DESCRIPTION
1	6.5			CL	100		SILTY CLAY, low, firm, damp, brown, no odor,
3	5.8			CH	100		CLAY, high, firm to stiff, damp, brown, no odor,
5	6.3			CH	100		CLAY, SIMILAR TO ABOVE (STA), no odor,
7	8.1			CH	90		CLAY, STA, no odor,
9	9.6			CH	100		CLAY, STA, no odor,
11	9.1			CL	50		SILTY CLAY, moderate, firm, damp, brown, no odor,
13	8.2			CL	50		SILTY CLAY, STA, soft, no odor,
15	7.9			CL	70		SILTY CLAY, STA, firm, no odor,
16	8.3			CL			SILTY CLAY, STA, no odor,

Completion Results

Well No. OW-60



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Western Refining SW, Inc
Gallup Refinery
Job No. WEST17020

Geologist	: Tracy Payne
Driller	: Enviro-Drill Inc/Cohagan
Drilling Rig	: CME75
Drilling Method	: Hollow Stem Auger 7 1/4"
Sampling Method	: 2' Split Spoon
Comments	: Hand Auger to 5' BGL
Total Depth	: 48'
Ground Water	: Not Encountered
Start Date	: 6/13/2017
Finish Date	: 6/13/2017

WELL NO. OW-60

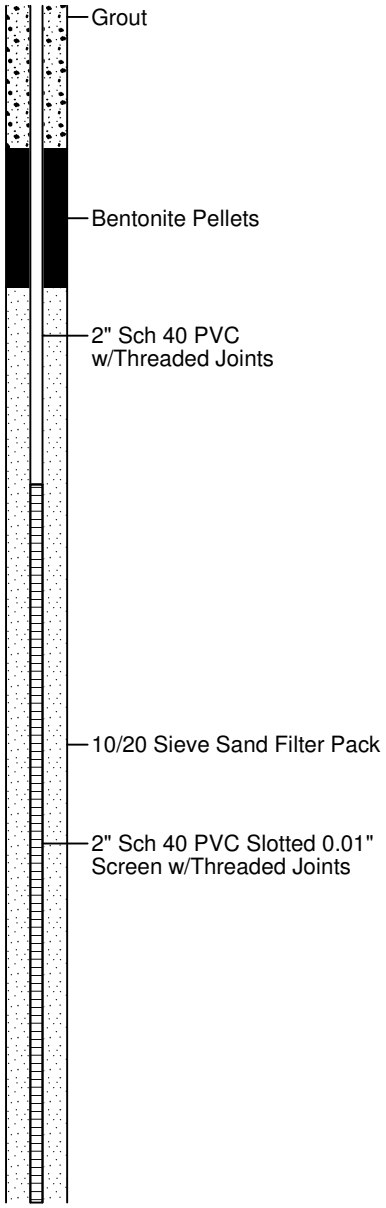
(Sheet 2 of 3)

Elev., TOC (ft.msl)	:
Elev., PAD (ft. msl)	:
Elev., GL (ft. msl)	:
Site Coordinates	:
N	: N35° 29.588'
E	: W108° 25.984'

Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Recovery (%)	Sample	DESCRIPTION
17							
18	8.3			CL	70		
19	10.1			CL	50		SILTY CLAY, STA, no odor,
20							
21	15.3			CL	60		SILTY CLAY, moderate, soft, damp, brown, no odor,
22							
23	12.1			CL	70		SILTY CLAY, STA, firm, no odor,
24							
25	11.6			CL	80		SILTY CLAY, STA,calcareous nodules (white) present, trace gravel, no odor,
26							
27	10.9			CL	80		SILTY CLAY, STA, tan-silt pockets throughout, no odor,
28							
29	10.5			ML	80		CLAYEY SILT, low, soft/crumbly, damp, light brown and grey, no odor,
30							
31	11.1			CL	70		SILTY CLAY, low, firm to crumbly, damp, light reddish brown with trace grey, no odor,
32							
33	15.0			CL	70		SILTY CLAY, STA, no odor,
34							
35	12.8			CL	80		SILTY CLAY, STA, no odor,
36							
37	12.7			CL			SILTY CLAY, low, very stiff, crumbly, damp, light reddish brown, grey, no odor,

Completion Results

Well No. OW-60



DiSorbo Consulting, LLC

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DiSorbo
Environmental Consulting Firm

Western Refining SW, Inc
Gallup Refinery
Job No. WEST17020

Geologist	: Tracy Payne
Driller	: Enviro-Drill Inc/Cohagan
Drilling Rig	: CME75
Drilling Method	: Hollow Stem Auger 7 1/4"
Sampling Method	: 2' Split Spoon
Comments	: Hand Auger to 5' BGL
Total Depth	: 48'
Ground Water	: Not Encountered
Start Date	: 6/13/2017
Finish Date	: 6/13/2017

WELL NO. OW-60

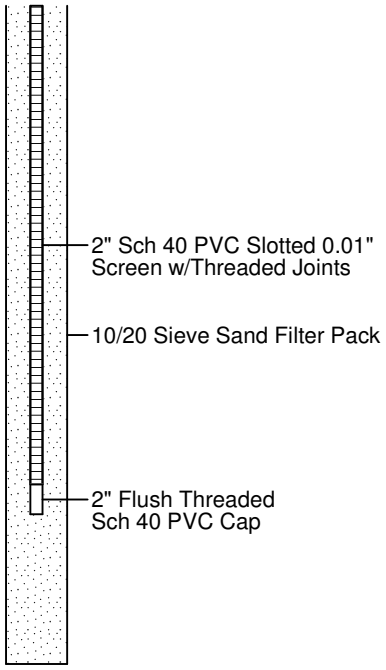
(Sheet 3 of 3)

Elev., TOC (ft.msl)	:
Elev., PAD (ft. msl)	:
Elev., GL (ft. msl)	:
Site Coordinates	:
N	: N35° 29.588'
E	: W108° 25.984'

Depth (ft.)	PID (ppm)	Saturation	Lithology	USCS	Recovery (%)	Sample	DESCRIPTION
37	12.7			CL	70		
38							SILT, low, compact to dense/stiff crumbly, damp, light grey, no odor,
39	10.4			ML	50		
40							SILT, STA, no odor,
41	9.9			ML	60		
42							SILT, STA, trace very fine sand, no odor,
43	10.7			ML	60		
44							SILT, STA, no odor,
45	10.1			ML	50		
46							SILT, STA, trace reddish brown clay with grey, no odor.
47	9.6			ML	50		
48							
49							
50							
51							
52							
53							
54							
55							
56							
57							

Completion Results

Well No. OW-60



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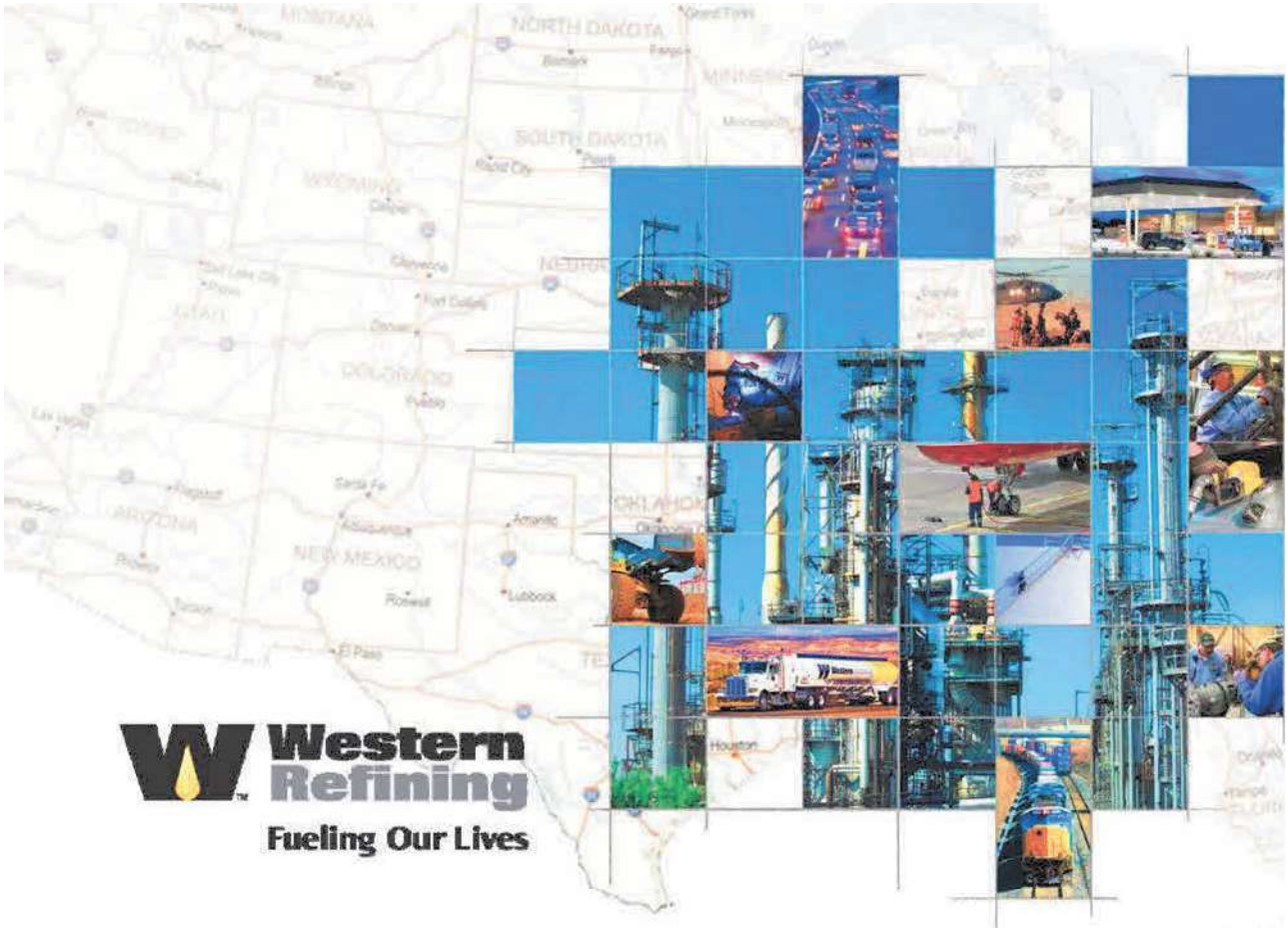
Annual Groundwater Monitoring Report
Gallup Refinery – 2016



Western Refining
Gallup, New Mexico
August 31, 2017

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Daniel J. Statile
Vice President, Gallup Refinery

8/31/17
Date

Reviewed by:

Bill Bailey
Environmental Supervisor

8-29-17
Date

Prepared by:

Cheryl Johnson
Environmental Specialist

8/29/17
Date

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LIST OF FIGURES – SECTION 11 - Continued

APPENDICES

LIST OF ACRONYMS

AC	Alternating Current
AL	Aeration Lagoon
API	American Petroleum Institute
BMP	Best Management Practices
BOD	Biochemical Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
BW	Boundary Well
COC	Chain of Custody
COD	Chemical Oxygen Demand
DC	Direct Current
DGF	Dissolved Gas Flotation
DO	Dissolved Oxygen
DRO	Diesel Range Organics
DTB	Depth to Bottom
DTP	Depth to Product
DTW	Depth to Water
EP	Evaporation Pond
EPA	Environmental Protection Agency
FT	Foot/Feet
FWGWMP	Facility Wide Groundwater Monitoring Plan
GPM	Gallons per Minute
GRO	Gasoline Range Organics
GWM	Groundwater Monitoring Well
HP	Horse Power
HWB	Hazardous Waste Bureau
IDW	Investigation Derived Waste
ISE	Ion Selective Electrode
LDU	Leak Detection Unit
LPG	Liquefied Petroleum Gas
LTU	Land Treatment Unit
MCL	Maximum Contaminant Level
MPPE	Macro Porous Polymer Extraction
MRO	Motor Oil Range Organics
MTBE	Methyl Tert Butyl Ether
mg/L	Milligrams/liter

LIST OF ACRONYMS - continued

MV	Millivolts
MW	Monitoring Well
NAIC	North American Industry Classification System
NAPIS	New American Petroleum Institute Separator
NAPL	Non Aqueous Petroleum Liquid
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NOD	Notice of Disapproval
NPDES	National Pollutant Discharge Elimination System
OBSM	Oil Bearing Secondary Material
OCD	Oil Conservation Division
OW	Observation Well
ORP	Oxidation Reduction Potential
PAH	Polycyclic Aromatic Hydrocarbon
PSTB	Petroleum Storage Tank Bureau
PVC	Polyvinyl Chloride
PW	Process Well
RCRA	Resource Conservation and Recovery Act
<RL	Less than the Applicable standards Detection Limit
RSL	Regional Screening Level
RW	Recovery Well
SMW	Shallow Monitoring Well
SPH	Separate Phase Hydrocarbon
STP	Sanitary Treatment Pond
SVOC	Semi-volatile Organic Compound
SMWU	Solid Waste Management Unit
SWPPP	Storm Water Pollution and Prevention Plan
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbon
µm	Micrometer
UPS	United Parcel Service
VOC	Volatile Organic Compounds
WQCC	Water Quality Control Commission
WWTP	Waste Water Treatment Plant
YTD	Year to Date

EXECUTIVE SUMMARY

The Annual Groundwater Monitoring Report for 2016 (Report) incorporates all of the field monitoring, sampling, and inspection of active wells located on the facility. Analytical data and field notes are incorporated into this report to show any changes or discoveries of various constituents found in the groundwater collected for sampling. On February 15, 2012, Groundwater Discharge Permit GW-032 was rescinded by the Oil Conservation Division (OCD) of New Mexico. We are: however, required to continue to abate pollution of groundwater pursuant to 19.15.30 NMAC (Remediation) under case number AP-111 with remediation activities already in place under Groundwater Discharge Permit GW-032. Monitoring and field work activities conducted for 2016 followed the guidelines of the "Approval with Modifications, Annual Facility-Wide Ground Water Monitoring Report: Gallup Refinery 2013, HWB-WRG-14-006", dated May 18, 2016 from New Mexico Environmental Department Hazard Waste Bureau (NMED HWB).

GROUNDWATER MONITORING

There are 87 monitoring wells located throughout the refinery property that are subject to the ground water monitoring program. The groundwater program consists of a number of sampling locations, target analytes, and monitoring frequencies which are monitored on a quarterly, semi-annual, and annual basis. A brief analytical summary is included while a more detailed summary is discussed in Section 7. In addition to the monitoring wells, there are three leak detection units (LDUs) at the new API Separator (NAPIS). These monitoring wells and LDUs have been grouped as follows:

GROUP A	GROUP B	GROUP C	GROUP D	GROUP E
BW-1A, 1B, 1C	GWM-1, 2, 3	OW-13, 14, 29, 30	PW-2, 3, 4	MKTF-1 thru
BW-2A, 2B, 2C	NAPIS-1, 2, 3, KA-3	OW-50, 52	OW-1, 10	MKTF-45
BW-3A, 3B, 3C	OAPIS-1	RW-1, 2, 5, 6	OW-11, 12	
MW-1, 2, 4, 5	East LDU, West LDU, Oil Sump LDU			
SMW-2, 4	STP1-NW, STP1-SW			

GROUP A - WELLS

There are a total of nine boundary wells located on the northwest section of the refinery property. Three (BW-1A, 1B, 1C) are located between evaporation ponds 7 and 8, and three (BW-2A, 2B, 2C) are located on the west end of evaporation pond 11. BW-3A, 3B, 3C are located on a flat terrain directly northwest of Evaporation pond 12A. Three of the nine wells (BW-1A, BW-1B, and BW-3A) continue to indicate no water level since original installation in 2003 and 2004.

- No benzene, toluene, ethylbenzene, or total xylenes (BTEX) or methyl tert butyl ether (MTBE) constituents have been detected in any of the boundary wells to date.
- Bis(2-ethylhexyl)phthalate was first detected in BW-3B in 2009, BW-3C in 2011, and in BW-1C in 2013. The detection of this organic compound is suspected to be a laboratory contaminant or possibly from the polyvinyl chloride (PVC) pipe materials used in the well. Subsequent annual sample results have indicated non-detectable levels of the organic constituent in each of these wells.

Within this area of the refinery, three Resource Conservation Recovery Act (RCRA) land treatment units (LTU) exist. Each of the three LTU cells measure 480 feet x 240 feet and received hazardous waste application until 1990. Non-hazardous waste application ceased in 1993. Each section is diked and encompasses a surface area of 2.6 acres.

The MW series (MW-1, 2, 4, and 5) and SMW series (SMW-2, 4) of wells were installed to monitor the detection of hazardous constituents from the LTU in groundwater. On the northern edge (downgradient) of the LTU are three monitoring wells (MW-1, SMW-4 and MW-2) and along the eastern edge of the LTU are two monitoring wells (MW-5 and SMW-2). MW-4 is located on the northwest corner of evaporation pond 2 (EP-2) and was installed as a background monitoring well. A summary of the laboratory analyses for these wells through 2016 includes:

- Detection of MTBE in low concentrations in SMW-2 from 2008 through 2016.
- Manganese has been detected at concentration levels above the WQCC standard since 2012 in SMW-2.

In addition to the annual sampling requirements, the LTU monitoring wells are on a once every ten year sample schedule per the RCRA Post-Closure Care Permit. The next RCRA Post-Closure Care Permit sample event is scheduled to occur in 2019.

GROUP B - WELLS

The Group B wells are located near the aeration basin. Wells GWM-1, GWM-2 and GWM-3 are located on the west edge of Aeration Lagoon 2 (AL-2) and Pond 1. The NAPIS-2, NAPIS-3, and KA-3 wells are adjacent to the west bay of the New American Petroleum Institute Separator (NAPIS) and NAPIS-1 is located upgradient on the southeast side of the east bay of the NAPIS. There are three leak detection units (LDU) located on the east and west bay of the NAPIS, identified as follows:

- West LDU is located on the west bay of the NAPIS unit;
- The Oil Sump LDU is located on the northeast section of the east bay of the NAPIS unit; and
- East LDU is located on the southeast section of the east bay of the NAPIS unit.

In July 2012, a well (OAPIS-1) was installed on the northwest side of the Old API Separator. The installation of this well resulted from the Solid Waste Management Units (SMWU) No. 1, Aeration Basin and SMWU No. 14, Old API Separator site investigation. The investigation work was implemented to determine if there had been a release from the aeration basin or Old API Separator and to delineate impacts associated with any such releases. Information collected from this site investigation is also used to track groundwater in monitoring wells GWM-2 and GWM-3.

Two monitoring wells (STP1-NW and STP1-SW) were installed at the new sanitary treatment pond in May of 2014. STP1-NW is located on the west end of the north bay of STP-1, and STP1-SW is located on the southwest corner of the south bay of STP-1. Both of these wells were added to the ground water sampling plan, however, STP1-SW has remained dry since it was installed.

A brief summary of laboratory analyses for the Group B wells for 2016 is listed below:

GWM 1, GWM-2, GWM-3

- No groundwater was present in GWM-2 and GWM-3 in 2016.
- No samples have been collected from GWM-1 since the third quarter 2015 due to the detection of an SPH level.

NAPIS-1, NAPIS-2, NAPIS-3, and KA-3

- Elevated concentrations of MTBE continue to be detected in NAPIS-2 throughout most of 2016. MTBE was also detected above the screening level in first quarter 2016 in NAPIS-3 and benzene was detected slightly above the screening level in KA-3 in the third quarter of 2016.

- DRO/GRO have been detected in NAPIS-2 in 2016 and DRO in NAPIS-3 in the fourth quarter 2016 and GRO in KA-3 in all four quarters of 2016.
- Barium, iron and manganese were detected in NAPIS-2 at concentration levels exceeding the applicable standards in 2016.
- Iron was detected in all four quarters of 2016 in NAPIS-3 at concentration levels exceeding the WQCC standards. Iron was detected in KA-3 in the fourth quarter of 2016 at concentration level exceeding the WQCC standard.
- Manganese was detected in all four quarters of 2016 above the applicable standard in KA-3 NAPIS-2 and NAPIS-3.
- Naphthalene and 1-methylnaphthalene were detected exceeding the applicable standards for NAPIS-2 in the third quarter of 2016.

East LDU, West LDU and Oil Sump LDU

- No water has been detected in the Oil Sump LDU since June 2013.
- Benzene and xylenes were detected in the East and West LDUs at levels exceeding applicable standards in 2016.
- In 2016, chromium, iron, and manganese have been detected in concentrations exceeding applicable standards in both the East and West LDUs.
- The organic constituents 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene have shown concentrations exceeding applicable standards in both the East and West LDUs in 2016.

OAPIS-1

- Benzene and MTBE have exceeded the applicable standards since 2013.
- Concentrations of fluoride and chloride, DRO and GRO have shown exceedances in OAPIS-1 since 2013.
- Arsenic, iron, and manganese have exceeded applicable standards in OAPIS-1 since 2013. Cyanide exceeded the screening level in the fourth quarter of 2016.
- Detections of 1,2-Dichloroethane (EDC), 1-methylnaphthalene and bis(2-ethylhexyl) phthalate have been detected in concentrations exceeding applicable standards in 2016.

STP1-NW and STP1-SW

- No water has been detected in STP1-SW since its installation in 2014.
- There were no detections of BTEX, MTBE, DRO, GRO, or MRO above applicable standards in 2016 in STP-1 NW.
- Chloride exceeded applicable standards in 2016 and iron was detected in the first and second quarter of 2016 at concentration levels which exceeded applicable standards.

GROUP C WELLS

Group C wells include six observation wells and four recovery wells. Observation well OW-14 is adjacent to the liquefied petroleum gas (LPG) compound while OW-13, OW-29, and OW-30 are located north of the tank farm. Observation wells OW-50 and OW-52 were installed in 2009 per NMED and monitors the potential for contaminant migration offsite. Recovery well RW-1 is located within the tank farm east of Tank 568 while RW-2 is located on the southwest side of Tank 576. Recovery well RW-5 and RW-6 are located northeast of Tank 345. The recovery wells were installed during a subsurface investigation conducted between 1987 and 1992 near the tank farm. BTEX concentrations and separate-phase hydrocarbons (SPH) were detected in the ground water and SPH recovery continues quarterly. When applicable, recovery is completed using a disposable hand-bailer in RW-5 and RW-6 and completed in RW-1 using a portable submersible pump. Measureable SPH has not been detected in RW-2. SPH was not detected in RW-5 and RW-6 during all of 2016. The SPH column thickness in RW-1 has increased during 2016.

A summary of the observation wells and recovery well laboratory analyses through 2016 is as follows:

OW-13, OW-14, OW-29, OW-30, OW-50, and OW-52

- Benzene has exceeded the EPA MCL standard in OW-14 since 2008 through 2016. MTBE concentrations have shown exceedances in OW-14, OW-29, and OW-30 since 2007 (2010 for OW-29) through 2016. No BTEX or MTBE constituents have been detected in OW-13, OW-50, and OW-52 above screening levels.
- Chloride has been detected above applicable standard in OW-14 from 2013 through 2016.
- DRO and GRO have been detected in OW-14, OW-29 and OW-30 in 2016.

RW-1, RW-2, RW-5, and RW-6

- BTEX concentrations have exceeded standards in RW-1 and RW-2 since 2011. RW-5 and RW-6 have exceeded standards for benzene from 2011 to present. Total xylenes concentrations exceeded the standard for RW-6 from 2012 through 2016.
- During 2016, the organic constituents 1,2,4-trimethylbenzene exceeded the applicable standards in RW-2. In RW-5 and RW-6, the organic constituents 1,2,4-trimethylbenzene, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene concentrations exceeded the applicable standards in 2016.

Hydrocarbon recovery from RW-1 has shown a steady decrease from 2005 through 2016. It is common for hydrocarbon recovery to decline over time, as the readily recoverable hydrocarbons is removed from the

formation. From a review of the hydrocarbon recovery log for RW-1 in Appendix A, it appears the recovery pump was initially (Feb 2005) operated in a continuous mode while recovery rates were higher. In March 2005, the recovery of SPH was reported at 48 to 74 gallons per week. By July and August, the reported recovery had declined to 18 to 28 gallons for an approximate three week recovery period. In December 2005, the recovery for two weeks had declined to five gallons of SPH. With the declining recovery volumes of SPH, the recovery method was changed to hand bailing in 2007. The recovery method reverted to using a bladder pump in 2008; however, due to the low recovery volumes the recovery was conducted in conjunction with purging the well for sampling and the pump was not operated on a continuous basis.

An increase in measured product thickness was recorded starting in 2013. The level measured in October 2012 was 0.09 feet and showed a sustained increase over time to 4.93 feet in November of 2014. A similar increase in SPH thickness occurred in late 2007 through 2009, with the product thickness decreasing to less than 0.6 feet through late 2012. In 2014, total hydrocarbon recovery is estimated at 8.5 gallons in 53 gallons of water purged compared to the 2005 estimate of 431 gallons of hydrocarbons in 1,210 gallons of water. A drop-in 3” diameter x 24” long bladder pump with suction at the top of the pump was used to purge water/hydrocarbons from this well until pump lost suction. The recovery well was never completely purged dry due to suction of the submersible pump being at the top, which left approximately 24” of product/water level remaining in RW-1. The recovered water/hydrocarbon mixture was pumped into a 55 gallon drum and the visible hydrocarbon layer thickness was measured and estimated as to volume of hydrocarbons recovered in gallons (not an accurate assessment) No measureable hydrocarbons have been detected in RW-2 since its been installed. SPH has not been detected in RW-5 and RW-6 since February 2009 and November 2011, respectively.

GROUP D WELLS

The Group D wells can be found within the refinery property and include three process/production wells (PW-2, PW-3 and PW-4) and four observation wells (OW-1, OW-10, OW-11, and OW-12). The process/production wells are used to provide process water for the refinery and drinking water for both the refinery and the Travel Center. PW-2 is located on the central west side of the refinery directly west of Evaporation Pond 6 (EP-6). PW-3 is centrally located on the refinery property north of the maintenance

shop and west of the domestic water tank Z-86-T2 and PW-4 is located south of the Pilot Lift Station. Each of the PW wells is screened at a depth of 1,000 feet. The observation well OW-1 is found west of PW-2 and is a flowing artesian well. Observation well OW-10 is located east of Evaporation Pond 9 (EP-9), OW-11 is located on the west side of the main access road, and OW-12 is centrally located west of the refinery tank farm.

A summary of the Group D Wells laboratory analyses through 2016 are as follows:

PW-2, PW-3, and PW-4

- No BTEX or MTBE constituents were detected in the process wells in 2016.
- Low concentrations of fluoride, chloride and sulfate were detected in PW-3.
- Low concentrations of arsenic, barium and iron were detected in PW-3 and PW-4 in 2016 at concentration levels below applicable standards.
- Two organic constituents were detected at levels below applicable standards in PW-3 and PW-4 in 2016 (bis(2-ethylhexyl) phthalate and di-n-octylphthalate). Low concentrations of 1,2,4 trimethylbenzene, 1,3,5 trimethylbenzene, naphthalene, 1-methyl naphthalene, 2-methylnaphthalene, benzoic acid, diethyl phthalate and dimethyl phthalate were also detected in PW-4 in the first half of 2016.

OW-1, OW-10, OW-11, and OW-12

- Low concentrations of benzene and ethylbenzene were detected in OW-1 during the last quarter of 2016, and low concentrations of MTBE were detected in OW-1 and OW-10 during all four quarters in 2016.
- Iron concentrations exceeded the WQCC standard in OW-1 during the third quarter of 2016.
- Chloride concentrations exceeded the WQCC standard in OW-10 in 2016.

GROUP E WELLS

To date, a total of 44 monitoring wells (MKTF-1 through MKTF-44) have been installed to aid in delineating the extent of a hydrocarbon seep discovered in 2013 in an isolated area approximately 100 yards west of the crude tanks T-101 and T-102. A pre-existing well located in the seep investigation site area located on the west end of the loading rack was added to the marketing wells and has been labeled as MKTF-45. Site investigations have included excavations within the seep area, soil/water samples, and the installation of six temporary sumps to recover the non-aqueous phase liquid (NAPL). Liquid recovery from the six sumps in 2016 is estimated at 366,287 gallons of NAPL and ground water. A hole was identified in the refinery's waste water process sewer line near the bundle cleaning pad and an underground leaking transmix transfer

line was also identified in the vicinity. Interim measures are on-going to identify any other potential sources of the hydrocarbon seep. An estimated 11.2 gallons of hydrocarbons was recovered from eleven of the MKTF wells in 2015. Hydrocarbon recovery from six temporary sumps is on-going. The measured SPH thickness is shown on Figure 13.

The MKTF wells are sampled quarterly. BTEX, MTBE, DRO, GRO, total and dissolved metals and several VOCs and SVOCs have been detected in many of the wells above the referenced standards. See Tables 8.15 thru 8.15.5 (Appendix G) for a complete list of constituents analyzed.

ADDITIONAL SITES MONITORED

The new waste water treatment plant (WWTP) and the new holding pond Sanitary Treatment Pond (STP-1) were completed and put in service in May of 2012. All waste water flow was routed to the WWTP in May 2012 and in January 2013, the demolition and removal of the benzene strippers was completed. Pilot effluent was routed to the WWTP in June of 2013 and the aeration lagoons and pond 1 were taken out of service and no longer received any flow. All influent and effluent sampling continued between lagoons and pond 1 as long as there was continued gravitational flow.

Outfall BW to EP-2

- Reverse Osmosis (RO) water from the boiler unit was re-routed back into the process and no longer discharges to evaporation pond 2.
- First quarter 2016 samples indicate sulfate was the only constituent that exceeded applicable WQCC standards.

Outfall STP1 to EP-2

- The EP-2 Inlet designation was changed to STP1 to EP-2 in the second half of 2012 as flow to the aeration lagoons and pond 1 were diverted to the new WWTP. Aeration lagoons and pond 1 were taken out of service and no longer receiving flow. STP-1 effluent now flows into the northeast corner of EP-2. The outfall is sampled on a quarterly basis.
- DRO concentrations were detected in 2016 and TDS concentrations have exceeded the WQCC applicable standard since 2010.
- Three volatile organic compounds were detected at below applicable standards in 2016.

ADDITIONAL APPLICABLE STANDARDS REQUIREMENTS

The Discharge Permit was rescinded by NM-OCD on February 15, 2012; however Gallup is still required to continue with abatement of pollution of groundwater pursuant to 19.15.30 NMAC (Remediation), under Abatement Plan AP-111, with remediation activities already in place.

SECTION 1

INTRODUCTION

The 2016 Annual Groundwater Monitoring Report has been prepared to describe monitoring and remediation activities undertaken throughout 2016. Groundwater sampling is performed on a quarterly, semi-annual and annual basis and includes sampling of the evaporation ponds located on the northwest section of the refinery property. The activities completed include analysis of all active monitoring wells and evaporation ponds. The data generated is used to characterize the nature and extent of impacts to the groundwater at the refinery from historical releases and to monitor any levels of constituents that exceed applicable standards.

This report presents the results of the groundwater monitoring activities and contains the following information:

- Scope of activities
- Sampling methods and procedures
- Groundwater elevation surveys
- Regulatory criteria
- Groundwater monitoring results
- Conclusions and recommendations

1.1 FACILITY OWNERSHIP, OPERATION AND LOCATION

This report pertains to the Western Refining Southwest Inc., Gallup Refinery, located at Exit 39 on Interstate I-40, approximately 17 miles east of Gallup, New Mexico, in Jamestown, New Mexico. Figure 1 shows the regional location of the refinery.

Owner: Western Refining (Parent Corporation)
123 West Mills Avenue, El Paso, TX 79901

Operator: Western Refining Southwest, Inc. (Postal address)
Gallup Refinery
92 Giant Crossing Road, Gallup, NM 87301

Western Refining Southwest, Inc. (Physical address)
Gallup Refinery
I-40, Exit 39, Jamestown, New Mexico 87347

The following regulatory identification and permit governs the Gallup Refinery:

- SIC code 2911 (Petroleum Refining) applies to the Gallup Refinery
- U.S. EPA ID Number NMD000333211 RCRA Post-Closure Care Permit
- OCD Abatement Plan, number AP-111
- 2015 NPDES MSGP, ID #NMR053168

The refinery status is corrective action/compliance. Annual, semi-annual, and quarterly groundwater sampling is conducted at the refinery to evaluate present conditions. The refinery is situated on an 810 acre irregular shaped tract of land that is substantially located within the lower one-quarter of Section 28 and throughout Section 33 of Township 15 North, Range 15 west, of the New Mexico Prime Meridian. A small component of the property lies within the northeastern one-quarter of Section 4 of Township 14 North, Range 15 West. Figure 2 is a topographic map showing the general layout of the refinery in comparison to the local topography.

1.2 BACKGROUND INFORMATION

The refinery primarily receives crude oil via two 6-inch diameter pipelines; two pipelines from the Four Corners Area enter the refinery property from the north. In addition, the refinery also receives natural gasoline feed stocks via a 4-inch diameter pipeline that comes in from the west along the Interstate 40 corridor from the Wingate Plant, formerly Conoco gas plant. Crude oil and other products also arrive at the site via railroad cars. These feed stocks are then stored in tanks until refined into products.

The refinery incorporates various processing units that refine crude oil and natural gasoline into finished products. These units are briefly described as follows:

- Crude Distillation Unit: separates crude oil into various fractions; including gas, naphtha, light oil, heavy oil, and residuum
- Fluidized Catalytic Cracking Unit (FCCU): dissociates long-chain hydrocarbon molecules into smaller molecules, and essentially converts heavier oils into naphtha and lighter oils.
- Alkylation Unit: combines specific types of hydrocarbon molecules into a high octane gasoline blending component.
- Reforming Unit: breaks up and reforms low octane naphtha molecules to form high octane naphtha.
- Hydro Treating Unit: removes undesirable sulfur and nitrogen compounds from intermediate feed stocks, and also saturates the feed stocks with hydrogen to make diesel fuel.
- Additional Treater Units: remove impurities from various intermediate and blending feed stocks to produce finished products that comply with sales specifications.
- A set of Acid Gas Treating and Sulfur Recovery Units: convert and recover various sulfur compounds from other processing units in order to produce either ammonium thiosulfate or a solid elemental sulfur byproduct.
- Waste Water Treatment Plant – process and treat refinery waste and storm water before releasing to treatment ponds.

As a result of these processing steps, the refinery produces a wide range of petroleum products including propane, butane, unleaded gasoline, diesel, kerosene, and residual fuel. In addition to the aforementioned processing units, various other equipment and systems support the operation of the refinery and are briefly described as follows:

- Storage tanks are used throughout the refinery to hold and store crude oil, natural gasoline, intermediate feed stocks, finished products, chemicals, and water. These tanks are all located aboveground and the capacity ranges from 80,000 barrels to less than 1,000 barrels.
- Pumps, valves, and piping systems are used throughout the refinery to transfer various liquids among storage tanks and processing units.
- A railroad spur track and a railcar loading rack are used to transfer feed stocks and products from refinery storage tanks into and out of railcars.
- Several tank truck loading areas are used at the refinery to load out finished products and also may receive crude oil, other feed stocks, additives, and chemicals.

Gasoline and diesel are delivered to the Travel Center via tanker truck. An underground diesel pipeline exists between the refinery and the Travel Center. As a result of an off-refinery release in 2011, the pipeline was purged of product, filled with nitrogen and temporarily taken out of service. Western worked with the

NMED – PSTB (Petroleum Storage Tank Bureau) and the NM OCD (Oil Conservation Division) to place this line back in service. In 2013 the underground diesel line from the Gallup Refinery to the Travel Center was replaced. The replaced line runs above ground from the marketing area of the refinery for approximately 150 feet and continues underground to the Travel Center. The diesel line was re-commissioned and put back in service on February 3, 2014.

A designated area is used to conduct employee firefighting training. During these training activities waste water and/or wash water drains directly into a dedicated tank that is located in the vicinity. The waste water is removed via vacuum truck and drained into a process sewer leading to the NAPIS after each training exercise. Oily water and sludge is transferred via vacuum truck to the NAPIS for processing and oil-water separation. The process waste water system is a network of curbing, paving, catch basins, and underground piping that collects waste water effluent and stormwater runoff from various processing areas within the refinery. The waste water effluent flows into T-27, T-28 and into T-35 (which works in parallel to T-27 and T-28) and into the NAPIS which provides the first stage oil-water separation where the removal of free oil is separated from waste water by gravity. The clarified water is routed to the waste water treatment plant (WWTP) Dissolved Gas Flotation (DGF) system which provides the second stage oil-water separation process. The DGF process involves the pressurization of waste water in the presence of air or nitrogen, creating a super-saturated solution called coagules that are carried to the surface. The float is removed to disposal by mechanical float scrapers and the effluent is recycled back to the flotation chamber. The skimmed float is sent to the DGF float management system, “float tanks”. Oily solids collected in the float tanks are recycled through the refining process (on-site) or handled as a K048 listed hazardous waste for proper disposal.

The clarified effluent from the DGF system was designed with the Macro Porous Polymer Extraction (MPPE) system however, the MPPE unit did not perform as expected from a flow rate standpoint. It removed benzene efficiently, but became plugged so that flow rates decreased below adequate levels. In December 2014, the MPPE was removed from service and replaced with the carbon canister system. The two systems ran in parallel for three months in the second half of 2014 followed by trial with carbon canisters for two months before the MPPE was removed from service. Flow rates up to 500 GPM can now be achieved through the carbon system. The waste water that passes through the carbon canisters

discharges into the sanitary treatment pond (STP-1). STP-1 has two bays, north and south and each bay is equipped with five aerators. The treated waste water is mixed with air in order to oxidize any remaining organic constituents and increase the dissolved oxygen concentration available in the water for growth of bacteria and other microbial organisms. The microbes degrade most of the hydrocarbons into carbon dioxide and water. Five 15-hp mechanical aerators provide aeration in each bay (North and South) in STP-1. Effluent from STP-1 then flows into evaporation pond 2 (EP-2) and is gravitated to the rest of the ponds. The initial startup of the new WWTP was in May of 2012 which resulted in the decommissioning of Benzene Strippers 1, 2, and 3, and the Aeration Lagoons 1 and 2 (AL-1 and AL-2). In November of 2012, the benzene strippers were taken off-line permanently and completely demolished in January of 2013. At the evaporation ponds, waste water is converted into vapor via solar and mechanical wind-effect evaporation. There are a total of four evaporators located at the ponds. Two 80 GPM, electrically driven water evaporators are located between evaporation ponds 4 and 5 and two additional 66 GPM sprayers were installed between ponds 3 and 4 in October 2014. No waste water is discharged from the refinery to surface waters of the U.S. All treated waste water is routed into several evaporation ponds which have large surface areas that are designed to efficiently evaporate water by sunlight and exposure to the changing ambient temperatures.

The stormwater system is a network of valves, gates, berms, embankments, culverts, trenches, ditches, natural arroyos, and retention ponds that collect, convey, control, treat, and release stormwater that falls within or passes through refinery property. Stormwater that falls within the processing areas is conveyed through the same underground piping system that collects waste water effluent from various processing areas with the refinery. The stormwater effluent from within the process areas follows the same flow pattern and treatment as described in the process waste water flow system (T-27 → T-28 → T-35 → NAPIS → WWTP → STP-1 → EP-2 → Evaporation Ponds).

Stormwater discharge from the refinery is infrequent due to the arid desert-like nature of the surrounding geographical area. Gallup Refinery maintains a Storm Water Pollution Prevention Plan (SWPPP) that includes Best Management Practices (BMPs) for effective storm water pollution prevention and control. The refinery has constructed several berms in various areas and improved outfalls (installed barrier dams

equipped with gate valves) to minimize the possibility of potentially impacted runoff leaving the refinery property.

1.3 SITE CHARACTERISTICS

Built in the 1950's, the refinery is located within a rural and sparsely populated section of McKinley County, Jamestown, New Mexico, and located 17 miles east of Gallup, New Mexico. The setting is a high desert plain on the western slope of the Continental Divide. The surrounding land is comprised primarily of public lands and is used for cattle and sheep grazing at a density of less than six cattle or 30 sheep per section. The nearest population centers are the Flying J Travel Center (formerly Pilot) refueling plaza, the Interstate 40 highway corridor, and a small cluster of residential homes located on the south side of Interstate 40, approximately 2 miles southwest of the refinery (Jamestown). Surface vegetation consists of native xerophytic vegetation including grasses, shrubs, small junipers and some prickly pear cacti. Average rainfall is less than ten inches per year with the maximum average precipitation occurring during the month of August.

Local topography consists of an incline down-slope from high ground in the southeast to a lowland fluvial plain in the northwest. The highest point on refinery property is located at the southeast corner boundary (elevation approximately 7,040 feet) and the lowest point is located at the northwest corner boundary (elevation approximately 6,860 feet). The refinery processing facility is located on a flat man-made terrace at an elevation of approximately 6,950 feet.

Surface water in this region consists of man-made evaporation ponds and aeration basins located within the refinery, a livestock watering pond (Jon Myer's Pond) located one mile east of the refinery, two small unnamed spring fed ponds located south of the refinery, and the South Fork of the Puerco River and its tributary arroyos. The various ponds and basins typically contain water consistently throughout the year. The South Fork of the Puerco River and its tributaries are intermittent and generally only contain water during, and immediately after, the occurrence of precipitation.

The 810 acre refinery property site is located on a layered geologic formation. Surface soils generally consist of fluvial and alluvial deposits; primarily clay and silt with minor inter-bedded sand layers. Below the surface layer is the Chinle Formation, which consists of very low permeability clay stones and siltstones that comprise the shale of this formation. As such, the Chinle Formation effectively serves as an aquitard. Inter-

bedded within the Chinle Formation is the Sonsela Sandstone bed, which represents the uppermost potential aquifer in the region. The Sonsela Sandstone bed lies within and parallels the dip of the Chinle Formation. As such, its high point is located southeast of the refinery and it slopes downward to the northwest as it passes under the refinery. Due to the confinement of the Chinle Formation aquitard, the Sonsela Sandstone bed acts as a water-bearing reservoir and is artesian at its lower extremis. Artesian conditions exist through much of the central and western portions of the refinery property.

Groundwater flow within the Chinle Formation is extremely slow and typically averages less than 10^{-10} centimeters per second (less than 0.01 feet per year). Groundwater flow within the surface soil layer, above the Chinle Formation, is highly variable due to the presence of complex and irregular stratigraphy; including sand stringers, cobble beds, and dense clay layers. As such, hydraulic conductivity may range from 10^{-8} centimeters per second in the clay soil layers located near the surface and up to 10^{-2} centimeters per second in the gravelly sands immediately overlying the Chinle Formation. Figure 4 depicts the regional surface water flows are in a westerly direction and Figure 5 depicts surface water bodies and flow lines.

Shallow groundwater located under refinery property generally flows along the upper contact of the Chinle Formation. Although the prevailing flow direction is from the southeast and toward the northwest; a subsurface ridge has been identified and is thought to deflect some flow in a northeasterly direction in the vicinity of the refinery tank farm.

SECTION 2

SCOPE OF ACTIVITIES 2016

The 2016 quarterly and annual groundwater sampling, and semi-annual evaporation pond sampling was conducted by DiSorbo Consulting Services and Western. The third quarter groundwater sampling was combined with the annual sampling event per approval from NMED and OCD and conducted in August and September 2016. The following is a list of monitoring and inspections completed for 2016:

- Separate Phase Hydrocarbon Recovery Logs – Appendix A
- Field Inspection Logs–Appendix B
- Applicable Standards – Appendix C
- Summary of EPA/NMED/RCRA Activity – Appendix D
- Summary of all leaks, spills and releases – Appendix E
- Temporary Land Farm Semi-Annual Sampling – Appendix F
- Hall Laboratory Analytical Data – Appendix G
- Data Tables – Section 8
- Well Data DTW/DTB Measurements (Elevations) – Section 9
- Quarterly, Semiannual, Annual Inspections Summary – Section 10

2.1 MONITORING AND SAMPLING PROGRAM

The primary objective of groundwater monitoring program is to analyze groundwater samples collected and use data to assess groundwater quality at and near the refinery. Groundwater elevation data was collected to evaluate groundwater flow conditions. The groundwater monitoring program for the refinery consists of sample collection and analysis from a series of monitoring, recovery, boundary, process, and shallow monitoring wells. In addition, surface water samples are collected at the evaporation pond locations.

The groundwater monitoring network is separated into five investigation areas (Group A, Group B, Group C, Group D, and Group E) plus the evaporation ponds and effluent from STP-1 to Pond 2. The sampling frequency, analyses and target analytes vary for each investigation areas. The combined data from these investigation area were used to assess groundwater quality beneath and immediately down-gradient of the refinery, and to evaluate local groundwater flow conditions. Samples were collected annually from all monitoring wells with the exception of recovery and/or monitoring wells that had a measurable separate-phase hydrocarbon (SPH) level. At wells that were purged dry, samples were collected if recharge volume was sufficient for sample collection within a 24-hour period. Wells not sampled due to insufficient recharge were documented in the field logs.

Daily field activities, including observations and field procedures, were recorded for each activity and are maintained at the refinery. Field logs include the following information:

- Sample Location Identification
- Date
- Start and finish sampling time
- Field team members, including visitors
- Weather conditions
- Daily activities and times conducted
- Observations
- Record of samples collected with sample designations
- Photo log (if needed)
- Field monitoring data, including health and safety monitoring (if needed)
- Equipment used and calibration records, if appropriate
- List of additional data sheets and maps completed
- An inventory of the waste generated and the method of storage or disposal
- Signature of personnel completing the field record

All samples collected for analysis are recorded in the field report or data sheets. Chain-of-Custody (COC) forms are completed at the end of each sampling day, prior to the transfer of samples off-site. The signed copy of the COC is placed inside sample containers with the samples and shipped to the laboratory. A custody seal is affixed to the lid of the shipping container. Copies of all COC forms generated are kept at the refinery.

2.2 SAMPLING METHODS AND PROCEDURES

Each monitoring well was gauged for depth to water (DTW), total depth, and depth to product (DTP), if applicable, to determine the amount of water to purge. A minimum of two well volumes is purged from each well prior to sampling. If water level is at a minimum or the well has a low recharge rate, the well is allowed to recharge within 24 hours before a sample is collected. For wells that are not supplied with dedicated pumps, a portable pump is lowered slowly into the well to minimize disturbance to a depth of the midpoint of the screened interval of the well. The pump controller is started at a slow rate and gradually increased until water is discharged. Field water quality measurements must stabilize for a minimum of three consecutive readings taken at 2 to 5-minute intervals, within the following limits before purging will be discontinued and sampling may begin: dissolved oxygen (DO) (10%), specific conductance (10%), temperature (10%), pH (10%).

Groundwater samples were obtained from each well within 24 hours of the completion of well purging. The samples were transferred to an appropriate, clean, laboratory-prepared containers provided by the analytical laboratory. Sample collection methods have been documented in the field monitoring reports. Weather conditions, the volume of groundwater purged, description of water, the instruments used, and the water quality readings obtained at each interval were recorded on the field-monitoring log.

Well purging and sampling were performed using disposable polyethylene bailers and/or appropriate portable sampling pumps where applicable. Some of the wells have dedicated pumps installed where a controller is used to power the submersible pump to purge water. In shallow wells, new disposable bailers were used for each well to hand bail purge water and retrieve water samples. All purged groundwater was collected in 55 gallon drum(s) and/or 5 gallon bucket(s) and drained into the refinery waste water treatment system upstream of the NAPIS. Groundwater samples intended for metals analysis were submitted to the laboratory as total and dissolved metals samples.

At a minimum, the following procedure was followed when collecting/shipping samples:

- Protective eye wear (safety glasses, goggles and or face shield)
- Neoprene, nitrile, or other protective gloves are worn when collecting samples. New disposable gloves are used to collect samples at each sample point.

- All samples collected for chemical analysis are transferred into clean sample containers supplied by the analytical laboratory. Sample containers are clearly marked and labeled.
- Groundwater samples obtained for dissolved metals analysis are filtered through a 0.45 µm (micrometer) mesh size disposable filter on site.
- Samples are labeled, sealed, placed in cooler with ice until they are shipped via United Parcel Service (UPS) Red, Federal Express Overnight or personally delivered to the analytical laboratory.
- Standard COC procedures are followed for all samples collected. The COC form and sample request form are shipped inside the sealed storage container to be delivered to the laboratory, signed and dated.
- Field duplicates and trip blanks are obtained for quality assurance during sampling activities. Trip blanks accompany laboratory sample bottles and shipping and storage containers intended for volatile organic compound (VOC) analyses. Trip blanks consist of a sample of analyte free de-ionized water placed in an appropriate sample container. Trip blanks are analyzed at a frequency of one for each shipping event involving twenty or more samples.

In order to prevent cross-contamination, field equipment that came into contact with water or soil was decontaminated before each sampling event. The decontamination procedure for the portable pump consists of rinsing/washing the equipment with a detergent water mixture followed by two rinses before use in another well. Any equipment that came in contact with each well, such as data loggers or tape measure, was decontaminated with a detergent water mixture and rinsed with distilled water before each use. Decontamination of equipment when feasible is done at the bundle pad where decontamination water is drained into the sewer system.

Decontamination water from field work was caught in an appropriate container and drained into the sewer system upstream of the NAPIS.

2.2.1 EQUIPMENT

- A submersible bladder pump 2 inch, 115 volt AC to DC converter, Grundfos Redi-flo2 constructed of stainless steel with check valve and 1/2 in. Teflon tubing, adjustable rate controller powered by a gas generator is used to purge groundwater from monitoring wells. Equipment is located downwind and at least 20 feet from the well so that exhaust fumes do not cross-contaminate the samples.
- Water level instrument used is a WaterMark Oil Water Interface Meter 100 feet, Model 101L/SMOIL. This instrument measures water and hydrocarbon level; indication is a steady audible tone for water and hydrocarbon indication is an erratic audible tone.

- Parameter Instrument – YSI Model 556 MPS Multi Probe System which simultaneously measures DO, conductivity, temperature, and optional pH and ORP (Oxidation Reduction Potential). As a backup, we also have an IQ Scientific Instrument, Model IQ180GLP which measures pH, DO, TDS (Total Dissolved Solids), conductivity, salinity, ISE (Ion Selective Electrode), mV (Millivolts) and temperature.

- Disposable Bailers – Polyethylene bailer 1.5 inches X 36 inches overall length (OAL) with a capacity of approximately 1 liter and 3 inches X 36 inches OAL. Individually sealed packaging, single check valve bailer with slide in angle cut nozzle for sample removal. A new bailer is used for each well that requires hand bailing for purging and sample retrieval.

- Field equipment parameter instruments were calibrated to known standards in accordance with the manufacturers' recommended schedules and procedures. Calibration checks are conducted before a sampling event and the instruments recalibrated as deemed necessary. Calibration of equipment was noted in the daily field logs.

- If field equipment becomes inoperable, a properly calibrated replacement instrument is used in the interim. Type of instrumentation used during a sampling event is recorded in the daily field logs.

2.3 COLLECTION AND MANAGEMENT OF INVESTIGATION DERIVED WASTE

Investigation derived waste (IDW) generated during each groundwater sampling event includes purged water, decontamination water, excess sample material, and disposable sampling equipment. All water purged from monitoring wells generated during sampling and decontamination activities was temporarily stored in a labeled 55-gallon drum(s) and/or 5 gallon bucket(s) and then drained into the refinery sewer system upstream of the NAPIS.

2.4 COLLECTION OF SURFACE WATER SAMPLES

At the evaporation ponds, grab samples were collected near the inlets (pond edge). This location was noted in the field notebooks. For outfalls, a grab sample was collected at the pipe end, and recorded in the field log.

2.5 ANALYTICAL METHODS

Groundwater and surface water samples collected during the monitoring events were analyzed for the constituents listed in Table 1, Section 10.0. In addition, the WQCC standard was used for total and dissolved metals analysis.

2.6 PERIMETER INSPECTION

Perimeter inspections are part of the daily routine for refinery personnel to report any hydrocarbon staining, spills or any release that could result in material leaving the property boundary

2.7 REMEDIATION ACTIVITIES

A site investigation of the refinery tank farm network conducted in 1987 indicated high concentrations of BTEX constituents in the groundwater as well as hydrocarbons. As a result of the findings from additional site investigations conducted from 1987 through 1990, four recovery wells (RW-1, RW-2, RW-5, and RW-6) were installed to recover the SPH. SPH has been recovered from RW-1 using a submersible bladder pump and from RW-5 and RW-6 by hand-bailing using a disposable polyethylene bailer. Tables in Appendix A summarizes measurements, volume of product and water purged and also provides year to date (YTD) product purged from each well. RW-2 is listed as a recovery well but to date no visible hydrocarbon layer or odor has been observed in this well during quarterly inspections.

In RW-1 a bladder pump was used to pump out SPH on a quarterly basis into a labeled 55-gallon drum. The visible layer of floating product in the drum was measured with a tape measure and calculated as best as possible for the volume of product recovered. In RW-5 and RW-6, a 3 foot disposable hand bailer was used to extract product and water from the wells. Bailed water was collected in a 5-gallon bucket and the visible layer of floating product was then measured with a tape measure to estimate volume of SPH recovered. The purged water was drained into the refinery waste water treatment system upstream of the NAPIS.

Although the SPH thickness level in RW-1 has generally increased since the first quarter of 2013, hydrocarbon recovery from RW-1 has shown a general decrease from 2005 through 2016. In 2016, total hydrocarbon recovery is estimated at 8.5 gallons in 53 gallons of water purged compared to the 2005 estimate of 431 gallons of hydrocarbons in 1,210 gallons of water. No measureable hydrocarbons have been detected in RW-2 since the well was installed. RW-5 and RW-6 have shown a steady decrease in hydrocarbons since 2005 and no SPH has not been detected since February 2009 and November 2011, respectively. Hydrocarbon recovery logs are included in Appendix A.

On June 26, 2013, notification of the discovery of a hydrocarbon seep to the land surface was made to NMED and OCD. Shortly after the seep was initially discovered, fourteen soil excavations were completed in the area of the seep to help identify the presence of hydrocarbons in the shallow subsurface. The

excavations confirmed the presence of hydrocarbons throughout the immediate area of the seep and to the east and south of the seep. Six of the excavations were found to have sufficient hydrocarbons to warrant completion as temporary recovery sumps. A six-inch PVC well screen was placed into each of these six excavations and backfilled with coarse gravel to create temporary sumps to allow for safe, continued recovery of liquids. The sumps range in depth from approximately 8 to 10 feet and are estimated to be 4 feet wide by 6 feet long. The area has been identified as the “Hydrocarbon Seep”, located directly west of crude Tanks 101 and 102. Response actions have included installation of six temporary sumps (S1 – S6), and to date a total of 44 permanent monitoring wells (MKTF-1 through MKTF-44) have been installed to monitor ground water impacts. From June 2013 through December 2016 total hydrocarbon recovery is estimated to be 14,552 gallons and 899,480 gallons of water from the sumps. Of the 44 permanent monitoring wells installed, eleven (MKTF 3, 5, 6, 7, 8, 12, 13, 14, 15, 36, 37) wells had measureable layers of product in 2016. Initial hydrocarbon recovery from these wells conducted in February and June 2015 is estimated at 11.2 gallons. No hydrocarbon recovery was done in 2016. The wells identified to have a product layer will be pumped on a more frequent basis to determine recharge rate and recovery of hydrocarbons.

SECTION 3

GROUNDWATER DTW/DTP ELEVATION

Groundwater elevation data were collected from the wells listed in Table 1, Section 10.0. A summary of field measurements (DTW, DTP) taken during the quarterly, semi-annual and annual inspections is included in Section 9. Groundwater levels and SPH column thickness measurements (from the RW series of wells as well as the MKTF wells) were collected quarterly to monitor groundwater elevation and product column thickness fluctuations over time. Maps were generated using elevation data collected from surveys conducted by DePauli Engineering and from Hammon Enterprises Inc., professional surveyor and data from the 2016 field inspection logs.

Field notes and measurement data were recorded in field logs for each well for 2016 and are located in Appendix B. The DTW and DTP levels were measured to the nearest 0.01-ft. The depth to groundwater and SPH column thickness are recorded relative to the surveyed well casing rim or other surveyed datum. A corrected water table elevation is provided in wells containing SPH by adding 0.8 times the measured SPH column thickness to the measured water table elevation (Section 9).

All water/product levels are measured to an accuracy of the nearest 0.01-ft using a WaterMark Oil Water Interface Meter, Model 101L/SMOIL (100 ft.). After the water level is determined, the well volume is calculated using the height of the liquid column and the internal cross sectional area of the well. The purge volume is a minimum of two times the well volume.

Groundwater and SPH levels were measured in all wells within 48 hours of the start of groundwater sampling activities. All manual extraction of SPH and water from recovery wells, observation wells, and collection wells is discontinued for 48 hours prior to the measurement of water and SPH levels. Figure 6 (Section 11) shows the locations of all active wells.

SECTION 4

REGULATORY CRITERIA

Laboratory analytical data is compared to the most current regulatory standards (Appendix C) at time of submission of report.

- New Mexico 20NMAC 20.6.2.3103 (WQCC). Standards for Groundwater of 10,000 mg/L TDS Concentration or Less
- EPA 40 CFR 141.62. National Primary Drinking Water Regulations (Updated MAY 2016) (EPA MCL)
- NMED Tap Water Screening Levels (JULY 2015)
- EPA Regional Screening Levels set for Residential Risk-Based Screening Levels (EPA RSL) for Tap Water (Ross) (MAY 2016)

SECTION 5

GROUNDWATER ELEVATIONS

Groundwater elevations are depicted in the following maps using data from the 2016 quarterly and annual sampling events. In addition, graphs of the water levels are included in Figures 11 – 11.4, 11-A and 11-B

- Figure 7 (Section 11) presents a south-north geologic profile (east side of the refinery) showing contours of monitoring wells with reference to stratigraphic locations in which the water bearing zones are located.

- Figure 8 (Section 11) presents a south-north section on the west side of the refinery showing contours of monitoring wells with reference to stratigraphic locations in which the water bearing zones are located.

- Figure 14 (Section 11) represents a geologic profile for the west-east well locations.

SECTION 6

GROUNDWATER MONITORING RESULTS

All analytical data tables referenced in the following subsections are included in Section 8 of this report. Bold and highlighted values indicate a constituent exceeds a listed standard(s). Due to requirements for field preservation of samples, some samples have the results for nitrite and nitrate reported as a single value of nitrogen. In these instances, the value is conservatively listed for both nitrite and nitrate and a comparison is made between the reported concentration and the regulatory standards for both nitrite and nitrate. This may result in false indication of nitrite exceeding the regulatory standard. Plots of the reported concentrations are provided in a series of Figures numbered 15 through 17. Appendix G - Laboratory data for 2016 sampling events is provided on attached CD.

6.1 CONSTITUENT LEVELS IN GROUP A MONITORING WELLS

Group A wells are located within the northwest corner of the refinery property. Nine monitoring wells are situated along the refinery boundary and six monitoring wells are within the RCRA LTU area.

6.1.1 BOUNDARY WELLS (BW -1A/1B/1C, BW-2A/2B/2C, BW-3A/3B/3C)

The nine boundary wells (BW), downgradient of the refinery property, are screened within three different stratigraphic units. BW-1A, BW-2A, and BW-3A are screened within the Upper Sand stratigraphic unit (Figure 12); BW-1B, BW-2B, and BW-3B are screened in the Chinle/Alluvium Interface stratigraphic unit (Figure 10); and BW-1C, BW-2C and BW-3C are screened within the Sonsela stratigraphic unit (Figure 9).

The BW-1A, BW-1B, and BW-1C wells are located on the elevated dike separating evaporation pond 7 (EP-7) and evaporation pond 8 (EP-8). BW-2A, 2B, and 2C are located on the northwest edge of evaporation pond 11 (EP-11) and BW-3A, 3B, and 3C are located in the field north of evaporation ponds 12A and 12B (EP-12A and EP-12B). The boundary wells are sampled on an annual basis and evaluated for the following analytes: 8260B plus MTBE, gasoline range organics, (GRO), diesel range organics (DRO) and motor oil range organics (MRO), major cations/anions, and WQCC metal (total and dissolved). No water level was

detected in wells BW-1A, BW-3A, and BW-1B. The boundary wells were sampled and/or inspected on the following dates:

WELL ID	DATE	WELL ID	DATE	WELL ID	DATE
BW-1A	9/8/16	**BW-2A**	9/8/16	**BW-3A**	9/8/16
BW-1B	9/8/16	**BW-2B**	9/8/16	**BW-3B**	9/8/16
BW-1C	9/8/16	**BW-3C**	9/8/16	**BW-3C**	9/8/16

- No BTEX or MTBE constituents were detected in BW-1C, 2A, 2B, 2C, 3B or 3C in 2016. (Table 8.1).
- Fluoride was detected above the WQCC standard of 1.6 mg/L in BW-1C (2.4 mg/L), BW-2B (1.5 mg/L) and BW-2C (1.9 mg/L). Low concentrations of chloride, sulfate and bromide were detected in each of the BW wells sampled in 2016. Phosphorus exceeded applicable standards in BW-1C, BW-2A and BW-3B (Table 8.1.1).
- Low concentrations of total and dissolved metals were detected in each of the BW wells in 2016 at concentration levels below the applicable standards. (Tables 8.1.2 and 8.1.3)
- Bis(2-ethylhexyl)phthalate was detected in BW-1C in 2013, in BW-3B in 2009, and BW-3C in 2011 and may possibly be a lab contaminant or from the PVCC pipe materials used as casing in these wells. The constituent was not detected in any of the BW wells sampled in 2016. As of 2016, SVOCs were removed from analytical requirement (Table 8.1.4).

6.1.2 LAND TREATMENT UNIT (MW-1, MW-2, MW-4, MW-5, SMW-2, and SMW-4)

The LTU groundwater monitoring wells include MW-1, MW-2, MW-4, MW-5, SMW-2, and SMW-4. MW-1, SMW-4, and MW-2 are located downgradient along the north edge of the closed RCRA LTU. MW-5 and SMW-2 are located on the eastern perimeter of the LTU and MW-4 is located upgradient (south) of the LTU. MW-1, MW-2, MW-4, MW-5 are screened within the Sonsela stratigraphic unit. SMW-4 is screened within the Chinle/Alluvium Interface and SMW-2 is screened in both the Chinle/Alluvium Interface and Upper Sand stratigraphic units.

The LTU monitoring wells are sampled on an annual basis. In addition, MW-1, MW-2, MW-4, and MW-5, SMW-2 and SMW-4 are sampled every 10 years to comply with the RCRA Post Closure Permit. Annual samples were analyzed for the following analytes: 8260B plus MTBE, DRO, GRO, MRO, major cations/anions, WQCC metals (total and dissolved), cyanide, VOCs and SVOCs.

Annual sampling and inspections for 2016 on the LTU monitoring wells were completed on the following dates:

WELL ID	DATE	WELL ID	DATE
MW-1	9/7/16	**SMW-2**	9/9/16
MW-2	9/7/16	**SMW-4**	9/9/16
MW-4	9/7/16		
MW-5	9/7/16		

The next 10 year RCRA Post Closure Permit sampling event for MW-1, MW-2, MW-4, MW-5, SMW-2 and SMW-4 is scheduled to occur in 2019. The following analytes are evaluated during the RCRA Post Closure Permit sample event: modified Skinner List for VOCs, SVOCs, total petroleum hydrocarbons (TPH), DRO, GRO, MRO, metals to include mercury and cyanide, and major cations/anions with pH and conductance.

- No BTEX or MTBE have been detected in any of the MW wells. (Table 8.2)
- Low concentrations of fluoride, chloride and sulfate were detected in the MW wells in 2016 at concentration levels below the applicable standards.
- Metals (total and dissolved) was also detected in concentrations below the applicable standards in all of the MW wells in 2016.
- Several organic compounds were detected at low concentrations in 2016 in all of the MW wells (bis (2-ethylhexyl)phthalate, benzoic acid, d-n-octylphthalate, dimethylphthalate and pyrene),
- No concentrations of BTEX or MTBE was detected in any of the SMW wells, with the exception of SMW-2 which has had low concentrations of MTBE below the applicable standard of (0.143 mg/L). (Table 8.3).
- In SMW-2, chloride and sulfate were detected above the WQCC standards since 2011. Low concentrations of fluoride, chloride and sulfate have been detected in SMW-4. GRO was also detected in both SMW wells. (Table 8.3.1)
- Low concentrations of metals (total and dissolved) have been detected in both wells, with manganese exceeding the WQCC standard of 0.2 mg/L in 2016. (Table 8.3.2 – 8.3.3)
- In 2016, five organic constituents were detected at concentration levels below the applicable standard (benzoic acid, bis(2-ethylhexyl) phthalate, di-n-octylphthalate, diethylphthalate, dimethylphthalate, phenol and pyrene). (Tables 8.3.4).

6.2 CONSTITUENT LEVELS IN GROUP B MONITORING WELLS

There are ten monitoring wells in Group B, not including the three leak detection units. These wells are located within the aeration basin west of the refinery tank farm. Group B includes three groundwater monitoring wells (GWM), four monitoring wells for the New American Petroleum Institute Separator (NAPIS), three leak detection units (LDU), OAPIS-1 installed in 2012 as a result of the Solid Waste Management Units (SMWU) No. 1, Aeration Basin and SMWU No. 14, Old API Separator site investigation. Two new monitoring wells (STP1-NW and STP1-SW) installed on the west end of the sanitary treatment pond (STP-1) in May 2014.

6.2.1 GROUNDWATER MONITORING WELLS (GWM-1, GWM-2, GWM-3)

The GWM series of wells are all screened in the Chinle/Alluvium Interface stratigraphic unit. GWM-1 and GWM-2 are located on the west side of the aeration basin straddling the dike that separates AL-2 and EP-1. Downgradient from GWM-1 and GWM-2 is GWM-3 located on the northwest corner of EP-1. These wells are inspected and sampled on a quarterly basis. No groundwater has been detected in GWM-2 and GWM-3 in 2014, 2015 and 2016. In fourth quarter 2015, an SPH level was detected in GWM-1 and in all of 2016 and no ground water samples were collected. Discussion for detected constituents will be for year 2015.

Groundwater samples from GMW-1 were analyzed for the following constituents: BTEX, MTBE, DRO, GRO, MRO, major cations/anions, WQCC total and dissolved metals, and VOCs and SVOCs.

Quarterly inspections and sampling of the GMW wells were completed on the following dates:

WELL ID	QTR 1	QTR 2	QTR 3	QTR 4
GWM-1	3/1/16	6/7/16	9/13/16	11/14/16
GWM-2	3/1/16	6/7/16	9/13/16	11/14/16
GWM-3	3/1/16	6/7/16	9/13/16	11/14/16

- No groundwater sample was collected from GWM-1 in all of 2016 due to the detection of SPH.
- No ground water samples were collected from GWM-2 and GWM-3 in all of 2016, wells are dry.
- Elevated concentration levels of benzene above the EPA MCL standard of 0.005 mg/L have been detected in GWM-1 since 2010 thru third quarter 2015, with the highest concentration recorded in the fourth quarter 2014 at 0.012 mg/L. Concentrations of ethylbenzene, toluene, xylenes, and MTBE remain within the applicable standards for GWM-1 (Table 8.7).

- DRO and GRO were detected in GWM-1 from 2010 through 2015 and in the fourth quarter 2015, MRO was detected in GWM-1 at 18 mg/L
- Fluoride and chloride have been detected in GWM-1 exceeding the WQCC standard (1.6 mg/L) since 2006 in GWM-1 with the exception of quarter four in 2011.
- Fluoride and chloride have also been detected in GWM-2 and GWM-3 at levels above the WQCC standards from 2010 thru 2013.
- Concentrations of total and dissolved arsenic, iron, and manganese in GWM-1 have exceeded applicable standards since 2008. Low concentrations of barium, chromium, lead, selenium and zinc have been detected in prior years. Total and dissolved barium and total lead concentrations, were detected within the applicable standards for all of 2015. Concentrations of the remaining total and dissolved metals did not exceed the applicable standards during 2015 (Tables 8.7.2 and 8.7.3).
- Concentrations of VOCs and SVOCs detected above the applicable standards in third quarter 2015 in GWM-1 include; naphthalene, 1-methylnaphthalene, 2-methylnaphthalene, benz(a)anthracene, benzo(a)pyrene, chrysene, fluorene, phenanthrene, and pyrene. (Table 8.7.4) No organic constituents have been detected in GWM-2 and GWM-3.

GWM-2 and GWM-3 were installed and developed in 2005. The wells are checked quarterly for the presence of water. If water is detected, NMED and OCD are notified within 24 hours of discovery. The water is purged from the well and re-measured to calculate the potential recharge rate. Groundwater samples are collected when water level is sufficient.

Groundwater was first observed in GWM-2 during the first quarter of 2008. The depth to water was 18.45 feet with an estimated water column height of 0.36 feet. Samples were collected and the well was bailed dry. GWM-2 did not recharge and remained dry until the third quarter of 2010. GWM-2 continued to recharge as samples were collected throughout 2011, 2012, and most of 2013. GWM-2 has had an insufficient volume for sampling since the fourth quarter of 2013 and remained dry throughout 2016. GWM-3 has remained dry since 2013. In late 2012 through early 2013, rerouting of the flow to the WWTP caused a reduction in the levels in the aeration lagoons and gravitational flow between the lagoons to pond 1 ceased.

6.2.2 GROUNDWATER MONITORING WELLS: NAPIS-1, NAPIS-2, NAPIS-3, AND KA-3

The NAPIS groundwater monitoring wells are located east of the aeration lagoons. NAPIS-1 is an upgradient well located on the southeast side of the separator. The NAPIS-2 monitoring well is located in the southwest corner of the bay to the separator, and NAPIS-3 is located in the northwest corner. KA-3 is located between NAPIS-2 and NAPIS-3 on the west side of the bay to the separator unit. These wells are

screened in the Chinle/Alluvium stratigraphic unit with three of the wells (NAPIS-2, NAPIS-3, and KA-3) installed subsurface.

The NAPIS and KA wells are sampled on a quarterly basis. In agreement with OCD and approved by NMED, the third quarter sampling is combined with the annual sampling event. Groundwater samples were analyzed for the following parameters: BTEX, MTBE, major cations/anions, WQCC total and dissolved metals, and VOCs and SVOCs.

WELL ID	QTR 1	QTR 2	QTR 3	QTR 4
NAPIS-1	3/1/16	6/7/16	9/1/16	11/14/16
NAPIS-2	3/1/16	6/7/16	9/1/16	11/14/16
NAPIS-3	3/1/16	6/7/16	9/1/16	11/14/16
KA-3	3/3/16	6/6/16	9/1/16	11/14/16

- BTEX and MTBE have remained below the applicable standards since 2008 for NAPIS-1. Benzene and MTBE concentrations in NAPIS-2 have exceeded the applicable standards since 2008 and remained in exceedance for 2016. BTEX constituents were not detected in NAPIS-3 with the exception of MTBE detected at 0.16 mg/L in the first quarter.
- In KA-3, benzene was detected in the first, second and third quarter of 2016 and low concentrations of ethyl benzene and MTBE have been detected in all of 2016 below applicable standards. (Table 8.8).
- DRO has been detected in the first and second quarter in NAPIS-2 and in the fourth quarter in NAPIS-3. Detections of GRO in NAPIS-2 and KA-3 continues and in all of 2016. No MRO has been detected in any of the NAPIS or KA wells. (Table 8.8.1).
- Low concentrations of fluoride, chloride, and sulfate have been detected in NAPIS-1 in 2016 (Table 8.8.1).
- Fluoride and chloride concentrations in NAPIS-2 have exceeded the WQCC standards of 1.6 mg/L and 250 mg/L, respectively, for 2016 (Table 8.8.1).
- Fluoride and chloride concentrations in NAPIS-3 also exceeded applicable standards in most of 2016. (Table 8.8.1).
- Fluoride, chloride and sulfate concentrations in KA-3 have remained below the WQCC standard since June of 2013 (Table 8.8.1).
- Detection of total metals include manganese in NAPIS-1 for all of 2016 at concentration levels above the WQCC standard of 0.2 mg/L and trace amounts of arsenic, barium, iron, lead, selenium, mercury and zinc were detected in 2016 in NAPIS-1. In NAPIS-2, barium, iron and manganese

also had high concentrations detected in all of 2016. Low concentrations of arsenic, chromium, copper, lead, selenium, mercury and zinc were detected, all at levels below the applicable standards. (Table 8.8.2).

- In NAPIS-3, arsenic, barium, chromium, iron and manganese were detected in the fourth quarter of 2016 at concentration levels above the applicable standards. Copper, lead, selenium, mercury and zinc were also detected at levels below the applicable standards in 2016. (Tables 8.8.2).
- In KA-3, barium and iron were detected at high concentrations in the fourth quarter 2016. Manganese was detected at levels exceeding applicable standards in all of 2016. Arsenic, copper, lead, selenium, mercury and zinc were also detected at levels below the applicable standards in 2016. (Tables 8.8.2 and 8.8.3).
- No VOCs have been detected in NAPIS-1 and NAPIS-3 with the exception of low concentrations of 1,2,4-trimethylbenzene and 1,2-dichloroethane (EDC) detected in the fourth quarter. In NAPIS-2, 12 organic compounds were detected in 2016 all at concentrations below the applicable standards and 1-methylnaphthalene and naphthalene were detected at levels exceeding applicable standards in 2016.
- In KA-3, trace amounts of ten VOCs were detected, all at concentrations below the applicable standards. See Table 8.8.4 for the complete list.

6.2.3 LEAK DETECTION UNITS (LDU): EAST LDU, OIL SUMP LDU, WEST LDU

The NAPIS secondary containment units otherwise known as leak detection units (LDU) are installed on the east and west bay of the NAPIS unit. The East LDU is located on the southeast corner in the east bay of the NAPIS unit between the unit and NAPIS-1. The Oil Sump LDU is located on the northeast side of the East LDU. The West LDU is located in the southwest corner of the west bay of the NAPIS unit. The LDUs were monitored in 2010 as part of the 2010 Facility Wide Groundwater Monitoring Work Plan (FWGWMP).

The LDU are sampled and inspected on a quarterly basis. In agreement with OCD and approved by NMED, the third quarter sampling was combined with the annual sample event. The LDUs were sampled for the following analytes in 2016: BTEX, MTBE, DRO, GRO, MRO, WQCC total and dissolved metals, and VOCs. Oil Sump LDU was dry all four quarters 2016 and therefore not sampled. There was not enough water in the East and West LDU for sample collection in the third quarter of 2016. Quarterly inspections and sampling were completed for the LDU wells on the following dates:

SAMPLE ID	QTR 1	QTR 2	QTR 3	QTR 4
EAST LDU	3/1/16	6/7/16	9/6/16	11/17/16
WEST LDU	3/1/16	6/7/16	9/6/16	11/17/16
OIL SUMP LDU	3/1/16	6/7/16	9/6/16	11/17/16

- Benzene was detected in the East LDU at concentration levels above the applicable standard and low concentrations of toluene, ethyl benzene, total xylenes and MTBE were also detected. DRO and GRO was also detected in 2016 in the East LDU (Table 8.10).
- In the West LDU, benzene exceeded applicable standards in all of 2016. Toluene, ethyl benzene, total xylenes, and MTBE were also detected at concentration levels below the applicable standards. DRO and GRO were also detected in 2016. (Table 8.10).
- No samples were collected from the Oil Sump LDU since the second half of 2013; no water level has been observed.
- The following metals (total and dissolved) have been detected at concentration levels above the applicable standard in 2016: Chromium, iron, and manganese. Low concentrations of arsenic, barium, copper, lead, selenium, mercury and zinc was also detected in the East LDU. (Table 8.10.1 and 8.10.2).
- Concentrations of 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene exceeded the EPA RSL and NMED standards in the East LDU in the first, second and third quarter of 2016. Concentrations of 1,2,4-trimethylbenzene, exceeded EPA RSL and NMED standards in the West LDU in the second quarter 2016. (Table 8.10.3).

6.2.4 GROUNDWATER MONITORING WELL: OAPIS-1

The OAPIS-1 groundwater monitoring well was installed in 2012 on the southeast edge of AL-2 as a result of the Investigation Work Plan for SMWU No. 1 (Aeration Basin) and SMWU No. 14 (Old API Separator). The OAPIS–1 well is screened in the Chinle/Alluvium Interface stratigraphic unit. The OAPIS-1 well was added to the quarterly sample schedule in 2013. In agreement with OCD and as approved by NMED, the third quarter sample event was combined with the annual sample event.

In 2016, groundwater samples were collected from OAPIS-1 for the following analytes: BTEX, MTBE, DRO, GRO, MRO, major cations/anions, WQCC total and dissolved metals, cyanide, VOCs and SVOCs.

The OAPIS-1 well was inspected and sampled on the following dates in 2016:

WELL ID	QTR 1	QTR 2	QTR 3	QTR 4
OAPIS-1	3/1/16	6/7/16	9/1/16	11/14/16

- Benzene and MTBE concentrations exceeded the EPA MCL standards (0.005 mg/L and 0.143 mg/L, respectively) for each quarterly sample event in 2016. Concentrations of toluene, ethylbenzene and total xylenes were also present but remained below the applicable standard in 2016 (Table 8.9).
- In 2016, DRO and GRO concentrations were detected in all of 2016. Chloride concentrations exceeded the WQCC standards of 250 mg/L, and fluoride was also above the applicable standard of 1.6 mg/L in the first quarter. (Table 8.9.1).

- The following metals (arsenic, iron, and manganese) exceeded the applicable standards in 2016 and total cyanide was detected at 0.504 mg/L in the fourth quarter 2016. Barium, chromium, copper, lead, selenium, mercury and zinc were also detected at levels below the applicable standards in 2016. (Table 8.9.2).

- In the first quarter of 2016, 1,2-dichloroethane(EDC) was detected 0.0062 mg/L exceeding the EPA MCL standard of 0.005 mg/L. Naphthalene, and 1-methylnaphthalene was also detected above the applicable standards in all of 2016. Low concentrations of 13 organic compounds were detected throughout 2016 all at levels below applicable standards. See Table 8.9.4 for a complete list of VOCs and SVOCs..

6.2.5 STP1-NW and STP1-SW

Monitoring well STP1-NW is located on the west end of the north bay (STP-1) and STP1-SW is located on the southwest corner of the south bay of STP-1. These wells were installed in May of 2013. Ground water samples were analyzed for the following analytes: 8260B plus MTBE, DRO, GRO, MRO, major cations/anions, WQCC total and dissolved metals, cyanide and SVOCs.

The STP1-NW and STP1-SW wells were inspected and sampled on the following dates in 2016:

WELL ID	QTR 1	QTR 2	QTR 3	QTR 4
STP1-NW	3/2/16	6/7/16	9/9/16	11/14/16
STP1-SW	3/2/16	6/7/16	9/9/16	11/14/16

- No samples collected from STP1-SW as this well has remained dry.

- There were no BTEX, DRO, GRO, or MRO constituents detected in 2016 in STP1-NW. Low concentrations of MTBE were detected in all of 2016 below the applicable standard of 0.143 mg/L. (Table 8.14).

- Chloride was detected above the applicable standard of 250 mg/L in the second, third and fourth quarter of 2016.

- Arsenic, iron, lead and manganese were detected above the applicable standards in the fourth quarter 2016. Barium, chromium, copper, selenium, mercury and zinc were also detected at concentration levels below the applicable standards. (Tables 8.14.1).

- No VOCs or SVOCs have been detected.

6.3 CONSTITUENT LEVELS IN GROUP C MONITORING WELLS

The Group C wells include six observation wells (OW-13, OW-14, OW-29, OW-30, OW-50, and OW-52) located on level terrain northeast of the refinery tank farm, and four recovery wells (RW-1, RW-2, RW-5, and RW-6) located within the refinery tank farm. Observation wells OW-50 and OW-52 were installed in 2009 to monitor potential migration of constituents. The recovery wells were installed between 1987 and 1990 and have been used to recover SPH.

6.3.1 OBSERVATION WELLS: OW-13, OW-14, OW-29, and OW-30

The observation wells OW-14, OW-29, and OW-30 are screened in the Chinle/Alluvium Interface; observation well OW-13 is screened in the Sonsela stratigraphic unit. OW-13 is downgradient (north) of the tank farm and OW-14 is upgradient and adjacent to the LPG tank farm. OW-29 is located directly north of OW-14 and OW-30 is situated northeast of OW-14 along the east side of the railroad spur entering the refinery property from the north. These observation wells are sampled quarterly and in agreement with OCD, approved by NMED, the third quarter sampling event is combined with the annual sampling requirement per the OCD discharge permit.

Groundwater samples were collected from these observation wells and submitted for laboratory analyses of the following analytes: BTEX, MTBE, DRO, GRO, MRO, major cations/anions, WQCC total and dissolved metals, and VOCs.

Observation wells OW-13, OW-14, OW-29, and OW-30 were sampled on the following dates in 2016:

WELL ID	QTR 1	QTR 2	QTR 3	QTR 4
OW-13	3/4/16	6/6/16	8/31/16	11/15/16
OW-14	3/4/16	6/6/16	8/31/16	11/15/16
OW-29	3/4/16	6/6/16	8/31/16	11/15/16
OW-30	3/8/16	6/6/16	8/31/16	11/14/16

- In OW-13, a low concentration of benzene was detected in the third quarter 2016 below the applicable standard (0.005 mg/L) and low concentrations of MTBE continues to be detected at

concentrations below the applicable standard of 0.143 mg/L. Toluene, ethylbenzene and xylenes were all non-detected for 2016. (Table 8.13)

- In OW-14, benzene and MTBE were above the applicable standard of 0.005 mg/L and 0.143 mg/L with the highest level of benzene (8.7 mg/L) in the fourth quarter and 0.068 mg/L of MTBE in the first quarter 2016.

- OW-29 sampling results indicate levels above the applicable standard of 0.143 mg/L for MTBE in all of 2016, with the highest reading of 3.4 mg/L occurring in the fourth quarter. Benzene was detected in the fourth quarter only above the applicable standard of 0.005 mg/L and in the fourth quarter, ethylbenzene was recorded at 0.0011 mg/L; below the applicable standard of 0.7 mg/L. Toluene and total xylenes were all non-detect for 2016. (Table 8.13).

- In OW-30, MTBE was detected above the applicable standard of 0.143 mg/L in all of 2016, with the highest reading of 3.5 mg/L in the first and fourth quarter. A low concentration of benzene was detected in the second quarter at 1.2E-03 mg/L. No detections of toluene, ethylbenzene or xylenes in 2016. (Table 8.13).

- GRO was detected in OW-13, OW-14, OW-29 and OW-30 in all of 2016 and DRO was detected only in OW-14 in 2016. (Table 8.13.1).

- Metals (total and dissolved). No metals were detected in OW-13 that exceeded applicable standards in 2016. (Table 8.13.1).

- Metals (total and dissolved). Arsenic, barium, iron and manganese were detected at concentration levels above applicable standards in 2016 in OW-14.

- Metals (total and dissolved). In OW-29, manganese was detected at levels above the applicable standard of 0.2 mg/L in all of 2016.

- No metals (total and dissolved) were detected exceeding the applicable standards in 2016 in OW-30.

- In OW-13, 1,2-dichloroethane (EDC) was detected in all of 2016 at concentration levels below the applicable standard of 0.005 mg/L. (Table 8.13.4).

- 1-methylnaphthalene and naphthalene was detected in OW-14 in all of 2016 at concentrations above the EPA RSL for tap water standard of 0.0011 mg/L and 0.00165 mg/L (NMED Tap Water) for naphthalene. Nine other organic compounds were also detected at concentration levels below the applicable standards. See Table 8.13.4 for a complete list.

- No organic compounds detected were exceeding applicable standards in OW-29 and OW-30 in all of 2016. See Table 8.13.4 for a complete list.

6.3.2 OBSERVATION WELLS: OW-50 and OW-52

Observation wells OW-50 and OW-52 were installed upgradient from OW-13 and OW-29 in 2009 to monitor possible migration of MTBE. The two observation wells are screened in the Chinle/Alluvium Interface stratigraphic unit. A request to change the 2010 FWGWMP sample frequency from quarterly to annual for OW-50 and OW-52 was approved by NMED in 2012 (2011 Updates, Comment 6).

In 2016, groundwater samples were collected from observation wells OW-50 and OW-52 for the following analytes: BTEX, MTBE, DRO, GRO, MRO, major anions/cations, WQCC total and dissolved metals, and VOCs.

Observation wells OW-50 and OW-52 were sampled on the following dates in 2016:

WELL ID	SAMPLE DATE
OW-50	9/9/16
OW-52	9/9/16

- BTEX, DRO, GRO, and MRO constituents have not been detected in either OW-50 or OW-52 since 2010 through 2016, however a low concentration of MTBE was detected in both wells in 2016 in the fourth quarter. (Tables 8.5 and 8.5.1).
- Low concentrations of fluoride, chloride and sulfate were detected in 2016 but remain below the applicable standards (Table 8.5.1).
- Low concentrations of total and dissolved arsenic, barium, iron, lead, manganese, selenium, mercury and zinc have been detected in OW-50 and OW-52 in 2016 and are at concentration levels below the applicable standards (Tables 8.5.2 and 8.5.3).
- 1,2-dichloroethane (EDC) was the only organic compound detected in 2016 in OW-50 and OW-52 at concentration levels below the EPA MCL standard of 0.005 mg/L. (Table 8.5.4).

6.3.3 RECOVERY WELLS: RW-1, RW-2, RW-5, RW-6

The recovery wells RW-1, RW-2, RW-5, and RW-6 are shallow wells installed in the refinery tank farm located in the east-central portion of the refinery property. The recovery wells are screened within the Chinle/Alluvium Interface stratigraphic unit and are used to recover SPH. RW-1 is located east of Tank 716; RW-2 is located between Tanks 574 and 576; and RW-5 and RW-6 are located in the northwest corner of the tank farm, east of Tanks 337 and 345.

Quarterly inspections for the RW wells include product recovery of SPH using disposable bailers in RW-5 and RW-6, and a portable 2-inch bladder pump for RW-1. Hydrocarbon thickness is measured prior to being removed. Purge water is collected and disposed upstream of the NAPIS. Hydrocarbon recovery is estimated based on measurements and observations.

The RW wells were added to the annual sampling schedule in 2011, per the Approval with Modifications in the 2010 FWGWMP. For 2016, the wells were sampled and evaluated for the following analytes: BTEX, MTBE, DRO, GRO, and MRO.

The recovery wells were inspected and sampled in 2016 on the following dates:

WELL ID	QTR 1	QTR 2	QTR 3	QTR 4
RW-1	3/4/16	6/8/16	9/13/16	11/16/16
RW-2	3/4/16	6/8/16	9/13/16	11/16/16
RW-5	3/4/16	6/7/16	9/13/16	11/16/16
RW-6	3/4/16	6/7/16	9/13/16	11/16/16

- No samples were collected from RW-1 due to SPH levels
- BTEX and MTBE concentrations exceeded applicable standards in RW-2 in 2016. Benzene exceeded the applicable standard in RW-5 and benzene and total xylenes concentrations exceeded applicable standards in RW-6. Concentrations of toluene, total xylenes and ethyl benzene were detected in RW-5 and RW-6 which did not exceed applicable standards. (Table 8.11).
- DRO and GRO concentrations were detected in RW-2, RW-5 and RW-6 in all of 2016 with the highest concentration of GRO in RW-2 (160 mg/L – first quarter), and DRO (14 mg/L in second and third quarters) in RW-2.

Hydrocarbon recovery from RW-1 has shown a steady decrease from 2005 through 2016. In 2016, total hydrocarbon recovery is estimated at 8.5 gallons in 53 gallons of water purged compared to the 2005 estimate of 431 gallons of hydrocarbons in 1,210 gallons of water. No measureable hydrocarbons have been detected in RW-2 since the well was installed. RW-5 and RW-6 have shown a steady decrease in hydrocarbons since 2005. No measureable SPH has been detected in RW-5 and RW-6 since February 2009 and November 2011.

6.4 CONSTITUENT LEVELS IN GROUP D MONITORING WELLS

The Group D wells include three process/production wells, PW-2, PW-3, and PW-4 that supply water to the refinery and for domestic uses. These process wells reach approximately 1,000 feet and are screened in the San Andreas/Yeso aquifer. Additionally, Group D also includes four observations wells OW-1, OW-10,

OW-11, and OW-12. The OW-1 and OW-10 wells are located in the northwest portion of the refinery and are considered artesian wells. OW-11 is located near the entrance of the refinery and OW-12 is west of the tank farm in the surplus yard.

6.4.1 PROCESS WELLS: PW-2, PW-3, PW-4

PW-2, PW-3 and PW-4 are all process/production wells which supply process water to the refinery and domestic water to the company housing and Travel Center. PW-2 is located west of evaporation pond 6 (EP-6). PW-3 is centrally located directly north of the maintenance shop, and PW-4 is located on the southern edge of the refinery property and adjacent to the Pilot Lift Station.

Production well PW-2 is on a staggered 3-year sampling schedule, PW-3 is sampled on an annual basis since 2010 due to the detection of 2-methylnaphthalene exceeding the applicable standard in 2008. In 2013, three organic compounds were detected in PW-4 at very low concentrations and per NMED directive (HWB-WRG-14-006), sampling of this well was switched to semi-annual to begin in 2017 to collect additional data. Ground water samples are collected or the following analytes: BTEX, MTBE, nitrate, WQCC total and dissolved metals, and VOCs and SVOCs.

The process well PW-3 was sampled in 2016 on the following dates:

WELL ID	DATE
PW-3	8/31/16
PW-4	6/10/16; 8/31/16

- No BTEX or MTBE constituents were detected in PW-3 or PW-4 in 2016 (Table 8.6).
- Low concentrations of the following metals (total and dissolved) were detected in both wells in 2016: Arsenic, barium, iron, lead, manganese, selenium, and zinc at levels below the applicable standards (Table 8.6.1 and 8.6.2). Cyanide was at non-detectable levels in both wells.
- There were a total of five organic constituents detected in PW-3 all at concentrations below the applicable standards in 2016. See Table 8.6.3 for a complete list.
- In 2016, 10 organic compounds were detected at concentration levels below the applicable standards in PW-4.

6.4.2 OBSERVATION WELLS: OW-1 AND OW-10

Observation well OW-1 is an artesian well located on the west side of EP-6. Well OW-10 is located downgradient from OW-1 on the east side of EP-9. Wells OW-1 and OW-10 are screened in the Sonsela stratigraphic unit. Inspection requirements for these two wells were modified in 2010, per the 2010 FWGWMP, and included sampling on a quarterly basis. In agreement with OCD, approved by NMED, the third quarter sampling was combined with the annual sampling event. In 2016, groundwater samples from OW-1 and OW-10 were evaluated for the following analytes: BTEX, MTBE, DRO, GRO, MRO, major cations/anions, WQCC total and dissolved metals, VOCs.

Groundwater samples were collected from OW-1 and OW-10 in 2016 on the following dates:

WELL ID	QTR 1	QTR 2	QTR 3	QTR 4
OW-1	3/3/16	6/6/16	9/6/16	11/15/16
OW-10	3/3/16	6/6/16	9/6/16	11/15/16

- Low concentrations of benzene, ethyl benzene and MTBE were detected in OW-1 in 2016 below applicable standards. Only the constituent MTBE was detected in OW-10 in all of 2016 at concentration levels below the applicable standard of 0.143 mg/L (NMED Tap Water). (Table 8.12).
- Low concentrations of cations were detected in OW-1 throughout 2016 at concentration levels below the applicable standard and no DRO/GRO/MRO were detected. OW-10 had exceedances of chloride in all of 2016 above the WQCC Standard of 250 mg/L. GRO was detected in the first, second and fourth quarters of 2016 in OW-10. (Table 8.12.1).
- Total metals (Iron and manganese) were detected at concentration levels above the applicable standards in OW-1 in 2016.
- Metals (total and dissolved): Low concentrations of the following metals were detected in both OW-1 and OW-10 In 2016 at concentration levels below applicable standards: Arsenic, barium, chromium, iron, leak, manganese, selenium, silver, mercury and zinc. See Table 8.12.1 and 8.12.2 for a complete list.
- In 2016 no VOCs were detected in OW-1, however in OW-10 four organic compounds were detected at concentrations below the applicable standards and are listed as follows: 1,1-Dichloroethane, 1,1-dichloroethene, 1,2-dichloroethane (EDC) and cis-1,2-DCE. (Table 8.12.4).

6.4.3 OBSERVATION WELLS: OW-11 AND OW-12

Observation well OW-11 is located within the refinery property (southeast) on the west side of the main entrance. Well OW-12 is located within the surplus or bone yard located west and slightly north of the primary tank farm. OW-11 and OW-12 are screened in the Sonsela stratigraphic unit.

Well inspections and sampling are conducted annually. In 2016, groundwater samples from the two wells were evaluated for the following analytes: BTEX, MTBE, major anions/cations, GRO, DRO, MRO, WQCC total and dissolved metals, VOCs, and SVOCs. Observation well OW-11 and OW-12 were sampled in the third quarter of 2016 on the following dates:

WELL ID	DATE
OW-11	9/9/16
OW-12	9/8/16

- BTEX and MTBE have not been detected in OW-11 and OW-12 since 2006 and remained non-detect for 2016 (Table 8.4).
- Fluoride and sulfate concentrations continue to exceed the applicable standards (1.6 mg/L and 600 mg/L, respectively) in OW-11. (Table 8.4.1).
- GRO, DRO and MRO were not detected in OW-11 and OW-12 in 2016 (Table 8.4.1).
- The following metals (total and dissolved) were detected at concentrations below the applicable standards in OW-11 and OW-12 in 2016: Arsenic, barium, chromium, iron, lead, manganese, selenium, and mercury. (Tables 8.4.2 and 8.4.3).
- No organic compounds were detected in OW-11 or OW-10 in 2016 (Table 8.4.4).

6.5 CONSTITUENT LEVELS IN GROUP E MONITORING WELLS

To date, a total of 44 monitoring wells (MKTF-1 through MKTF-44) have been installed to aid in delineating the extent of a hydrocarbon seep discovered in 2013, directly west of crude tanks T-101 and T102. During the investigation, a pre-existing well (labeled as MKTF-45) was found directly west of the truck-loading rack. Each of the wells has been constructed into permanent monitoring wells, and these wells are designated as Group E wells.

6.6 CONSTITUENT LEVELS FOR MKTF WELLS

In 2016, groundwater samples were collected from the MKTF wells and evaluated for the following analytes: BTEX, MTBE, DRO, GRO, MRO, major cations/anions, metals, VOCs, and SVOCs. Wells that had a hydrocarbon layer were not sampled.

- Benzene concentrations exceeded the standard of 0.005 mg/L in the following wells: MKTF-1, MKTF-2, MKTF-4, MKTF-9, MKTF-10, MKTF-11, MKTF-15 through MKTF-26. The greatest benzene concentration (23 mg/L) during 2016 occurred in well MKTF-16 during quarter four (Table 8.17).

- Toluene concentrations exceeded the standard of 0.75 mg/L in the following wells: MKTF-1, MKTF-10, MKTF-11, MKTF-15, and MKTF-23. The highest toluene concentration (23 mg/L) occurred in well MKTF-10 in the first quarter 2016. (Table 8.17).

- Ethylbenzene concentrations exceeded the standard of 0.7 mg/L in the following wells: MKTF-1, MKTF-4, MKTF-10, MKTF-11, MKTF-15, MKTF-16, MKTF-19 and MKTF-20. The highest concentration (1.7 mg/L) occurred in MKTF-10 during the first, third and fourth quarters of 2016. (Table 8.17).

- Total xylenes concentrations exceeded the standard of 0.62 mg/L in the following wells: MKTF-1, MKTF-4, MKTF-10, MKTF-11, MKTF-15, MKTF-16, MKTF-19 MKTF-20, MKTF-21, MKTF-23, and MKTF-37. The highest concentration (9.2 mg/L) occurred in well MKTF-20 in the fourth quarter 2016. (Table 8.17).

- MTBE concentrations exceeded the standard of 0.143 mg/L in the following wells: MKTF-1, MKTF-4, MKTF-9, MKTF-16, MKTF-17, and MKTF-19 through MKTF-25, MKTF-32, MKTF-33, and MKTF-36. The highest concentration (10.0 mg/L) occurred in well MKTF-19 in the fourth quarter 2016 (Table 8.17).

- The constituent DRO and GRO was detected in MKTF-1 through MKTF-25, MKTF-36, MKTF-37, MKTF-39 and MKTF-42. GRO was also detected in MKTF-26, through MKTF-35, MKTF-38, MKTF-43, and MKTF-44. There were no detectable concentrations of MRO in any of the MKTF wells. (Table 8.17.1).

- Chloride concentration exceedances above the standard (250 mg/L) were found in the following wells: MKTF-1, MKTF-2, MKTF-4, MKTF-10, MKTF-11, MKTF-16, MKTF-20, MKTF-27, MKTF-28, MKTF-30, MKTF-31, MKTF-32, MKTF-34, MKTF-39, MKTF-40, MKTF-41, MKTF-42 and MKTF-43. (Table 8.17.1).

- Total metals above applicable standards were detected in the following wells:: Table 8.17.2):
    - Arsenic (0.01 mg/L): MKTF-11, MKTF-16, MKTF-19, MKTF-20, MKTF-21, MKTF-23, MKTF-24, MKTF-36, MKTF-43 and MKTF-44.
    - Barium (1.0 mg/L): MKTF-2, MKTF-4, MKTF-10, MKTF-11, MKTF-15, MKTF-16, MKTF-24, MKTF-25, MKTF-33, MKTF-35, MKTF-36, MKTF-39.
    - Chromium (0.05 mg/L): MKTF-24
    - Iron (1.0 mg/L): MKTF-1 through MKTF-44.
    - Lead (0.015 mg/L): MKTF-19, MKTF-22, MKTF-24, MKTF-25, MKTF-30, and MKTF-35.
    - Manganese (0.2 mg/L): All wells with the exception of MKTF-34.
    - Selenium (0.05 mg/L): MKTF-43.

- Dissolved metals concentrations above applicable standards were noted in the following wells (Table 8.17.3):
    - Arsenic: MKTF-4, MKTF-11, MKTF-16, MKTF-19, MKTF-20, MKTF-21, MKTF-36, and MKTF-43.
    - Barium: MKTF-1, MKTF-4, MKTF-10, MKTF-11, MKTF-15, MKTF-16, MKTF-18, MKTF-19, MKTF-20, MKTF-21, MKTF-22, MKTF-36, and MKTF-39.
    - Iron: MKTF-1, MKTF-4, MKTF-9, MKTF-10, MKTF-11, MKTF-15, MKTF-16, MKTF-18, MKTF-19, MKTF-20, MKTF-21, MKTF-22, MKTF-23, MKTF-35, MKTF-36, MKTF-37 and MKTF-39.
    - Manganese: All wells with the exception of MKTF-28, MKTF-30, MKTF-31, MKTF-32, MKTF-33, and MKTF-34, MKTF-40, MKTF-41 and MKTF-44.

Fourteen semi volatile organic compounds were detected that exceeded applicable standards in 2016 and are listed as follows: See Table 8.17.4 for the complete list.

- Aniline
- Benz(a)anthracene
- Bis(2-ethylhexyl)phthalate
- Butylbenzene
- 2,4 dimethylphenol
- Fluorene
- 1-methyl naphthalene
- 2-methylnaphthalene
- 2-methylphenol
- 3+4-methylphenol
- Naphthalene
- Pentachlorophenol
- Phenanthrene
- Phenol

Fifteen volatile organic compounds were detected in the MKTF wells in 2016 at concentration levels above the applicable standards and are listed as follows: See Table 8.17.5 for the complete list.

- 1,2,4-trimethylbenzene
- 1,3,5-trimethylbenzene
- 1,2-dichloroethane (EDC)
- 1-methylnaphthalene
- Bromomethane
- Cis1,2-DCE
- 1,1-Dichloroethane
- 1,1-Dichloroethene
- Methylene chloride
- Tetrachloroethene (PCE)
- 1,1,1-Trichloroethane
- Trichloroethene (TCE)
- Vinyl Chloride

6.7 CONSTITUENT LEVELS FOR EVAPORATION PONDS, INFLUENTS, AND EFFLUENTS

There are eleven evaporation ponds located within the northwest section of the refinery. Evaporation pond 1 is more commonly known as Pond 1 and is considered separate from the remaining SMWU No. 2 Evaporation Ponds. Pond 1, which is out of service, is separated by a dike along the north side of aeration lagoon 1 (AL-1) and aeration lagoon 2 (AL-2), and was used as a holding pond for the aeration lagoons. Evaporation ponds 2 through 6 are separated by dikes and are located west of AL-2. Evaporation pond 9 (EP-9) is to the south and is separated from EP-2 through EP-6 by a two-track road. Evaporation ponds 7, 8, 11, 12A, and 12B are also separated by dikes and are located on the northwest corner of the refinery. In addition to the evaporation ponds, there is one effluent points that is routinely monitored.

6.7.1 EVAPORATION PONDS 1 THROUGH 12B

Samples have been collected annually from Pond 1 and EP-2 through EP-8 since 2007. In 2011, EP-9, EP-11, EP-12A, and EP-12B were added to the sample list, per the 2010 FWGWMP, and the sample frequency was increased to semi-annually for all of the ponds. Pond 1 is no longer in service.

In 2016, samples were collected from the evaporation ponds for the following analytes: BTEX, MTBE, major anions/cations, biochemical oxygen demand (BOD), chemical oxygen demand (COD), e-coli bacteria, WQCC total and dissolved metals, and VOCs and SVOCs. EP-2 through EP-9, EP-11, EP-12A, and EP-12B were sampled in 2016 on the following dates:

SAMPLE LOCATION	DATE	DATE
Ponds 2 – 12B	3/8/16	8/29/16

- Benzene was detected above the applicable standard of 0.005 mg/L in evaporation ponds (EP-2 and EP-3) in 2016. Toluene, ethylbenzene, total xylenes and MTBE have been detected at concentration levels below applicable standards in the following evaporation ponds: EP-2, EP-3, EP-4 and EP-12B. (Table 8.15).
- Concentrations of fluoride, chloride, and sulfates exceeded the applicable WQCC standards in each evaporation pond during 2016 (Table 8.15). In 2016, BOD concentrations exceeded the general requirement of the 20 NMAC 6.2.3103 (<30 mg/L) in each of the evaporation ponds except for EP-7 and EP-9. COD concentrations exceeded the general requirement (<125 mg/L) in each of the ponds.

- Metals (total and dissolved): Arsenic, iron and manganese have been detected in the several of the evaporation ponds in 2016 above the WQCC and EPA MCL listed standards. See Table 8.15.2 for a complete list.
- The constituent bromomethane was detected in EP-3, EP-12A and EP-12B above the NMED Tap Water standard of 0.00754 mg/L in 2016. See Table 8.15.4 for the complete list.
- Two SVOCs were detected exceeding the applicable standards in the following evaporation ponds in 2016: EP-2, EP-3, EP-4, EP-12A and EP-12B = bis (2-ethylhexyl)phthalate and Phenol in EP-2, EP-3, EP-4, EP-5, EP-6 and EP-12B. See Table 8.15.5 for the complete list.
- Four SVOCs were also detected exceeding applicable standards in EP-8 and are listed as follows: Ben(a)anthracene, benzo(a)pyrene, Benzo(b)fluoranthene and indeno(1,2,3-cd)pyrene. See table 8.15.5 for a complete list of VOCs.

6.7.2 INFLUENTS: AL-1, AL-2, AND EP-1

The start-up of the new WWTP occurred in May 2012. By the end of June 2012, all of the processed water going into AL-1 was re-routed to the WWTP, via Tank 35 and the NAPIS unit, with the exception of the Pilot lift station. Some gravitational flow continued from AL-1 to AL-2 and from AL-2 to Pond 1 (EP-1) through the second half of 2013.

The aeration lagoons and pond 1 are no longer in service and no samples were collected in 2016.

6.7.3 EFFLUENTS: AL-2 TO EP-1, PILOT, AND NAPIS

All effluents have been non-existent since June 2013 due to re-routing waters to the WWTP. The last effluent sample from AL-2 was in June 2013. The Pilot effluent was rerouted in June 2013 while the NAPIS unit was re-routed mid-June 2012. No effluent analyses are available for 2016.

6.7.4 OUTFALL BW TO EP-2

BW is defined as reverse osmosis water coming from the boiler unit. The flow from the boiler unit discharges into EP-2 through a 4-inch PVC pipe. The reverse osmosis water no longer discharges to EP-2 and has been rerouted back into the units for reuse. No samples were collected in 2016.

6.7.5 OUTFALL STP1 to EP-2 Inlet

The EP-2 Inlet designation was changed to STP1 to EP-2 in the second half of 2012 due to the startup of the new WWTP and the new sanitary treatment pond (STP-1). STP-1 effluent now flows into the northeast corner of EP-2. Sampling of STP1 to EP-2 inlet was changed to quarterly beginning the second quarter of 2016 per NMED directive dated May 18, 2016, and sampled for the following analytes: BTEX, MTBE, VOCs, GRO, DRO, MRO, BOD, COD, and TDS.

- No BTEX and MTBE constituents were detected in all of 2016. DRO was detected in all of 2016 and no GRO or MRO was detected. The TDS concentration of 5100 mg/L exceeded the standard of 1,000 mg/L in the third quarter of 2016. (Table 8.16).
- BOD and COD concentrations exceeded the applicable standards in 2016 (Tables 8.16.1).
- Three organic compounds were detected in 2016: (Acetone, 2-Butanone, Carbon Disulfide) all at concentrations below the applicable standards No other VOCs were detected in 2016 (Tables 8.16.2).

6.8 ADDITIONAL SAMPLING AND/OR CHANGES

Requirements by NMED per directive dated May 18, 2016 (HWB-WRG-14-006)

- The permittee must sample PW-4 during the next scheduled sampling event and then semi-annually thereafter;
- Since EDC is a lead scavenger, the Permittee must add analysis for 1,2-Dibromethane (EDB) in all monitoring wells where EDC has been detected.
- Permittee must include analysis for MTBE, EDC and EDB at OW-1 starting with the next round of quarterly sampling.
- The Permittee must sample the EP-2 inlet on a quarterly basis
- The Permittee may discontinue analysis for uranium in all wells
- The Permittee must edit Table 1 to remove the statement “[a]ll wells including Recovery Wells.”
- Permittee must submit a work plan and/or additional information for the following:
    - The Permittee must prepare a work plan for installation of a replacement well and propose to properly abandon OW-1.
    - Additionally, the Permittee must submit a work plan to propose additional wells downgradient of the Evaporation Ponds per OCD’s requirement (Comment 8).

SECTION 7

CONCLUSIONS AND RECOMMENDATIONS

This section is an overview of the analytical water quality data collected to identify potential impacts to the groundwater and determine if further monitoring or site investigations are required.

7.1 GROUP A

The boundary wells (BW-1A, BW-1B, BW-1C, BW-2A, BW-2B, BW-2C, BW-3A, BW-3B, and BW-3C) located in the northwest corner of the refinery along the west sides of evaporation ponds 7, 8 and 11 have not shown any detection of BTEX or MTBE constituents during annual sampling events. Three of the nine wells (BW-1A, BW-1B, and BW-3A) continue to indicate no water level since their original installation in 2003 and 2004. Fluoride concentrations were detected above WQCC standards in BW-1C, BW-2B, and BW-2C, which may be naturally occurring in the groundwater. No VOCs were detected in any of the BW wells in 2016. SVOC analytical requirement was discontinued from the BW annual sampling event per approval from NMED dated July 24, 2015.

RECOMMENDATION: *Continue with current monitoring schedule. There have been no significant changes or discoveries of contaminants that warrant any changes.*

The MW (MW-1, MW-2, MW-4, and MW-5) series of wells are located around the RCRA LTU. No detectable concentration levels of BTEX or MTBE constituents have been found in the groundwater samples collected from these wells. No metals (total or dissolved) exceeded the applicable standards; however, very low concentrations of arsenic, barium, lead, manganese, selenium and mercury were detected in most of the MW series of wells. There were five organic compounds detected in the MW wells at low concentration levels below applicable standards (bis (2-ethylhexyl)phthalate, benzoic acid, d-n-octylphthalate, dimethylphthalate and pyrene. These wells are also monitored under the RCRA Post Closure Permit on a 10-year cycle. The first cycle was completed in 2009/2010.

RECOMMENDATION: *Continue with current monitoring schedule and the RCRA 10 year monitoring.*

The SMW (SMW-2, SMW-4) wells are also located around the RCRA LTU and are screened in the Chinle/Alluvium Interface stratigraphic unit. These wells are also monitored under the RCRA Post-Closure Permit on a 10-year cycle. The first cycle was completed in 2009/2010. No detectable concentration levels of BTEX constituents were found in these wells from 2006 through 2016. MTBE was detected in SMW-2 at concentration levels below the NMED Tap Water standard of 0.143 mg/L. SMW-2 also had elevated chloride and sulfate levels, and manganese was detected exceeding the WQCC standard in both SMW-2 and SMW-4. Five organic constituents were detected at concentration levels below the applicable standards in 2016. (Benzoic acid, bis(2-ethylhexyl)phthalate, di-n-octylphthalate, diethylphthalate, dimethylphthalate, phenol and pyrene).

RECOMMENDATION: *Continue with current monitoring schedule and the RCRA 10 year monitoring.*

7.2 GROUP B – GROUNDWATER MONITORING

Benzene concentrations from all 2016 sampling events at GWM-1 have exceed applicable standards. This would indicate the potential for historical releases from the aeration lagoons and/or other nearby SWMUs (e.g., Old API Separator). There was an insufficient volume of water in GWM-2 during the fourth quarter of 2013 for sample collection, and the well was reported dry for all of 2014 and 2016. GWM-3 was dry during 2013, 2014 and 2016.

RECOMMENDATION: *Continue with current monitoring schedule. There have been no significant changes or discoveries of contaminants that warrant any changes.*

The GWM wells located at the aeration lagoons were not sampled in 2016. GWM-2 and GWM-3 had no detection of a water level since 2014 through 2016. In the fourth quarter 2016, an SPH level was detected in GWM-1 and in all of 2016 and no ground water samples were collected. Wells continue to be checked on a quarterly basis.

RECOMMENDATION: *Continue with current inspection schedule. Monitor GWM-1 on a more regular basis: gauging water/SPH level, purge dry to check for recharge rate and monitor level of SPH after each purge.*

At the NAPIS wells, there is no significant deviation in the detection of contaminants at the wells. NAPIS-1 continues to indicate detections of MTBE at concentrations below applicable standards, fluctuating from 0.002 mg/L to a low of 0.00032 mg/L. No changes in NAPIS-2, NAPIS-3 or KA-3, continued detection of Benzene and MTBE. Fluoride & chloride continue to be detected in NAPIS-2 and NAPIS-3. Metals (total and dissolved) continue to be detected in all of the wells through 2016 with barium, iron and manganese detected in all wells. No VOCs were detected in NAPIS-1 above screening levels; 13 VOCs were detected in NAPIS-2 all at concentration levels below applicable standards, except 1-methylnaphthalene and naphthalene. Nine VOCs were detected in NAPIS-3 at concentration levels below applicable standards and only 1-methylnaphthalene was detected above screening levels. In KA-3 ten VOCs were detected at concentration levels below applicable standards.

RECOMMENDATION: *Continue with current inspection schedule. No changes required.*

There are three leak detection units on the NAPIS Unit which are inspected for fluid level. Quarterly inspections of the units have indicated the continued presence of fluids in the East LDU and West LDU. The Oil Sump LDU has not had any detection of fluid since the second half of 2013. Both LDUs continue to be pumped on a regular basis. In the third quarter 2016, there was not enough water for sample collection. Recent water column measurements on the West LDU indicate that the bay is leaking into the LDU. The East LDU also contains water but it has been out of service for the last year. Plans are to inspect the east bay, place it back in service and then take the west bay out of service for inspection.

RECOMMENDATION: *Continue with current inspection schedule. No changes required.*

A new well was installed on July 17, 2012, designated as OAPIS-1. The installation of this well is from a site investigation conducted according to the Investigation Work Plan Solid Waste Management Unit (SMWU) No. 1 Aeration Basin and SMWU No. 14 Old API Separator. No significant deviations from past analytical with the exception of cyanide detected in the fourth quarter at a concentration level above the WQCC standard of 0.2 mg/L reading 0.504 mg/L.

RECOMMENDATION: *Continue with current inspection schedule. No changes required.*

7.3 GROUP C – GROUNDWATER MONITORING

Groundwater monitoring activities from the Group C wells (northeast side of the Refinery) have shown that an MTBE plume exists in the area of OW-13, OW-14, OW-29, and OW-30. In March of 2010, dedicated pumps were installed in all four wells to prevent possible cross contamination from sampling equipment and or field activities. Although concentration levels of MTBE in OW-13 does not exceed the applicable standard of 0.143 mg/L, sample data indicates a steady increase of MTBE from year to year. Of the four wells OW-14 is the only well where two constituents (benzene and MTBE) have been consistently detected in the groundwater samples collected since 2006 that have exceeded the applicable standards. These two constituents continued to increase from year to year through 2016. OW-14 is located down-gradient from two recovery wells RW-1 and RW-2. RW-1 is the only well where hydrocarbons are continually recovered.

Downgradient from OW-14 is OW-29 and OW-30 and the analytical data from both of these wells indicates that MTBE is present in the groundwater at concentration levels exceeding the NMED Tap Water standard of 0.143 mg/L since March of 2010 in OW-29 and December 2007 in OW-30. Analytical data for these four wells indicate a steady increase of MTBE concentration levels indicating that the MTBE plume is slowly migrating in a northerly direction down-gradient from RW-1 and RW-2. The stratigraphic units in which these wells are screened is the Chinle/Alluvium Interface.

RECOMMENDATION: *An investigation work plan was initiated concerning OW-14 contaminant plume migration. Additional soil borings and wells were installed in the tank farm area and results are being evaluated. Continue with current sampling requirements. No changes required.*

Two new wells (OW-50 and OW-52) were installed in October 2009 downgradient of OW-13, OW-14 and OW-29 to monitor possible migration of MTBE in a north, north-east direction. No detectable concentration levels of BTEX or MTBE constituents were detected in OW-50 and OW-52 through 2015, however, during the annual sampling event in 2016, MTBE was detected in low concentrations in both OW-50 and OW-52 and 1,2-dichloroethane (EDC) was also detected in both wells at concentration levels below the applicable standard of 0.005 mg/L.

RECOMMENDATION: *Continue with current sampling requirements. No changes required.*

The inspection of the four recovery wells (RW-1, RW-2, RW-5 and RW-6) will continue as scheduled along with SPH recovery. No changes in product recovery are required and will continue with scheduled quarterly inspections. Product recovery continues in RW-1 as there is a measureable hydrocarbon column thickness. Field notes indicate that although the SPH thickness level in RW-1 has generally increased since the first quarter of 2013, hydrocarbon recovery has shown a general decrease from 2005 through 2016. Total hydrocarbon recovery is estimated at 8.5 gallons for 2016 compared to 431 gallons in 2005. Hydrocarbon recovery is done only during quarterly inspections because of the decline in hydrocarbons observed in the well when it first began in 2005 when the well was continuously pumped. Additional information regarding characteristics of RW-1 will be collected during field work from the approved Work Plan for investigation at OW-14. RW-5 and RW-6 product recovery has also been declining. From 2010 through 2016, no product has been recovered from RW-5 and no product was recovered from RW-6 from 2012 to 2016. Although there is no measureable product level in RW-5 and RW-6, both wells will continue to be bailed as there is evidence of hydrocarbons in the wells from observing the bailed water (slight odor with a visible sheen).

RECOMMENDATION: *Continue with current inspection/sampling schedule. No changes required.*

7.4 GROUP D – GROUNDWATER MONITORING

PW-2, PW-3 and PW-4 are all process/production wells that are all set at around 1000 feet. All three of these wells are sampled every three years with the exception of PW-3 which was changed to annual in 2009 due to the detection of 2-methylnaphthalene in January 2008. Although the samples collected in August 2008 were all non-detect, it was determined by NMED that annual sampling was required for PW-3. PW-4 was switched to semi-annual sampling in the second half of 2016 per NMED directive (HWB-WRG-14-06) due to the detection of VOCs. In 2016 10 VOCs were detected at low concentration levels below the applicable standards. PW-2 remains on a three-year sample event and next scheduled sample date for PW-2 is 2017.

RECOMMENDATION: *Continue with current inspection/sampling schedule. No changes required.*

OW-1 is a flowing artesian well located on the west section of the refinery property. Historically, OW-1 is a relatively clean well; however, very low concentrations of benzene, toluene, total xylenes, and MTBE were detected for the first time in the fourth quarter of 2015. Only MTBE continued to be detected throughout 2016.

OW-10 is completed in the Sonsela Aquifer and is located directly east of evaporation pond 9 (EP-9). No BTEX constituents were detected in all of 2016 in OW-10 with the exception of MTBE at concentrations below the applicable standard of 0.143 mg/L. Due to the detection of MTBE in OW-10, NMED and OCD has requested that an additional boundary monitoring well be installed. Four organic compounds were detected in 2016: 1,1-dichloroethane, 1,1-dichloroethene, 1,2-dichloroethane (EDC) and cis-1,2-DCE, all at concentration levels below the applicable standards.

RECOMMENDATION: *Continue with current inspection/sampling schedule. No changes required.*

Observation well OW-11 is located within the refinery property (southeast) on the west side of the main entrance and OW-12 is located within the surplus yard located west and slightly north of the primary tank farm. OW-11 and OW-12 are screened in the Sonsela stratigraphic unit. There was no detection of BTEX, MTBE, GRO/DRO/MRO or VOC constituents in 2016. Fluoride and sulfate were detected above screening levels in OW-11, which is an up-gradient background monitoring well.

RECOMMENDATIONS: *Continue with current sampling schedule.*

7.5 GROUP E – GROUNDWATER MONITORING

To date, a total of 44 permanent monitoring wells (MKTF-1 through MKTF-44) have been installed to aid in delineating the extent of a hydrocarbon seep discovered in 2013, directly west of crude tanks T-101 and T-102. During the investigation, a pre-existing well (labeled as MKTF-45) was found directly west of the truck-loading rack. The MKTF wells are sampled quarterly. BTEX, MTBE, DRO, GRO, total and dissolved metals, and several VOCs and SVOCs have been detected in many of the wells above the referenced standards. Of the 44 wells installed, eleven MKTF wells have been identified having an SPH level.

RECOMMENDATIONS: *Continue with current sampling schedule in 2017. This will establish a clear baseline of at least three years of quarterly monitoring in most MKTF wells. It is recommended to reduce the monitoring frequency in 2018, as many of the analytical results indicate little change over the monitoring period, such that continued quarterly monitoring is not warranted. At the wells identified as having an SPH level, begin a routine hydrocarbon recovery effort to evaluate recharge rate and record volumes of water and SPH recovered. Continue on-going recovery at existing sumps.*

7.6 ADDITIONAL MONITORING

- Continue with the sampling requirements of the most current approved Facility Wide Groundwater Monitoring Work Plan.
- In order to prevent duplication and potential conflict of documentation, recommendations and/or changes to monitoring requirements will be included in future investigation work plans.
- Submit the Annual Groundwater Monitoring Report on or before September 1 of every year.
- Submit recommendations to change or modify sampling requirements as needed.
- Conduct site assessments as required when spills/leaks are discovered.

SECTION 8

DATA TABLES

8.1 BW-1A/B/C, BW-2A/B/C, BW-3A/B/C
8.2 MW-1, MW-2, MW-4, MW-5
8.3 SMW-2, SMW-4
8.4 OW-11, OW-12
8.5 OW-50, OW-52
8.6 PW-2, PW-3, PW-4
8.7 GWM-1, GWM-2, GWM-3
8.8 NAPIS-1, NAPIS-2, NAPIS-3, KA-3
8.9 OAPIS-1
8.10 LEAK DETECTION UNITS (East LDU, West LDU, Oil Sump LDU)
8.11 RW-1, RW-2, RW-5, RW-6
8.12 OW-1, OW-10
8.13 OW-13, OW-14, OW-29, OW-30
8.14 STP-1NW and STP-1SW
8.15 EVAPORATION PONDS 1 - 12B
8.16 STP-1 to EP-2
8-17 MKTF-1 thru MKTF-45

COMPLETE DATA TABLES ON ATTACHED CD.

SECTION 9

WELL DATA DTW/DTB MEASUREMENTS

The 2016 Well Data DTB/DTW Measurements has been updated with survey information submitted to and approved by NMED per notification received “Approval with Modifications, Requirement to Resurvey Groundwater Monitoring Wells and Recovery Wells issued on September 26, 2012. Western was required to resurvey the monitoring wells due to discrepancies found in applicable standards ground level elevation, well casing elevation, well casing bottom elevation and stick up lengths. All monitoring wells were surveyed by a licensed professional surveyor, DePauli Engineering on June 7, 2011, April 2014, September 2014, December 2014, and January 2016. The Well Data Table is attached as Section 9.1.

The additional wells from the hydrocarbon seep (MKTF series) and the two new wells STP1-NW and STP1-SW were surveyed by Hammon Enterprises Inc., professional surveyor on September 15, 2014, December 16, 2014 and on December 16, 2014.

SECTION 10

2016 MONITORING SCHEDULE

Table 1 in Section 10 details the approved Ground Water Monitoring Schedule for all wells at Gallup Refinery and details the analytical suite required for each sample site location.

FIGURES

APPENDIX A

SEPARATE PHASE HYDROCARBON RECOVERY LOGS

APPENDIX B

FIELD INSPECTION LOGS

APPENDIX C

APPLICABLE STANDARDS

APPENDIX D

SUMMARY OF EPA/NMED/RCRA ACTIVITY

APPENDIX E

SUMMARY OF ALL LEAKS, SPILLS AND RELEASES

APPENDIX F

TEMPORARY LAND FARM ANALYTICAL RESULTS

(ON ATTACHED CD)

APPENDIX G

HALL LABORATORY ANALYTICAL DATA

(ON ATTACHED CD)

APPENDIX A - RW-1 HYDROCARBON RECOVERY LOG
2/22/05 thru 12/2015

Measurement Date	Time	Quarter	Method	Status	Depth to Product (ft)	Depth to Water (ft)	Product Thickness Level [2] (ft)	Product Bailed or Purged [2] (gal)	Water Purged [2] (gal)
2/22/2005	8:30	1st	NR	Start	32.46	36.5	4.04	14	NR
3/2/2005	7:45	1st	NR	Start	32.42	36.44	4.02	9	NR
3/8/2005	8:30	1st	NR	Start	31.92	36.35	4.43	15	NR
3/9/2005	830	1st	NR	Start	31.92	37.5	5.58	4	NR
3/11 to 3/18/05	NR	1st	NR	Start	NR	NR	NR	74	NR
3/18 to 3/23/05	NR	1st	Pump	Continue pumping	NR	NR	NR	48	NR
3/23 to 4/1/05	NR	1st	Pump	Continue pumping	NR	NR	NR	62	NR
4/1 To 4/4/05		2nd	Pump	Pump shutdown to measure	NR	NR	NR	27	NR
4/5/2005	11:30	2nd	Pump		34.75	38.92	4.17	NR	NR
4/4 to 4/15/05	11:00	2nd	Pump	Continue pumping	NR	NR	NR	50	NR
4-15 to 5-5-05	12:30	2nd	Pump	Continue pumping	NR	NR	NR	45	154
5-5 to 6-17-05	11:30	2nd	Pump	Continue pumping	NR	NR	NR	24	196
6/27/2005	14:30	2nd		Pump shutdown to measure	NR	NR	NR	NR	NR
6/28/2005	11:30	2nd			32.46	33.25	0.79	NR	NR
6/28/2005		2nd	Pump	Continue pumping	NR	NR	NR	NR	NR
6/17 to 7/8/2005	10:30	2nd	Pump	Continue pumping	NR	NR	NR	18	146
7/8 to 8/9/2005	13:30	3rd	Pump	Continue pumping	NR	NR	NR	28	350
8/9 to 9/16/2005	11:35	3rd			36.46	36.54	0.08	8	240
12/5/2005	13:15	4th			31.92	34.71	2.79	NR	NR
12/8/2005	14:00	4th	Pump	Start	NR	NR	NR	NR	NR
12/22/2005	15:30	4th		stop	NR	NR	NR	5	120
12/29/2005	14:00	4th	Bailer	Hand bailed	NR	NR	NR	0.5	4.5
3/16/2006	13:00	1st.			NR	NR	NR	NR	NR
3/16/2006	14:30	1st.	Pump	Start	32.23	34.48	2.25	NR	NR
3/23/2006	14:30	1st.		Stop	NR	NR	NR	NR	NR
3/27/2006	15:30	1st.	Pump	Start	NR	NR	NR	NR	NR
3/31/2006	11:30	1st.	Pump	Continue pumping	NR	NR	NR	7	174
4/3/2006	11:30	2nd		Stop	NR	NR	NR	1	38
4/4/2006	11:00	2nd			32.75	33.08	0.33	NR	NR
6/6/2006	13:00	2nd			32.39	34.54	2.15	NR	NR
6/8/2006	15:00	2nd	Pump	Start	NR	NR	NR	NR	NR
6/29/2006	10:00	2nd		Stop	NR	NR	NR	8	365
7/31/2006	11:45	3rd			33.06	33.48	0.42	NR	NR
7/31/2006	11:45	3rd	Pump	Start pump	NR	NR	NR	NR	NR
8/3/2006	14:20	3rd		Stopped pump	NR	NR	NR	2	87
8/8/2006	9:00	3rd	Pump	Start pump	NR	NR	NR	NR	NR
8/10/2006	15:30	3rd	Pump	Start pump	NR	NR	NR	NR	NR
8/22/2006	9:00	3rd		Stopped. Pulled pump	NR	NR	NR	4.9	373
8/22/2006	9:45	3rd	Pump	Start pump	33.1	33.4	0.3	NR	NR

RW-1 HYDROCARBON RECOVERY LOG - Continued

Measurement Date	Time	Quarter	Method	Status	Depth to Product (ft)	Depth to Water (ft)	Product Thickness Level [2] (ft)	Product Bailed or Purged [2] (gal)	Water Purged [2] (gal)
12/21/2006	15:55	4th	Pump	Start pump	35.2	36	0.8	0.62	70
2/21/2007	10:15	1st.	Pump	Start pump	33.42	34.6	1.18	0.63	53.5
6/5/2007	10:00	2nd		Compressor Down	32.42	32.71	0.29	NR	NR
6/5/2007	10:10	2nd		Hand Bailed	NR	NR	NR	0.05	9
6/6/2007	8:40	2nd		Hand bailed	NR	NR	NR	0.1	11
6/13/2007	14:00	2nd		Hand bailed	NR	NR	NR	0.1	12
6/14/2007	10:40	2nd		Hand bailed	NR	NR	NR	0.05	8
7/10/2007	10:08	3rd		Hand bailed	32.42	32.71	0.29	0.3	18
7/11/2007	9:25	3rd		Hand bailed	NR	NR	NR	0.21	NR
7/23/2007	10:00	3rd		Hand bailed	NR	NR	NR	0.1	NR
11/26/2007	10:50	4th		Hand bailed	30.76	36.45	5.69	0.18	37
2/18/2008	15:32	1st.		Hand Bailed - pump frozen	30.18	34.77	4.59	1.66	36
5/21/2008	14:10	2nd	Pump	Used Pump	30.33	34.57	4.24	1.39	51
9/12/2008[1]	14:30	3rd		Bladder pump malfunctioned	30.03	34.59	4.56	Not Bailed	0
11/13/2008	13:00	4th	Pump	Used Pump	30.02	34.63	4.61	0.94	65
2/11/2009	14:05	1st.	Pump	Used Pump	30.21	31.72	1.51	0.29	90
5/5/2009	11:30	2nd	Pump	Used Pump	30.22	30.8	0.58	0.41	76
8/10/2009	9:22	3rd	Pump	Used Pump	30.69	31.02	0.33	0.89	98
10/28/2009	10:55	4th	Pump	Used Pump	30.56	30.75	0.19	0.19	74
3/3/2010	9:00	1st	Pump	Used Pump	30.89	31.05	0.16	0.21	31
6/3/2010	13:10	2nd	Pump	Used Pump	30.99	31.09	0.1	0.1	32
9/20/2010	14:00	3rd	Pump	Used Pump	29.91	30.06	0.15	0.25	34
11/3/2010	9:10	4th	Pump	Used Pump	30.89	31.01	0.12	0.1	31
3/9/2011	10:19	1st	Pump	Used Pump	30.04	30.15	0.11	0.12	40
6/27/2011	8:05	2nd	Pump	Used Pump	30.52	30.63	0.11	0.1	45
10/3/2011	15:07	Annual	Pump	Used Pump	30.81	30.9	0.09	0.11	42
11/8/2011	8:30		Pump	Used Pump	30.77	30.85	0.08	0.09	38
3/15/2012	10:30	1st	Pump	Used Pump	29.31	29.34	0.03	0.02	22
6/4/2012	9:00	2nd	Pump	Used Pump	29.39	29.41	0.02	0.05	40
8/13/2012	10:30	3rd	Pump	Used Pump	29.54	30.13	0.59	0.4	40
10/8/2012	9:40	4th	Pump	Used Pump	29.28	30.18	0.9	0.5	35
3/26/2013	10:25	1st	Pump	Used Pump	29.11	32.6	3.49	0.028	24
6/17/2013	11:50	2nd	Pump	Used Pump	29.37	33.1	3.73	0.75	18
9/16/2013	11:05	3rd	Pump	Used Pump	28.75	33.09	4.34	0.8	19
11/12/2013	9:25	4th	Pump	Used Pump	28.73	33.11	4.38	0.75	25
3/7/2014	NR	1st	Pump	Used Pump	28.15	31.65	3.5	0.75	28
6/9/2014	NR	2nd	Pump	Used Pump	28.31	33.06	4.75	0.75	25
9/18/2014 [3]	NR	3rd		Annual Sampling Only	28.05	Unknown			
11/13/2014	NR	4th	Pump	Used Pump	28.11	33.04	4.93	0.87	30
3/23/2015	3:00	1st	Pump	Pump	28.2	32.8	4.6	0.5	25
6/9/2015	4:25	2nd	Pump	Pump	27.7	32.1	4.4	0.75	15
8/23/2015 [3]	10:10	3rd	Pump	Pump	28.08	30.02	1.94	None	None

RW-1 HYDROCARBON RECOVERY LOG - Continued

Measurement Date	Time	Quarter	Method	Status	Depth to Product (ft)	Depth to Water (ft)	Product Thickness Level [2] (ft)	Product Bailed or Purged [2] (gal)	Water Purged [2] (gal)
10/29/2015	9:15	4th	Pump	Pump	27.65	30.1	2.45	0.75	14
3/4/2016	0:00	1st			28.05	30.55	2.5	None	None
6/8/2016	0:00	2nd			27.98	31.8	3.82	3.5	28
9/13/2016	2:05	3RD			27.9	32.04	4.14	2.5	10
11/16/2016	1:00	4th	Bailer	Start	27.8	30.9	3.1	2.5	15
					YTD TOTALS		**118.74**	**479.758**	**3662**

NOTES:

FT - Feet *NR - Not recorded*

Gal - Gallon *YTD -Year to date*

1) Bladder pump has torn diaphragm. Pump non-repairable. Ordered new pump

2) Measurements given are estimated values based on the technicians interpretation and should not be viewed as accurate.

3) Annual Samples collected - no purging done at this time.

RW-5 HYDROCARBON RECOVERY LOG - Continued

APPENDIX A - RW-5 HYDROCARBON RECOVERY LOG
2/22/05 thru 12/2015

Measurement Date	Time	Quarter	Method	Status	Depth to Product (ft)	Depth to Water (ft)	Product Thickness Level [1] (ft)	Product Bailed/Purged [1] (gal)	Water Purged [1] (gal)
2/22/2005	14:15	1st	Bailer	Start	32.92	34.01	1.09	4.5	NR
3/3/2005	14:00	1st	Bailer	Start	33.08	33.42	0.34	6	NR
6/24/2005	9:00	2nd	Bailer	Start	32.96	34.04	1.08	2.5	NR
9/16/2005	9:20	3rd	Bailer	Start	32.83	33.85	1.02	2.5	NR
12/5/2005	14:00	4th	Bailer	Start	32.52	33.21	0.69	1.5	NR
3/16/2006	14:50	1st	Bailer	Start	32.58	33	0.42	1	NR
7/26/2006	14:35	2nd	Bailer	Start	32.9	33.31	0.41	0.5	NR
10/16/2006	09:15	4th	Bailer	Start	32.73	33.42	0.69	0.25	NR
2/13/2007	09:00	1st	Bailer	Start	32.17	33.95	1.78	0.5	NR
4/30/2007	11:20	2nd	Bailer	Start	33	33.83	0.83	2.5	NR
7/10/2007	10:15	3rd	Bailer	Start	33.1	33.92	0.82	2.5	NR
11/26/2007	08:00	4th	Bailer	Start	33.01	33.91	0.9	1.75	NR
2/18/2008	15:15	1st	Bailer	Start	33.19	33.95	0.76	0.19	20
5/21/2008	14:20	2nd	Bailer	Start	32.77	33.84	1.07	0.14	18
9/12/2008	14:30	3rd	Bailer	Start	32.62	32.85	0.23	0.05	15
11/3/2008	14:00	4th	Bailer	Start	31.05	32.34	1.29	0.05	15
2/11/2009	13:40	1st	Bailer	Start	32.08	32.15	0.07	0.05	15
5/5/2009	10:02	2nd	Bailer	Start	0	31.91	0	0	0
8/10/2009	9:50	3rd	Bailer	Start	0	31.94	0	0	0
10/28/2009	10:45	4th	Bailer	Start	0	31.71	0	0	0
3/3/2010	9:35	1st	Bailer	Start	0	31.63	0	0	0
6/3/2010	13:40	2nd	Bailer	Start	0	31.37	0	0	0
9/20/2010	14:24	3rd	Bailer	Start	0	31.94	0	0	0
11/3/2010	9:30	4th	Bailer	Start	0	31.94	0	0	0
3/9/2011	10:29	1st	Bailer	Start	0	30.05	0	0	20
6/27/2011	8:40	2nd	Bailer	Start	0	28.96	0	0	20
10/4/2011	8:15	3rd	Bailer	Start	0	29.89	0	0	14
11/8/2011	9:20	4th	Bailer	Start	0	29.85	0	0	17
3/15/2012	9:50	1st	Bailer	Start	0	29.32	0	0	15
6/4/2012	9:20	2nd	Bailer	Start	0	29.37	0	0	10
8/13/2012	10:50	3rd	Bailer	Start	0	29.49	0	0	10
10/8/2012	10:10	4th	Bailer	Start	0	29.58	0	0	15
3/26/2013	9:10	2nd	Bailer	Start	0	29.45	0	0	10
6/17/2013	10:20	2nd	Bailer	Start	0	29.44	0	0	14
9/16/2013	9:30	3rd	Bailer	Start	0	28.98	0	0	15
11/12/2013	9:50	4th	Bailer	Start	0	28.96	0	0	16

RW-5 HYDROCARBON RECOVERY LOG - Continued

Measurement Date	Time	Quarter	Method	Status	Depth to Product (ft)	Depth to Water (ft)	Product Thickness Level [1] (ft)	Product Bailed/Purged [1] (gal)	Water Purged [1] (gal)
3/17/2014	NR	1st	Bailer	Start	0	27.92	0	0	15
6/9/2014	NR	2nd	Bailer	Start	0	28.8	0	0	20
9/18/2014 [2]	NR	3rd	Bailer	Start	0	28.81	0	0	0
11/13/2014	NR	4th	Bailer	Start	0	28.77	0	0	16
3/23/2015	3:15	1st	N/A	N/A	0	29.1	0	0	0
6/9/2015	4:10	2nd	Bailer	Start	0	28.8	0	0	15
8/23/2015	9:25	3rd	Bailer	Start	0	29.08	0	0	16
10/29/2015	1:35	4th	Bailer	Start	0	27.94	0	0	17
3/4/2016	0:00	1ST	Bailer	Start	0	28.22	0	0	15
6/7/2016	3:47	2ND	Bailer	Start	0	28.22	0	0	17
9/13/2016	9:10	3RD	Bailer	Start	0	27.7	0	0	20
11/16/2016	9:12	4th	Bailer	Start	0	27.4	0	0	20
					YTD TOTALS		**13.49**	**26.48**	**430**

NOTES:

FT - Feet NR - Not recorded

Gal - Gallon YTD - Year to Date

1) Measurements given are estimated values based on the technicians interpretation.

2) Annual grab samples collected - no purging of well at this time.

RW-6 HYDROCARBON RECOVERY LOG - Continued
APPENDIX A - RW-6 HYDROCARBON RECOVERY LOG
2/22/05 thru 12/2015

Measurement Date	Time	Quarter	Method	Status	Depth to Product (ft)	Depth to Water (ft)	Product Thickness Level [1] (ft)	Product Bailed/Purged [1] (gal)	Water Purged [1] (gal)
2/22/2005	14:30	1st	Bailer	Start	33.12	34.5	1.38	4.5	NR
3/3/2005	14:00	2nd	Bailer	Start	33.15	34	0.85	6	NR
6/24/2005	11:00	2nd	Bailer	Start	33.31	34.46	1.15	3.5	NR
9/16/2005	10:20	3rd	Bailer	Start	32.98	34.33	1.35	3	NR
3/16/2006	12:45	1st	Bailer	Start	32.67	33.75	1.08	2.5	NR
7/26/2006	15:00	2nd	Bailer	Start	33	34.12	1.12	1.5	NR
10/16/2006	09:55	4th	Bailer	Start	33.71	34.63	0.92	0.75	NR
2/13/2007	09:50	1st	Bailer	Start	33.29	34.5	1.21	0.75	NR
4/30/2007	11:25	2nd	Bailer	Start	34.42	34.58	0.16	0.25	NR
7/10/2007	10:08	3rd	Bailer	Start	33.29	34.58	1.29	6.78	NR
11/28/2007	08:10	4th	Bailer	Start	33.25	34.47	1.22	4.5	NR
2/18/2008	15:11	1st	Bailer	Start	33.44	34.35	0.91	0.11	20
5/21/2008	14:30	2nd	Bailer	Start	33.02	34.12	1.1	0.13	18
9/12/2008	14:35	3rd	Bailer	Start	32.12	32.83	0.71	0.09	15
11/3/2008	14:35	4th	Bailer	Start	32.46	32.69	0.23	0.04	15
2/11/2009	13:30	1st	Bailer	Start	32.19	32.35	0.16	0.12	15
5/5/2009	9:45	2nd	Bailer	Start	32.08	32.26	0.18	0.04	15
8/10/2009	9:55	3rd	Bailer	Start	32.04	32.28	0.24	0.03	15
10/28/2009	10:55	4th	Bailer	Start	31.81	32.03	0.22	0.03	12
3/3/2010	9:40	1st	Bailer	Start	31.78	32.01	0.23	0.05	15
6/3/2010	13:45	2nd	Bailer	Start	31.61	31.7	0.09	0.05	15
9/20/2010	14:30	3rd	Bailer	Start	32.04	32.28	0.24	0.03	15
11/3/2010	9:35	4th	Bailer	Start	32.01	32.1	0.09	0.02	15
3/9/2011	10:34	1st	Bailer	Start	30.24	30.26	0.02	0.04	25
6/27/2011	9:25	2nd	Bailer	Start	30.11	30.15	0.04	0.04	30
10/4/2011	9:05	3rd	Bailer	Start	29.91	29.94	0.03	0.09	30
11/8/2011	9:45	4th	Bailer	Start	29.90	29.93	0.03	0.05	25
3/15/2012	9:55	1st	Bailer	Start	0	29.46	0	0	17
6/4/2012	9:25	2nd	Bailer	Start	0	29.54	0	0	20
8/13/2012	11:00	3rd	Bailer	Start	0	29.57	0	0	15
10/8/2012	10:15	4th	Bailer	Start	0	29.62	0	0	15
3/26/2013	9:15	1st	Bailer	Start	0	29.59	0	0	20
6/17/2013	10:25	2nd	Bailer	Start	0	29.52	0	0	15
9/16/2013	10:10	3rd	Bailer	Start	0	29.13	0	0	20
11/12/2013	9:50	4th	Bailer	Start	0	29.1	0	0	15
3/17/2014	NR	1st	Bailer	Start	0	27.92	0	0	15
6/9/2014	NR	2nd	Bailer	Start	0	28.8	0	0	20
9/18/2014 [2]	NR	3rd	Bailer	Start	0	28.81	0	0	0
11/13/2014	NR	4th	Bailer	Start	0	28.77	0	0	16
3/23/2015	3:15	1st	N/A	N/A	0	29.18	0	0	0
6/9/2015	4:12	2nd	Bailer	Start	0	28.68	0	0	15
8/23/2015	9:27	3rd	Bailer	Start	0	29.06	0	0	20
10/29/2015	3:37	4th	Bailer	Start	0	27.97	0	0	19
3/4/2016	0:00	1st	Bailer	Start	0	28.25	0	0	14
6/7/2016	3:45	2nd	Bailer	Start	0	28.24	0	0	18
9/13/2016	9:50	3RD	Bailer	Start	0	27.99	0	0	20
11/16/2016	9:15	4th	Bailer	Start	0	27.72	0	0	20

RW-6 HYDROCARBON RECOVERY LOG - Continued

Measurement Date	Time	Quarter	Method	Status	Depth to Product (ft)	Depth to Water (ft)	Product Thickness Level [1] (ft)	Product Bailed/Purged [1] (gal)	Water Purged [1] (gal)
					YTD TOTALS		16.25	34.99	609

NOTES:

FT - Feet NR - Not recorded

Gal - Gallon YTD - Year to Date

1) Measurements given are estimated values based on the technicians interpretation.

2) Annual grab samples collected - no purging of well at this time.

APPENDIX A
ESTIMATED YEAR TO DATE SUMMARY 1995 THRU 2016

RW-1

Year	Product Thickness Level [1] (ft)	Product Bailed/Purged [1] (gal)	Water Purged [1] (gal)
2005	25.9	431.5	1210.5
2006	6.25	23.52	1107
2007	7.45	1.72	148.5
2008	18	3.99	152
2009	2.6	1.78	338
2010	0.53	0.66	128
2011	0.39	0.42	165
2012	1.54	0.97	137
2013	1.54	15.198	86
2014	2.37	2.37	83
2015	26.95	10.5	107
2106	13.56	8.5	53
TOTAL	**107.08**	**501.128**	**3715**

RW-5

Year	Product Thickness Level [1] (ft)	Product Bailed/Purged [1] (gal)	Water Purged [1] (gal)
2005	4.22	17	NR
2006	1.52	1.75	NR
2007	4.33	7.25	NR
2008	3.35	0.43	68
2009	0.07	0.05	15
2010	0	0	0
2011	0	0	71
2012	0	0	50
2013	0	0	55
2014	0	0	51
2015	0	0	48
2016	0	0	72
TOTAL	**13.49**	**26.48**	**430**

RW-6

Year	Product Thickness Level [1] (ft)	Product Bailed/Purged [1] (gal)	Water Purged [1] (gal)
2005	4.73	17	NR
2006	3.12	4.75	NR
2007	3.88	12.28	NR
2008	2.95	0.37	68
2009	0.8	0.22	57
2010	0.65	0.15	60
2011	0.12	0.22	110
2012	0	0	67
2013	0	0	70
2014	0	0	51
2015	0	0	54
2016	0	0	72
TOTAL	**16.25**	**34.99**	**609**

NOTES:
NR - Not recorded
1) Measurements given are estimated values based on the technicians interpretation and should not be viewed as accurate.

Western Refining Southwest, Inc. - Gallup Refinery
Stand Pipes Recovery Records

DATE	hydrocarbon recovered (gallons)	water pumped (gallons)	total fluid pumped (gallons)
9/3/2013*	682	3818	4500
9/3/2013*	367	4133	4500
9/4/2013	62	3938	4000
9/6/2013	62	3938	4000
9/9/2013	30	4470	4500
9/11/2013	30	4470	4500
9/13/2013	62	3938	4000
9/16/2013	135	5140	5275
9/18/2013	125	4111	4236
9/24/2013	58	4742	4800
9/26/2013	16	4220	4236
10/2/2013	29	4918	4947
10/8/2013	30	4569	4599
10/18/2013	109	5059	5168
10/28/2013	199	5379	5578
10/29/2013	63	4049	4112
11/12/2013	205	5275	5480
11/14/2013	78	5168	5246
11/18/2013	60	4539	4599
11/26/2013	80	5168	5248
12/3/2013	54	5169	5223
12/6/2013	57	4890	4947
12/12/2013	54	5169	5223
12/17/2013	58	4775	4833
12/24/2013	57	4890	4947
1/2/2014	88	4687	4775
1/6/2014	56	4947	5003
1/7/2014	32	3829	3861
1/9/2014	32	3448	3480
1/13/2014	29	4688	4717
1/16/2014	29	4688	4717
1/22/2014	29	4918	4947
1/29/2014	30	4449	4479
1/31/2014	61	4236	4297
2/4/2014	61	4236	4297
2/11/2014	60	4539	4599
2/18/2014	57	4890	4947
2/25/2014	57	4890	4947
2/28/2014	63	3924	3987
3/4/2014	31	4327	4358
3/7/2014	29	4804	4833
3/12/2014	29	4804	4833
3/14/2014	30	4449	4479
3/17/2014	32	3829	3861
3/19/2014	32	3448	3480
3/24/2014	32	3703	3735
3/28/2014	32	3703	3735
4/1/2014	32	3703	3735
4/3/2014	32	3320	3352
4/7/2014	15	4220	4235
4/15/2014	30	4205	4235
4/23/2014	31	4327	4358
5/1/2014	31	4327	4358
5/7/2014	31	4081	4112
5/14/2014	30	4205	4235

2013 Totals	hydrocarbon recovered	water pumped	total fluid pumped
	2,705	**111,045**	**113,750**

Western Refining Southwest, Inc. - Gallup Refinery
Stand Pipes Recovery Records

DATE	hydrocarbon recovered (gallons)	water pumped (gallons)	total fluid pumped (gallons)
5/22/2014	31	4081	4112
5/29/2014	31	3994	4025
6/6/2014	31	4081	4112
6/13/2014	32	3829	3861
6/20/2014	32	3955	3987
7/3/2014	31	4081	4112
7/10/2014	30	4205	4235
7/18/2014	30	4205	4235
7/28/2014	30	4205	4235
8/4/2014	30	4205	4235
8/14/2014	32	3955	3987
8/20/2014	31	4081	4112
8/29/2014	32	3955	3987
9/4/2014	32	3703	3735
9/11/2014	32	3576	3608
9/18/2014	32	3320	3352
9/26/2014	32	3448	3480
9/30/2014	32	3576	3608
10/7/2014	32	3320	3352
10/14/2014	32	3320	3352
10/21/2014	32	3955	3987
10/30/2014	32	3955	3987
11/7/2014	32	3320	3352
11/12/2014	32	3320	3352
11/18/2014	32	3064	3096
12/4/2014	32	3829	3861
12/9/2014	32	3955	3987
12/15/2014	31	4081	4112
12/24/2014	31	4081	4112
12/30/2014	32	3703	3735
1/8/2015	31	4081	4112
1/21/2015	31	4327	4358
1/29/2015	32	3448	3480
2/6/2015	32	3448	3480
2/11/2015	32	3320	3352
3/5/2015	29	4688	4717
3/12/2015	31	4081	4112
3/16/2015	31	4081	4112
3/25/2015	32	3703	3735
3/31/2015	32	3955	3987
4/13/2015	32	3829	3861
4/20/2015	32	3703	3735
4/27/2015	16	4096	4112
4/30/2015	16	4096	4112
5/11/2015	16	4220	4236
5/29/2015	16	3971	3987
6/8/2015	16	4096	4112
6/12/2015	16	4096	4112
6/16/2015	16	4220	4236
6/24/2015	15	4583	4599
7/2/2015	16	4096	4112
7/8/2015	16	3971	3987
7/15/2015	15	4343	4358
7/22/2015	16	4220	4236
7/30/2015	16	3845	3861
8/6/2015	16	4220	4236
8/12/2015	16	3971	3987
8/17/2015	16	4220	4236
8/21/2015	16	3845	3861
8/26/2015	16	4220	4236

2014 Totals	hydrocarbon recovered	water pumped	total fluid pumped
	2,108	**242,182**	**244,290**

Western Refining Southwest, Inc. - Gallup Refinery
Stand Pipes Recovery Records

DATE	hydrocarbon recovered (gallons)	water pumped (gallons)	total fluid pumped (gallons)
9/2/2015	15	4464	4479
9/11/2015	14	5154	5168
9/25/2015	15	4464	4479
10/2/2015	15	4583	4599
10/8/2015	16	4220	4236
10/23/2015	16	4817	4833
10/29/2015	16	4220	4236
11/11/2015	14	4933	4947
11/20/2015	24	5554	5578
11/30/2015	43	4790	4833
12/10/2015	56	5323	5379
12/17/2015	56	4891	4947
12/24/2015	54	5114	5168
12/31/2015	54	5114	5168
1/7/2016	56	5323	5379
1/19/2016	51	5429	5480
1/26/2016	56	5003	5059
2/11/2016	54	5221	5275
2/17/2016	56	4891	4947
2/25/2016	56	5323	5379
3/4/2016	47	5625	5672
3/11/2016	49	5529	5578
3/17/2016	59	4658	4717
3/24/2016	45	5717	5762
3/31/2016	49	5529	5578
4/6/2016	38	5966	6004
4/15/2016	40	5888	5928
4/20/2016	56	5323	5379
4/27/2016	43	5804	5847
5/5/2016	47	5625	5672
5/9/2016	60	4419	4479
5/10/2016	45	5717	5762
5/17/2016	40	5888	5928
5/19/2016	51	5429	5480
5/24/2016	38	5966	6004
5/25/2016	49	5529	5578
5/27/2016	43	5804	5847
6/1/2016	45	5717	5762
6/3/2016	51	5429	5480
6/7/2016	35	6039	6074
6/9/2016	47	5625	5672
6/13/2016	40	5888	5928
6/16/2016	38	5966	6004
6/20/2016	40	5888	5928
6/23/2016	49	5529	5578
6/27/2016	47	5625	5672
6/30/2016	60	4419	4479
7/6/2016	232	4768	5000
7/8/2016	109	3891	4000
7/11/2016	232	4768	5000
7/19/2016	300	5300	5600
7/21/2016	109	3891	4000
7/25/2016	232	4768	5000
7/28/2016	109	3891	4000
8/2/2016	232	4768	5000
8/9/2016	300	5300	5600
8/15/2016	232	4768	5000
8/18/2016	109	3891	4000
8/23/2016	232	4768	5000
8/25/2016	109	3891	4000

2015 Totals	hydrocarbon recovered	water pumped	total fluid pumped
	1,071	**188,634**	**189,707**

Western Refining Southwest, Inc. - Gallup Refinery
Stand Pipes Recovery Records

DATE	hydrocarbon recovered (gallons)	water pumped (gallons)	total fluid pumped (gallons)
8/29/2016	232	4768	5000
9/1/2016	109	3891	4000
9/7/2016	232	4768	5000
9/9/2016	109	4187	4296
9/12/2016	109	3891	4000
9/15/2016	109	3891	4000
9/19/2016	232	4768	5000
9/27/2016	300	5300	5600
9/29/2016	109	3891	4000
10/5/2016	280	5180	5460
10/7/2016	280	5180	5460
10/10/2016	280	5180	5460
10/20/2016	109	3891	4000
10/26/2016	50	2450	2500
10/28/2016	109	3891	4000
11/1/2016	109	3891	4000
11/3/2016	109	3891	4000
11/8/2016	109	3891	4000
11/10/2016	109	3891	4000
11/14/2016	109	3891	4000
11/23/2016	109	3891	4000
12/6/2016	109	3891	4000
12/8/2016	109	3891	4000
12/13/2016	303	4697	5000
12/15/2016	109	3891	4000
12/20/2016	109	3891	4000
12/27/2016	400	4600	5000
12/29/2016	109	3891	4000

2016 Totals	hydrocarbon recovered	water pumped	total fluid pumped
	8,668	**357,619**	**366,287**

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION	
NAPIS-1	
GAUGE DATE	3.1.16
GAUGE TIME	1030
DTB (feet) Depth to Bottom	13.74
DEDICATED PUMP	—
DTW (feet) Depth to Water	6.65
DTB - DTW	7.09
Capacity per foot	0.163
2 Well Volumes	2.31 → 2.5
PURGE DATE	3.1.16
PURGE TIME	1050
SAMPLE DAY	3.1.16
SAMPLE TIME	1100
PUMP DEPTH	
DTW (feet) at end of Purging	

TEST PARAMATERS

	Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
(1)	10:44	6.37	10.59	66.82	59.95	65.95	162.6	64.5
(2)	1047	6.93	9.51	70.11	64.26	70.56	66.7	41.8
(3)	1050	6.89	9.94	71.06	64.81	71.35	28.9	43.8
(4)								

WEATHER CONDITIONS

CLEAR, CALM, 59°

WATER APPEARANCE

CLEAR

SAMPLE LOG

6 VOA – 250mL AMBER

125 HNO_3 500mL NEAT

125 H_2SO_4

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature:

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
NAPIS-2			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	3.1.16	(1)	1133	6.65	20.26	109.1	78.09	90.65	28.9	-121.6
GAUGE TIME	1127	(2)	1135	6.80	20.11	112.2	80.44	93.96	21.3	-119.1
DTB (feet) Depth to Bottom	13.80	(3)	1137	6.83	20.74	115.0	81.37	95.32	17.5	-120.3
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	7.65									
DTB - DTW	6.15									
Capacity per foot	0.163									
2 Well Volumes	2.0									
PURGE DATE	3.1.16									
PURGE TIME	1137									
SAMPLE DAY	3.1.16									
SAMPLE TIME	1200									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, LIGHT WIND 59°

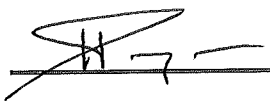
WATER APPEARANCE

CLEAR

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
NAPIS-3			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	3.1.16	(1)	1214	7.80	20.31	75.98	54.24	58.76	46.7	-8.0
GAUGE TIME	1206	(2)	1220	7.89	20.93	76.61	53.99	58.44	20.8	6.9
DTB (feet) Depth to Bottom	30.68	(3)	1227	7.79	19.75	181.5	31.9	176.25	20.7	21.9
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	8.55									
DTB - DTW	22.13									
Capacity per foot	0.163									
2 Well Volumes	7.21 → 7.25									
PURGE DATE	3.1.16									
PURGE TIME	1227									
SAMPLE DAY	3.1.16									
SAMPLE TIME	1245									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, LIGHT WIND, 62°

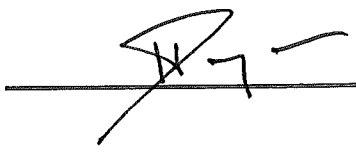
WATER APPEARANCE

CLEAR

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
OAPIS-1			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	3.1.16	(1)	1337	6.65	15.20	285.5	288	404.52	27.8	-104
GAUGE TIME	1330	(2)	1341	6.66	15.04	285.5	229	407.26	10.8	-95.6
DTB (feet) Depth to Bottom	28.55	(3)	1345	6.68	15.20	287.2	229	407.70	6.4	-93.5
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	11.86									
DTB - DTW	16.69									
Capacity per foot	0.163									
2 Well Volumes	~~3.77~~ 5.44									
PURGE DATE	3.1.16									
PURGE TIME	1345									
SAMPLE DAY	3.1.16									
SAMPLE TIME	1425									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR WEST WIND

WATER APPEARANCE

AMBER ODOR

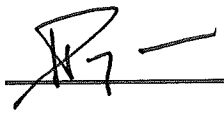
SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION	
~~POND 9~~ KA-3	
GAUGE DATE	3.3.16
GAUGE TIME	0856
DTB (feet) Depth to Bottom	23.38
DEDICATED PUMP	—
DTW (feet) Depth to Water	7.68
DTB - DTW	15.70
Capacity per foot	0.163
2 Well Volumes	5.19
PURGE DATE	3.3.16
PURGE TIME	0922
SAMPLE DAY	3.3.16
SAMPLE TIME	0940
PUMP DEPTH	—
DTW (feet) at end of Purging	—

TEST PARAMATERS									
	Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
(1)	0914	6.72	20.19	74.41	52.96	57.09	18.0	11.2
(2)	0918	6.87	23.26	80.08	53.82	58.22	9.4	-15.0
(3)	0922	6.92	23.46	80.46		58.31	15.8	-13.4
(4)				53.89↗				

WEATHER CONDITIONS

CLEAR, CALM, 49°

WATER APPEARANCE

CLEAR

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

API

SAMPLE ID/LOCATION		TEST PARAMATERS								
EAST LDU			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	3.1.16	(1)								
GAUGE TIME	1319	(2)								
DTB (feet) Depth to Bottom	12.70	(3)								
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	5.02									
DTB - DTW										
Capacity per foot	—									
2 Well Volumes	—									
PURGE DATE	—									
PURGE TIME	—									
SAMPLE DAY	3.1.16									
SAMPLE TIME	1630									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, WNW WIND, 64°

WATER APPEARANCE

GRAYISH GREEN, ODOR

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

API

SAMPLE ID/LOCATION		TEST PARAMATERS								
WEST LDU			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	3.1.16	(1)								
GAUGE TIME		(2)								
DTB (feet) Depth to Bottom	12.60	(3)								
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	5.58									
DTB - DTW	—									
Capacity per foot	—									
2 Well Volumes	—									
PURGE DATE	—									
PURGE TIME	—									
SAMPLE DAY	3.1.16									
SAMPLE TIME	1650									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, WNW WIND, 64°

WATER APPEARANCE

AMBER ODOR

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature:

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

API

SAMPLE ID/LOCATION		TEST PARAMATERS								
OIL SUMP LDU			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	3-1-16	(1)								
GAUGE TIME	1316	(2)								
DTB (feet) Depth to Bottom		(3)								
DEDICATED PUMP		(4)								
DTW (feet) Depth to Water		WEATHER CONDITIONS								
DTB - DTW										
Capacity per foot										
2 Well Volumes										
PURGE DATE		WATER APPEARANCE								
PURGE TIME										
SAMPLE DAY	NOT SAMPLED									
SAMPLE TIME	"	"								
PUMP DEPTH										
DTW (feet) at end of Purging										

SAMPLE LOG

DT HC 4.88'

DT W 5.88'

TD 6.55'

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: _____

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
GWM-1			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	3.1.16	(1)								
GAUGE TIME	1440	(2)								
DTB (feet) Depth to Bottom	26.44	(3)								
~~DEDICATED PUMP~~	22.84	(4)								
DTW (feet) Depth to Water	22.88	DTW C	WEATHER CONDITIONS							
DTB - DTW	-									
Capacity per foot	—									
2 Well Volumes	—									
PURGE DATE	—		WATER APPEARANCE							
PURGE TIME	—									
SAMPLE DAY	NA									
SAMPLE TIME	NA									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
GWM-2			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	3.1.16	(1)								
GAUGE TIME	1435	(2)								
DTB (feet) Depth to Bottom	19.05	(3)								
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	NA	WEATHER CONDITIONS								
DTB - DTW	—									
Capacity per foot	—									
2 Well Volumes	—									
PURGE DATE	—	WATER APPEARANCE								
PURGE TIME	—									
SAMPLE DAY	NA									
SAMPLE TIME	NA									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: _____

WESTERN REFINING - GALLUP REFINERY

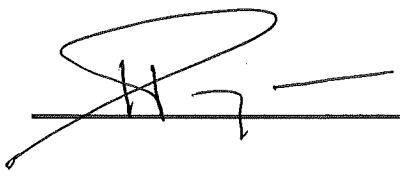
1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
GWM-3			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	3.1.16	(1)								
GAUGE TIME	1430	(2)								
DTB (feet) Depth to Bottom	17.80	(3)								
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	NA	WEATHER CONDITIONS								
DTB - DTW	—									
Capacity per foot	—									
2 Well Volumes	—									
PURGE DATE	—									
PURGE TIME	—	WATER APPEARANCE								
SAMPLE DAY	NA									
SAMPLE TIME	NA									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
STP1-NW			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	3.1.16	(1)								
GAUGE TIME	1548	(2)								
DTB (feet) Depth to Bottom	49.70	(3)								
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	20.55									
DTB - DTW	29.15									
Capacity per foot	0.163									
2 Well Volumes	9.5									
PURGE DATE	3.2.16									
PURGE TIME	0900									
SAMPLE DAY	3.2.16									
SAMPLE TIME	0920									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, CALM, 62°

WATER APPEARANCE

CLEAR

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
OW-1			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	3.3.16	(1)	1257	8.58	14.99	57.91	46.45	48.99	16.1	10.9
GAUGE TIME	1255	(2)	1325	* PUMP	DRY @ 70	GALLONS	*			
DTB (feet) Depth to Bottom	94.55	(3)								
DEDICATED PUMP		(4)								
DTW (feet) Depth to Water	0.00									
DTB - DTW	94.55									
Capacity per foot	0.74									
2 Well Volumes	140									
PURGE DATE	3.3.16									
PURGE TIME	1325									
SAMPLE DAY	3.3.16									
SAMPLE TIME	1405									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, LIGHT WIND, 66°

WATER APPEARANCE

CLEAR

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: [signature]

2.5 GALLONS/MIN

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MW-10			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	3/3/16	(1)	1059	7.12	14.29	83.57	68.05	76.10	99.2	42.9
GAUGE TIME	1045	(2)	1117	7.04	13.76	240.7	199.0	323.13	21.3	9.1
DTB (feet) Depth to Bottom	60.63	(3)	1134	7.22	13.50	213.2	176.4	268.12	60.3	18.3
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	1.42									
DTB - DTW	~~[illegible]~~	59.21								
Capacity per foot	0.74									
2 Well Volumes	87.63									
PURGE DATE	3/3/16									
PURGE TIME	1134									
SAMPLE DAY	3/3/16									
SAMPLE TIME	1140									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, CALM, 64°

WATER APPEARANCE

CLEAR

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature:

2.5 GALLONS/MIN.

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION	
OW-13	
GAUGE DATE	3.4.16
GAUGE TIME	0935
DTB (feet) Depth to Bottom	99.15
DEDICATED PUMP	—
DTW (feet) Depth to Water	21.43
DTB - DTW	77.72
Capacity per foot	0.74
2 Well Volumes	115
PURGE DATE	3.4.16
PURGE TIME	1056
SAMPLE DAY	3.4.16
SAMPLE TIME	1100
PUMP DEPTH	—
DTW (feet) at end of Purging	—

TEST PARAMATERS

	Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
(1)	1010	7.63	14.41	52.64	42.85	44.69	16.8	-33.1
(2)	1033	7.83	13.15	50.17	42.11	43.72	19.8	2.6
(3)	1056	7.96	13.18	49.03	41.17	42.66	99.2	-3.2
(4)								

WEATHER CONDITIONS

CLEAR, LIGHT WIND, 58°

WATER APPEARANCE

CLEAR

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: [signature]

1.5/MIN / 5 GALLONS

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
OW-14 3.4.16			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	~~MRET-14~~	(1)	1145	6.66	15.00	89.81	72.21	82.03	17.0	-124.0
GAUGE TIME	1125	(2)	1152	6.77	13.96	87.86	72.40	82.13	13.1	-124.8
DTB (feet) Depth to Bottom	46.52	(3)	1209	6.80	14.56	92.17	73.00	83.11	8.0	-126.2
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	23.20									
DTB - DTW	23.32									
Capacity per foot	0.74									
2 Well Volumes	35									
PURGE DATE	3.4.16									
PURGE TIME	1209									
SAMPLE DAY	3.4.16									
SAMPLE TIME	1220									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, CALM, 62°

WATER APPEARANCE

CLEAR, ODOR

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature:

5 GALLONS / 2 MIN
2.5 GALLONS / MIN.

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
OW-29			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	3.4.16	(1)	1245	7.02	13.95	75.73	62.30	68.71	50.8	-116.1
GAUGE TIME	1235	(2)	1255	7.12	12.94	75.06	75.08	63.35	12.7	-92.9
DTB (feet) Depth to Bottom	51.08	(3)	1305	7.10	12.93	75.63	63.74	70.29	16.0	-78.7
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	18.15									
DTB - DTW	32.93									
Capacity per foot	0.74									
2 Well Volumes	48.7									
PURGE DATE	3.4.16									
PURGE TIME	1305									
SAMPLE DAY	3.4.16									
SAMPLE TIME	1315									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR MODERATE WIND, 63°

WATER APPEARANCE

CLEAR

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature:

24

2.5 GALLONS / MIN

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
OW-30			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	3.8.16	(1)	0840	6.12	11.66	74.09	64.63	71.44	104.2	-26.9
GAUGE TIME	0834	(2)	0905	6.94	12.34	76.81	65.85	73.14	51.0	-41.5
DTB (feet) Depth to Bottom	49.90	(3)	0930	6.92	12.66	77.84	66.20	73.66	37.6	43.6
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	22.55									
DTB - DTW	27.35									
Capacity per foot	0.74									
2 Well Volumes	4.0									
PURGE DATE	3.8.16									
PURGE TIME	0930									
SAMPLE DAY	3.8.16									
SAMPLE TIME	0945									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, CALM, 32°

WATER APPEARANCE

CLEAR

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

_____ QTR 2015

SAMPLE ID/LOCATION		TEST PARAMATERS								
STP1-SW			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	3.8.16	(1)								
GAUGE TIME	1300	(2)								
DTB (feet) Depth to Bottom	29.15	(3)								
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	DRY	WEATHER CONDITIONS								
DTB - DTW										
Capacity per foot										
2 Well Volumes										
PURGE DATE		WATER APPEARANCE								
PURGE TIME										
SAMPLE DAY										
SAMPLE TIME										
PUMP DEPTH										
DTW (feet) at end of Purging										

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
RW-1			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	3.4.16	(1)								
GAUGE TIME	0805	(2)								
DTB (feet) Depth to Bottom		(3)								
DEDICATED PUMP		(4)								
DTW (feet) Depth to Water		WEATHER CONDITIONS								
DTB - DTW		CLEAR, CALM, 35°								
Capacity per foot										
2 Well Volumes										
PURGE DATE		WATER APPEARANCE								
PURGE TIME		NA - HC PRESENT								
SAMPLE DAY										
SAMPLE TIME										
PUMP DEPTH										
DTW (feet) at end of Purging										

SAMPLE LOG

DTP - 28.05', BTOC

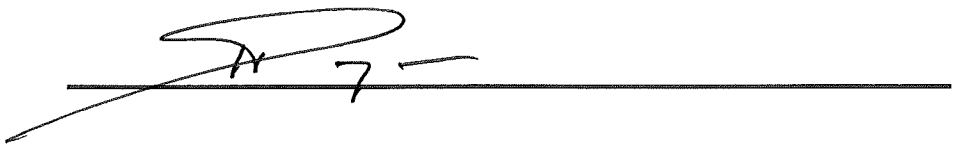
DTW - 30.55', BTOC

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

TK 576

SAMPLE ID/LOCATION		TEST PARAMATERS								
RW-2			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	3.4.16	(1)								
GAUGE TIME	0816	(2)								
DTB (feet) Depth to Bottom	40.10	(3)								
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	22.45									
DTB - DTW	17.65									
Capacity per foot	0.74									
2 Well Volumes	26 ✓									
PURGE DATE	3.7.16									
PURGE TIME	1120									
SAMPLE DAY	3.7.16									
SAMPLE TIME	1145									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, WEST WIND, 32°

WATER APPEARANCE

CLEAR ⇒ GRAY
ODOR SHEEN

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature:

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

TKS 344/337

SAMPLE ID/LOCATION		TEST PARAMATERS								
RW-5			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	3.4.16	(1)								
GAUGE TIME	0849	(2)								
DTB (feet) Depth to Bottom	41.70	(3)								
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	28.22									
DTB - DTW	13.48									
Capacity per foot	0.74									
2 Well Volumes	19.95									
PURGE DATE	3.7.16									
PURGE TIME	0855									
SAMPLE DAY	3.7.16									
SAMPLE TIME	0910									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, WEST WIND, 30°

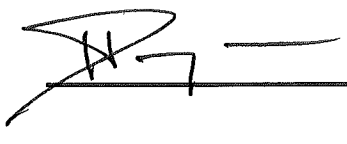
WATER APPEARANCE

CLEAR, ODOR, SHEEN

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

TKS 344 / 337

SAMPLE ID/LOCATION		TEST PARAMATERS								
RW-6			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	3.4.16	(1)								
GAUGE TIME	0843	(2)								
DTB (feet) Depth to Bottom	41.15	(3)								
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	28.25	WEATHER CONDITIONS								
DTB - DTW	12.90	CLEAR, WINDY, 32°								
Capacity per foot	0.74									
2 Well Volumes	19.09									
PURGE DATE	3.7.16									
PURGE TIME	0940	→ 14 GALLONS / DRY	WATER APPEARANCE							
SAMPLE DAY	3.7.16									
SAMPLE TIME	1010									
PUMP DEPTH	—	CLEAR, ODOR, SHEEN								
DTW (feet) at end of Purging	—									

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-1			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.24.16	(1)	0910	6.73	7.98	99.24	95.59	113.49	52.6	-83.6
GAUGE TIME	0850	(2)	0918	6.63	8.39	100.5	95.66	113.83	50.3	-92.2
DTB (feet) Depth to Bottom	17.44	(3)	0932	6.75	9.28	103.5	96.24	115.07	153.1	-99.7
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	5.84									
DTB - DTW	11.60									
Capacity per foot	0.74									
2 Well Volumes	17.16 → 17.25									
PURGE DATE	2.24.16									
PURGE TIME	0932									
SAMPLE DAY	2.24.16									
SAMPLE TIME	1010									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

PARTLY CLOUDY, NE WIND, 32°

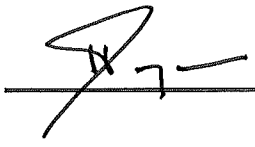
WATER APPEARANCE

CLEAR, ODOR

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-2			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.24.16	(1)	1037	7.22	8.34	81.13	77.36	87.64	100.6	-13.9
GAUGE TIME	1026	(2)	1044	7.32	8.99	81.57	76.35	86.46	60.4	-72.4
DTB (feet) Depth to Bottom	20.38	(3)	1056	7.36	10.42	122.8	110.9	138.50	111.4	-79.7
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	7.22									
DTB - DTW	13.16									
Capacity per foot	0.74									
2 Well Volumes	19.48 → 20									
PURGE DATE	2.24.16									
PURGE TIME	1056									
SAMPLE DAY	2.24.16									
SAMPLE TIME	1135									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, 36°, LIGHT BREEZE

WATER APPEARANCE

CLEAR, ODOR

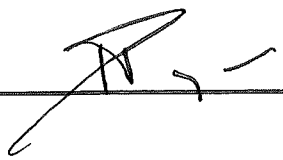
SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-04			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.29.16	(1)	0808	6.30	12.07	90.10	77.80	89.27	22.9	-110.8
GAUGE TIME	0756	(2)	0816	6.56	12.70	95.30	81.03	93.93	20.4	-109.7
DTB (feet) Depth to Bottom	22.20	(3)	BAILED DRY @ 15 GALLONS @ 0828							
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	10.68	WEATHER CONDITIONS								
DTB - DTW	11.52	CLEAR, CALM, 34°								
Capacity per foot	0.74									
2 Well Volumes	17.05									
PURGE DATE	2.29.16	WATER APPEARANCE								
PURGE TIME	0828	CLEAR, ODOR ⇒ CLOUDY SHEEN								
SAMPLE DAY	2.29.16									
SAMPLE TIME	0930									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

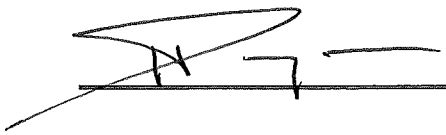
SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-9			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.29.16	(1)	1245	6.51	12.39	71.51	61.15	67.08	88.5	-85.2
GAUGE TIME	1235	(2)	1250	6.61	11.87	73.26	63.54	70.03	36.2	-99.3
DTB (feet) Depth to Bottom	22.70	(3)	1258	6.75	12.07	74.03	63.94	70.61	13.4	-112.6
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	14.15									
DTB - DTW	8.55									
Capacity per foot	0.74									
2 Well Volumes	12.665 → 12.75									
PURGE DATE	2.29.16									
PURGE TIME	1258									
SAMPLE DAY	2.29.16									
SAMPLE TIME	1330									
PUMP DEPTH										
DTW (feet) at end of Purging										

WEATHER CONDITIONS

CLOUDY, WEST WIND, 64°

WATER APPEARANCE

CLEAR -> GRAY, SHEEN, ODOR

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature:

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-10			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.29.16	(1)	1126	6.07	12.89	183.7	155.3	221.53	33.6	-59.6
GAUGE TIME	1115	(2)		BAILED DRY @		5 GALLONS		@ 1130		
DTB (feet) Depth to Bottom	16.00	(3)								
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	8.60									
DTB - DTW	~~7.40~~									
Capacity per foot	~~0.74~~									
2 Well Volumes	10.95 → 11									
PURGE DATE	2.29.16									
PURGE TIME	1130									
SAMPLE DAY	2.29.16									
SAMPLE TIME	1700									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, WEST WIND, 62°

WATER APPEARANCE

CLEAR -> ODOR

GRAY -> SHEEN

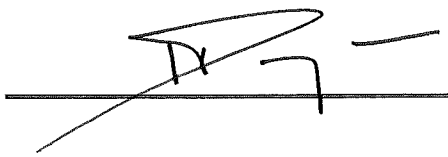
SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-11			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.29.16	(1)	1012	6.33	12.66	180.4	153.5	217.8	114.1	-118.2
GAUGE TIME	1000	(2)	1017	6.73	13.18	177.5	148.4	206.8	35.0	-123.8
DTB (feet) Depth to Bottom	18.38	(3)	1025	6.77	13.46	245.2	204.5	337.3	71.7	-116.1
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	8.80									
DTB - DTW	9.58									
Capacity per foot	0.74									
2 Well Volumes	14.17 → 14.5									
PURGE DATE	2.29.16									
PURGE TIME	1025									
SAMPLE DAY	2.29.16									
SAMPLE TIME	1050									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, WEST WIND, 46°

WATER APPEARANCE

CLEAR → DARK GRAY

ODOR:

SAMPLE LOG

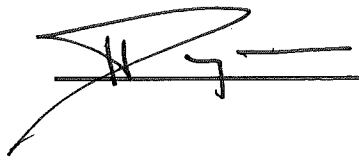
INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature:



WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-16			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.29.16	(1)	1356	6.66	15.57	146.5	116.1	149.04	25.7	-111.7
GAUGE TIME	1348	(2)	1359	6.60	15.02	144.4	116.0	148.87	14.9	-1135
DTB (feet) Depth to Bottom	14.09	(3)	1403	6.61	15.07	145.6	116.8	150.12	10.6	-1123
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	9.90	WEATHER CONDITIONS								
DTB - DTW	4.19	CLEAR, WEST WIND, 64°								
Capacity per foot	0.163									
2 Well Volumes	1.37 → 1.5									
PURGE DATE	2.29.16	WATER APPEARANCE								
PURGE TIME	1403	CLEAR								
SAMPLE DAY	2.29.16									
SAMPLE TIME	1425									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

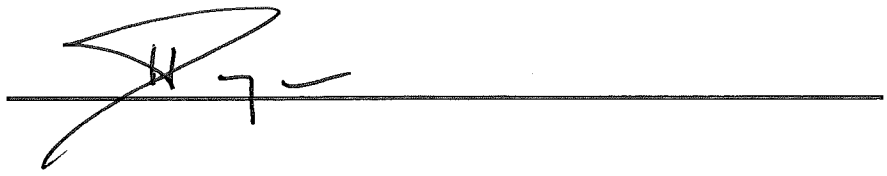
SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-17			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.25.16	(1)	1518	6.71	14.27	65.30	53.38	57.44	35.8	-76.7
GAUGE TIME	1508	(2)	1522	6.78	14.29	65.81	53.76	57.91	15.2	-73.9
DTB (feet) Depth to Bottom	24.60	(3)	DRY @ 3 GALLONS @ 1525							
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	11.82									
DTB - DTW	12.78									
Capacity per foot	0.163									
2 Well Volumes	4.16 → 4.5									
PURGE DATE	2.25.16									
PURGE TIME	1525									
SAMPLE DAY	2.26.16									
SAMPLE TIME	0930									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, CALM, 57°

WATER APPEARANCE

CLEAR TO MUDDY @ BOTTOM

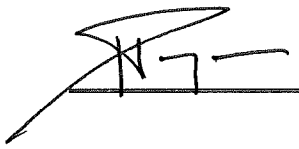
SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-18			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.26.16	(1)	1055	6.73	12.92	63.83	53.81	57.79	25.2	-117.8
GAUGE TIME	10:51	(2)	1103	6.93	15.20	68.04	54.38	58.75	10.8 ~~25~~	-123.6
DTB (feet) Depth to Bottom	25.5	(3)			~~DRAFT~~	DRY @ 3 GALLONS @ 1105				
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	8.34									
DTB - DTW	17.16									
Capacity per foot	0.163									
2 Well Volumes	~~5.60~~									
PURGE DATE	2.26.16									
PURGE TIME	1105									
SAMPLE DAY	2.26.16									
SAMPLE TIME	1330									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, CALM, 50°

WATER APPEARANCE

CLEAR ⇒ BROWN, ODOR

SAMPLE LOG

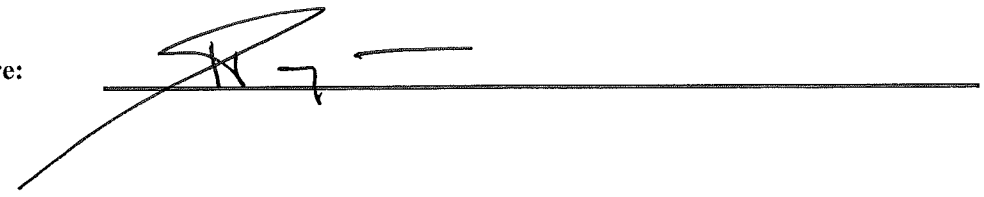
INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature:



WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-19			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.25.16	(1)	1402	6.48	13.63	80.20	66.43	74.07	98.6	-112.1
GAUGE TIME	1352	(2)	1404	6.62	12.88	79.26	66.91	74.60	15.8	-107.7
DTB (feet) Depth to Bottom	17.29	(3)	1406	6.63	12.64	78.80	66.99	74.68	9.2	-104.3
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	12.62									
DTB - DTW	4.67									
Capacity per foot	0.163									
2 Well Volumes	1.52									
PURGE DATE	2.25.16									
PURGE TIME	1406									
SAMPLE DAY	2.25.16									
SAMPLE TIME	1440									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR CALM 57°

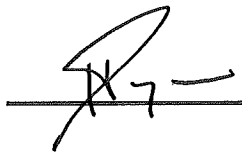
WATER APPEARANCE

CLEAR, ODOR
↳ BROWN

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-20			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.29.16	(1)	1440	6.37	13.50	60.31	50.26	53.52	24.2	+104.7
GAUGE TIME	1436	(2)	1443	6.59	13.36	61.82	51.98	52.61	20.1	-96.9
DTB (feet) Depth to Bottom	9.56	(3)		BAILED DRY @ 1445 @ 2 GALLONS						
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	7.81									
DTB - DTW	1.75									
Capacity per foot	0.74									
2 Well Volumes	2.59									
PURGE DATE	2.29.16									
PURGE TIME	1445									
SAMPLE DAY	3.1.16									
SAMPLE TIME	0905									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, WEST WIND — 2.29.15

CLEAR, CALM, 40° → 3.1.15

WATER APPEARANCE

CLEAR → BLACK

ODOR

SHEEN

SAMPLE LOG

6 VOA, ONE 1-LITER AMBER

1 250 ML AMBER

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-21			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.29.16	(1)	1512	6.42	11.92	41.09	35.56	36.10	63.0	-89.4
GAUGE TIME	1505	(2)		BAILED DRY @ 1516 @ 1 GALLON						
DTB (feet) Depth to Bottom	8.82	(3)								
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	7.24									
DTB - DTW	1.58									
Capacity per foot	0.74									
2 Well Volumes	2.33									
PURGE DATE	2.29.16									
PURGE TIME	1516									
SAMPLE DAY	3.1.16									
SAMPLE TIME	0840									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, WEST WIND - 2.29.15

CLEAR, CALM, 40° → 3.1.15

WATER APPEARANCE

@ CLEAR → BLACK

ODOR, SHEEN

SAMPLE LOG

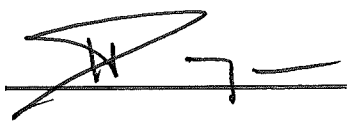
6 VOA, 1-1L AMBER, 1-250ML AMBER

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-22			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.25.16	(1)	1024	6.80	13.21	67.77	56.83	61.64	30.1	-105.4
GAUGE TIME	1010	(2)	1027	6.79	12.86	66.91	56.62	61.35	18.8	-101.8
DTB (feet) Depth to Bottom	35.24	(3)	1030	6.87	12.64	69.27	58.88	64.14	24.4	-100.7
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	26.13	WEATHER CONDITIONS: CLEAR, LIGHT WIND, 39°								
DTB - DTW	9.11									
Capacity per foot	0.163									
2 Well Volumes	2.97 → 3.0									
PURGE DATE	2.25.16									
PURGE TIME	1030	WATER APPEARANCE: CLEAR → BROWN, ODOR								
SAMPLE DAY	2.25.16									
SAMPLE TIME	1055									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

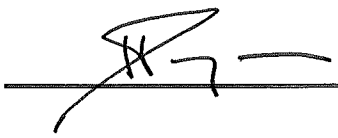
SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-23			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.25.16	(1)	0906	7.14	10.91	84.19	74.85	84.91	140.1	-103.7
GAUGE TIME	0858	(2)	0909	6.94	10.96	84.91	75.40	85.68	25.6	-94.1
DTB (feet) Depth to Bottom	20.37	(3)	0912	7.04	11.14	86.66	76.59	87.33	17.7	-93.9
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	14.67	WEATHER CONDITIONS								
DTB - DTW	5.67	CLEAR, CALM, 34°								
Capacity per foot	0.163									
2 Well Volumes	1.85 → 2									
PURGE DATE	2.25.16									
PURGE TIME	0912	WATER APPEARANCE								
SAMPLE DAY	2.25.16	CLEAR, ODOR, SHEEN								
SAMPLE TIME	0940									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-24			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.22.16	(1)	1225	5.42	12.81	70.16	59.16	64.49	65.5	54.6
GAUGE TIME	1202	(2)	1228	6.15	13.09	1.521	1.327	0.96	67.8	-9.1
DTB (feet) Depth to Bottom	30.45	(3)	1234	6.63	12.81	1.262	0.899	0.78	67.4	-14.1
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	21.34									
DTB - DTW	9.11									
Capacity per foot	0.163									
2 Well Volumes	2.97 → 3.00									
PURGE DATE	2.2.16									
PURGE TIME	1234									
SAMPLE DAY	2.2.16									
SAMPLE TIME	1310									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

PARTLY CLOUDY, LIGHT WEST WIND
54°F

WATER APPEARANCE

CLEAR TO REDDISH BROWN
NO ODOR

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-25			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.23.16	(1)	1157	6.83	8.32	111.9	106.8	130.87	62.3	12.2
GAUGE TIME	1150	(2)	1201	6.76	8.56	121.4	114.8	143.71	26.5	6.8
DTB (feet) Depth to Bottom	19.40	(3)	1205	6.74	8.74	120.7	113.8	142.37	19.3	5
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	10.83									
DTB - DTW	8.57									
Capacity per foot	0.163									
2 Well Volumes	2.79 → 3									
PURGE DATE	2.23.16									
PURGE TIME	1205									
SAMPLE DAY	2.23.16									
SAMPLE TIME	1225									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLOUDY, NORTH WIND, SNOW, 37°

WATER APPEARANCE

CLEAR -> LT. PINK, ODOR

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1 QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-26			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.22.16	(1)	1359	6.93	9.20	116.2	107.9	132.92	24.6	33.7
GAUGE TIME	1350	(2)	1403	6.98	7.59	95.09	92.54	108.70	86.7	-7.7
DTB (feet) Depth to Bottom	17.16	(3)	1407	6.91	8.29	141.4	134.8	178.40	35.0	12.1
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	8.17	WEATHER CONDITIONS: MOD NORTH WIND PARTLY CLOUDY 55°								
DTB - DTW	8.99									
Capacity per foot	0.163									
2 Well Volumes	2.93									
PURGE DATE	2.22.16	WATER APPEARANCE: CLEAR => BROWN / CLOUDY; NO ODOR								
PURGE TIME	1407									
SAMPLE DAY	2.22.16									
SAMPLE TIME	1435									
PUMP DEPTH										
DTW (feet) at end of Purging										

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-27			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.22.16	(1)	1559	6.63	8.41	305.5	289.8	602.86	118.1	59.1
GAUGE TIME	1550	(2)	1602	6.80	7.68	307.5	297.6	627.28	40.4	58.6
DTB (feet) Depth to Bottom	14.71	(3)	1606	6.76	8.33	313.4	298.4	632.81	29.6	61.4
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	7.20	WEATHER CONDITIONS: CLOUDY, NORTH WIND, 50°, TRACE SNOW								
DTB - DTW	7.51									
Capacity per foot	0.163									
2 Well Volumes	2.49 → 2.5									
PURGE DATE	2.22.16	WATER APPEARANCE: CLEAR								
PURGE TIME	1606									
SAMPLE DAY	2.22.16									
SAMPLE TIME	~~1635~~ 1635									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

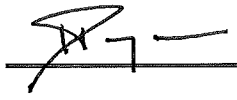
1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-28			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.23.16	(1)	0856	7.14	10.16	103.9	94.29	112.51	68.4	51.1
GAUGE TIME	0850	(2)	0901	7.22	10.76	104.3	92.20	109.55	48.6	54.4
DTB (feet) Depth to Bottom	16.14	(3)	0905	7.23	12.85	112.5	95.18	114.71	37.1	55.3
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	5.32	WEATHER CONDITIONS								
DTB - DTW	10.82	CLOUDY, LIGHT WIND, 340								
Capacity per foot	0.163									
2 Well Volumes	3.52 → 3.75									
PURGE DATE	2.23.16									
PURGE TIME	0905	WATER APPEARANCE								
SAMPLE DAY	2.23.16	CLEAR								
SAMPLE TIME	0935									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF - 29			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.23.16	(1)	1022	7.49	4.67	69.31	73.64	81.18	233.2	23.7
GAUGE TIME	1015	(2)	1027	7.10	9.13	89.24	82.82	95.51	29.7	13.0
DTB (feet) Depth to Bottom	22.80	(3)	1035	7.20	9.59	90.68	8207	94.71	21.6	6.5
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	1.92									
DTB - DTW	20.88									
Capacity per foot	0.163									
2 Well Volumes	6.8 → 7									
PURGE DATE	2.23.16									
PURGE TIME	1035									
SAMPLE DAY	2.23.16									
SAMPLE TIME	1100									
PUMP DEPTH	~									
DTW (feet) at end of Purging	~									

WEATHER CONDITIONS

34°, CLOUDY LIGHT BREEZE, SNOW

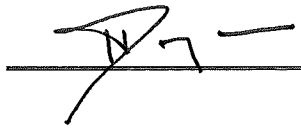
WATER APPEARANCE

CLEAR

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-30			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.23.16	(1)	1527	6.97	11.70	153.2	133.7	178.89	122.8	52.0
GAUGE TIME	1520	(2)	1532	7.06	12.77	195.9	166.1	244.48	39.4	55.2
DTB (feet) Depth to Bottom	23.18	(3)	1536	7.05	13.02	201.3	169.6	252.42	32.3	54.7
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	14.40									
DTB - DTW	8.78									
Capacity per foot	0.163									
2 Well Volumes	2.86 → 3.0									
PURGE DATE	2.23.16									
PURGE TIME	1536									
SAMPLE DAY	2.23.16									
SAMPLE TIME	1545									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLOUDY, SNOW, 39°

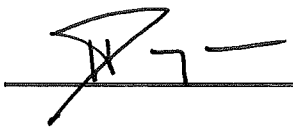
WATER APPEARANCE

CLEAR

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

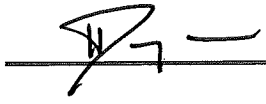
1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-31			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.23.16	(1)	1309	6.52	8.00	123.6	118.7	150.2	44.08	55
GAUGE TIME	1250	(2)	1315	6.86	7.91	124.2	119.7	151.56	36.80	43.7
DTB (feet) Depth to Bottom	22.72	(3)	1326	6.86	8.01	122.7	118.2	149.70	26.4	41.1
DEDICATED PUMP		(4)								
DTW (feet) Depth to Water	7.95	WEATHER CONDITIONS								
DTB - DTW	14.77	SNOW, 36°								
Capacity per foot	0.163									
2 Well Volumes	4.8 → 5									
PURGE DATE	2.23.16	WATER APPEARANCE								
PURGE TIME	1326	CLEAR								
SAMPLE DAY	2.23.16									
SAMPLE TIME	1345									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-32			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.24.16	(1)	1515	7.23	13.89	113.1	93.22	111.98	31.1	38.5
GAUGE TIME	1508	(2)	1519	7.46	13.18	112.8	94.78	114.25	38.9	32.0
DTB (feet) Depth to Bottom	27.75	(3)	1524	7.49	12.99	116.8	98.34	119.49	18.4	36.2
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	14.53									
DTB - DTW	13.22									
Capacity per foot	0.163									
2 Well Volumes	4.31 → 4.5									
PURGE DATE	2.24.16									
PURGE TIME	1524									
SAMPLE DAY	2.24.16									
SAMPLE TIME	1550									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, LIGHT → MOD WIND, 51°

WATER APPEARANCE

CLEAR

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-33			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.25.16	(1)	1124	6.67	13.45	67.60	56.35	61.09	73.8	7.0
GAUGE TIME	1116	(2)	1128	6.92	12.89	67.23	56.80	61.55	14.4	10.2
DTB (feet) Depth to Bottom	33.20	(3)	1132	6.98	12.92	69.19	58.48	63.72	14.0	19.5
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	23.20									
DTB - DTW	10.00									
Capacity per foot	0.163									
2 Well Volumes	3.26 → 3.5									
PURGE DATE	2.25.16									
PURGE TIME	1132									
SAMPLE DAY	2.25.16									
SAMPLE TIME	1155									
PUMP DEPTH	—									
DTW (feet) at end of Purging	~									

WEATHER CONDITIONS

CLEAR, CALM, 48°

WATER APPEARANCE

CLEAR ⇒ BROWN

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-~~#~~ 34			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.25.16	(1)	1556	7.16	14.72	82.73	66.97	74.94	70.9	34.2
GAUGE TIME	1547	(2)	1600	7.21	14.20	81.46	67.02	74.98	53.4	39.0
DTB (feet) Depth to Bottom	27.67	(3)	1604	7.27	14.05	82.04	67.54	75.69	45.3	42.2
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	19.20									
DTB - DTW	8.47									
Capacity per foot	0.163									
2 Well Volumes	2.76 → 3.0									
PURGE DATE	2.25.16									
PURGE TIME	1604									
SAMPLE DAY	2.25.16									
SAMPLE TIME	1630									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, CALM, 61°

WATER APPEARANCE

CLEAR

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-35			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.26.16	(1)	1130	6.67	12.26	53.57	45.86	4/8.16	34.8	-100
GAUGE TIME	1125	(2)	1132	6.77	12.36	53.72	46.15	48.47	74.7	-104
DTB (feet) Depth to Bottom	16.45	(3)	1134	6.78	11.57	52.78	4629	48.59	66.1	-106.1
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	8.40									
DTB - DTW	8.05									
Capacity per foot	0.163									
2 Well Volumes	2.62									
PURGE DATE	2.26.16									
PURGE TIME	1134									
SAMPLE DAY	2.26.16									
SAMPLE TIME	1200									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR CALM 48°

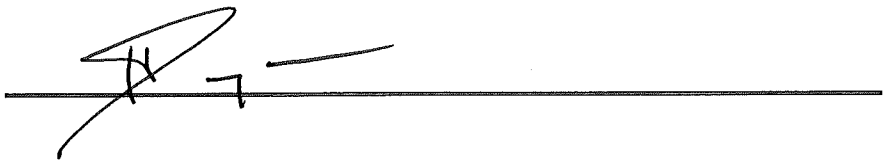
WATER APPEARANCE

CLEAR → BROWN — FAINT ODOR

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-38			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.29.16	(1)	1549	6.53	12.66	78.32	66.61	74.18	20.7	-8.5
GAUGE TIME	1544	(2)	1552	6.64	12.10	77.49	66.83	74.38	11.7	-54.4
DTB (feet) Depth to Bottom	20.40	(3)	1556	6.66	12.45	74.56	63.76	70.43	20.0	-54.1
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	8.63									
DTB - DTW	11.77									
Capacity per foot	0.163									
2 Well Volumes	3.84 → 4									
PURGE DATE	2.29.16									
PURGE TIME	1556									
SAMPLE DAY	2.29.16									
SAMPLE TIME	1620									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, WEST WIND, 63°

WATER APPEARANCE

CLEAR → LT BROWN

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature:

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-39			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	3.3.16	(1)	1600	6.58	15.89	232.6	181.5	280.8	2 39.9	-124.4
GAUGE TIME	1550	(2)	1602	6.61	15.31	441.7	352.6	891.3	2 25.7	-108.9
DTB (feet) Depth to Bottom	15.18	(3)	1604	6.55	15.10	443.6	355.4	905.0	5 11.5	-109.5
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	8.50									
DTB - DTW	6.68									
Capacity per foot	0.163									
2 Well Volumes	2.18									
PURGE DATE	3.3.16									
PURGE TIME	1604									
SAMPLE DAY	3.3.16									
SAMPLE TIME	1630									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, LIGHT WIND, 70°

WATER APPEARANCE

CLEAR → LIGHT GRAY, ODOR

SHEEN

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: _____

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-40			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.23.16	(1)	1421	6.75	9.97	338.1	387.6	675.13	92.8	66.0
GAUGE TIME	1413	(2)	1425	6.80	11.06	446.6	3945	999.99	50.0	64.9
DTB (feet) Depth to Bottom	23.60	(3)	1429	6.74	10.97	4.605	4.025	3.35	47.5	58.5
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	13.88									
DTB - DTW	9.72									
Capacity per foot	0.163									
2 Well Volumes	3.17 → 3.25									
PURGE DATE	2.23.16									
PURGE TIME	1429									
SAMPLE DAY	2.23.16									
SAMPLE TIME	1450									
PUMP DEPTH	—									
DTW (feet) at end of Purging	~									

WEATHER CONDITIONS

CLOUDY, SNOW, 36°

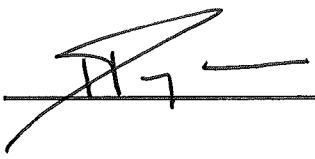
WATER APPEARANCE

CLEAR → LT. PINK

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-41			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.24.16	(1)	1621	7.62	13.66	126.0	104.5	129.42	94.1	29.0
GAUGE TIME	1610	(2)	1627	7.96	13.54	126.6	105.3	130.68	33.6	42.3
DTB (feet) Depth to Bottom	40.00	(3)	1632	7.99	13.39	128.0	104.9	129.86	32.6	44.9
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	19.90	WEATHER CONDITIONS								
DTB - DTW	20.10	CALM, CLEAR, 52°								
Capacity per foot	0.163									
2 Well Volumes	6.55 → 6.75									
PURGE DATE	2.24.16	WATER APPEARANCE								
PURGE TIME	1632	CLEAR → LT BROWN								
SAMPLE DAY	2.24.16									
SAMPLE TIME	1650									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

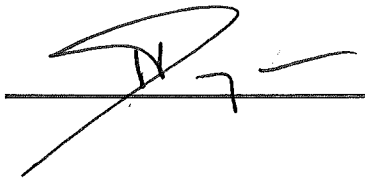
SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-42			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.24.16	(1)	1405	7.41	13.14	148.1	124.4	162.60	64.9	21.7
GAUGE TIME	1357	(2)	1411	7.76	12.87	137.5	116.3	148.46	85.8	-6.9
DTB (feet) Depth to Bottom	33.13	(3)	1417	7.76	13.00	135.0	113.8	144.41	52.2	-1.8
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	17.69									
DTB - DTW	15.44									
Capacity per foot	0.163									
2 Well Volumes	5.00									
PURGE DATE	2.24.16									
PURGE TIME	1417									
SAMPLE DAY	2.24.16									
SAMPLE TIME	1450									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

WEATHER CONDITIONS

CLEAR, LIGHT WIND, 48°

WATER APPEARANCE

CLEAR, AMBER

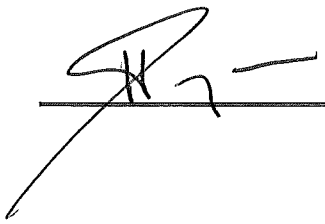
SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-43			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.24.16	(1)	1315	6.69	8.60	1342	1264	999.99	50.4	65.2
GAUGE TIME	1304	(2)	1319	7.28	6.55	1319	1301	999.99	22.3	71.9
DTB (feet) Depth to Bottom	15.42	(3)	1323	7.25	6.53	1316	1293	999.99	23.9	82.6
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	5.00	WEATHER CONDITIONS								
DTB - DTW	10.42	CLEAR CALM 46°								
Capacity per foot	0.163									
2 Well Volumes	3.40 → 3.5									
PURGE DATE	2.24.16	WATER APPEARANCE								
PURGE TIME	1323	CLEAR								
SAMPLE DAY	2-24-16									
SAMPLE TIME	1340									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY

1ST QTR 2016

SAMPLE ID/LOCATION		TEST PARAMATERS								
MKTF-44			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	2.24.16	(1)	1213	7.49	12.97	96.21	81.20	94.20	155.5	9.2
GAUGE TIME	1205	(2)	1220	7.78	12.43	95.85	82.00	95.20	66.1	10.4
DTB (feet) Depth to Bottom	51.00	(3)	1228	7.84	12.42	94.66	81.17	94.01	101.1	11.2
DEDICATED PUMP	—	(4)								
DTW (feet) Depth to Water	28.74	WEATHER CONDITIONS: CLEAR, CALM, 40°								
DTB - DTW	22.26									
Capacity per foot	0.163									
2 Well Volumes	7.25									
PURGE DATE	2.24.16	WATER APPEARANCE: CLEAR → LT PINK								
PURGE TIME	1228									
SAMPLE DAY	2.24.16									
SAMPLE TIME	1245									
PUMP DEPTH	—									
DTW (feet) at end of Purging	—									

SAMPLE LOG

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.

Water Level - Heron Instrument 100 feet DipperT electric water depth tape.

Bailer

Signature: 

WESTERN REFINING - GALLUP REFINERY
2ND QTR 2016

OW-1	
GAUGE DATE	6/6/2016
GAUGE TIME	1410
DTB (feet) Depth to Bottom	94.55
DEDICATED PUMP	Y
DTW (feet) Depth to Water	FULL
DTB - DTW	94.55
Capacity per foot	0.740
3 Well Volumes	209.90
PURGE DATE	6/6/2016
PURGE TIME	
SAMPLE DAY	6/6/2016
SAMPLE TIME	1518
PUMP DEPTH	NA
DTW (feet) at end of Purging	NA

TEST PARAMATERS

	Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
(1)	15.01	8.74	15.06	56.890	45.640	48.030	41.2	-25.1
(2)	15.03	8.64	15.36	57.450	45.770	48.200	29.1	-10.2
(3)								
(4)								

WEATHER CONDITIONS

Overcast, breezy, 80-85 deg F

WATER APPEARANCE

Clear slightly cloudy - pink

SAMPLE LOG

Water level full (to top of casing).

OW-10	
GAUGE DATE	6/6/2016
GAUGE TIME	1530
DTB (feet) Depth to Bottom	60.33
DEDICATED PUMP	Y
DTW (feet) Depth to Water	1.22
DTB - DTW	59.11
Capacity per foot	0.740
3 Well Volumes	131.22
PURGE DATE	6/6/2016
PURGE TIME	
SAMPLE DAY	6/6/2016
SAMPLE TIME	1615
PUMP DEPTH	NA
DTW (feet) at end of Purging	NA

TEST PARAMATERS

	Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
(1)								
(2)	Did not save results on the meter.							
(3)								
(4)								

Overcast-cloudy, breezy, 70-75 deg F

WATER APPEARANCE

Clear, no odor detected.

SAMPLE LOG

Purged water collected in 300 gallon tote and disposed of upstream of the WW treatment Plant.

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
bailer.

Signature:

Cheryl Johnson / Environmental Specialist / Gallup Refinery

WESTERN REFINING - GALLUP REFINERY
2ND QTR 2016

NAPIS-3	
GAUGE DATE	6/7/2016
GAUGE TIME	812
DTB (feet) Depth to Bottom	30.42
DTW (feet) Depth to Water	7.72
DTB - DTW	22.70
Capacity per foot	0.163
3 Well Volumes	11.10
PURGE DATE	6/7/2016
PURGE TIME	
SAMPLE DAY	6/7/2016
SAMPLE TIME	925
Depth to Product	
Product Layer	

TEST PARAMATERS

	Time (hrs)	pH	Temperature Deg C	Conductivity (uS), (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
(1)	918	7.55	18.47	1718.000	127.600	170.00	53.3	5.6
(2)	920	7.74	19.47	177.500	129.000	172.76	31.3	-9.4
(3)	922	7.71	19.42	177.400	129.100	172.92	24.1	-6.4
(4)	924	7.69	19.34	177.200	129.200	173.03	22.1	-1.5

WEATHER CONDITIONS

Partly cloudy, breezy, 65-70 Deg F

WATER APPEARANCE

Clear - slightly cloudy

SAMPLE LOG

With new bailer, bailed approx. 8 gallons. Collected purged water in a container and disposed of at the bundle pad.

KA-3	
GAUGE DATE	6/7/2016
GAUGE TIME	814
DTB (feet) Depth to Bottom	23.20
DTW (feet) Depth to Water	7.42
DTB - DTW	15.78
Capacity per foot	0.163
3 Well Volumes	7.72
PURGE DATE	6/7/2016
PURGE TIME	
SAMPLE DAY	6/7/2016
SAMPLE TIME	910
Depth to Product	
Product Layer	

TEST PARAMATERS

	Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
(1)	902	7.25	23.80	83.900	55.810	60.74	55.0	-16.4
(2)	904	7.08	23.61	83.390	55.680	60.56	45.3	-8.1
(3)	906	7.02	23.39	82.820	55.550	60.40	42.0	3.8
(4)								

WEATHER CONDITIONS

Clear, calm, 60-65 deg F

WATER APPEARANCE

Clear - slightly cloudy

SAMPLE LOG

With new bailer, bailed approx. 6 gallons. Collected purged water in a container and disposed of at the bundle pad.

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Disposable Polyethylene Bailer

Signature: _____

Cheryl Johnson / Environmental Specialist / Gallup Refinery

WESTERN REFINING - GALLUP REFINERY
2ND QTR 2016

NAPIS-1	
GAUGE DATE	6/7/2016
GAUGE TIME	814
DTB (FT) Depth to Bottom	13.53
DTW (FT) Depth to Water	6.45
DTB - DTW	7.08
Capacity per foot	0.163
3 Well Volumes	3.46
PURGE DATE	6/7/2016
PURGE TIME	
SAMPLE DAY	6/7/2016
SAMPLE TIME	1012
Depth to Product	
Product Layer	

TEST PARAMATERS

	Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
(1)								
(2)	Did not save results on the meter.							
(3)								
(4)								

WEATHER CONDITIONS
Clear, slight breeze, 60-65 deg F.

WATER APPEARANCE
Clear, no odor detected

SAMPLE LOG
Used new bailer for purging and collecting samples. Purged water collected in a plastic container and disposed of at the bundle pad.

NAPIS-2	
GAUGE DATE	6/7/2016
GAUGE TIME	810
DTB (FT) Depth to Bottom	13.61
DTW (FT) Depth to Water	6.40
DTB - DTW	7.21
Capacity per foot	0.163
3 Well Volumes	3.53
PURGE DATE	6/7/2016
PURGE TIME	
SAMPLE DAY	6/7/2016
SAMPLE TIME	850
Depth to Product	
Product Layer	

TEST PARAMATERS

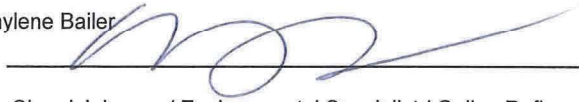
	Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
(1)	841	7.14	23.46	117.30	78.530	91.30	22.4	-108.2
(2)	843	7.02	23.30	116.80	78.470	91.22	17.8	-111.3
(3)	845	6.98	23.03	116.20	78.500	91.25	15.4	-107.6
(4)								

WEATHER CONDITIONS
Clear, calm, 60-65 Deg F

WATER APPEARANCE
Clear with slight yellow tint

SAMPLE LOG
With new bailer, bailed approx. 4 gallons. Collected purged water in a container and disposed of at the bundle pad.

INSTRUMENTS USED:
YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Bailer
Disposable Polyethylene Bailer

Signature: 

Cheryl Johnson / Environmental Specialist / Gallup Refinery

WESTERN REFINING - GALLUP REFINERY
2ND QTR 2016

OAPIS-1		TEST PARAMATERS								
			Time (hrs)	pH	Temperature Deg C	Conductivity (mS)	TDS (g/L)	Salinity (ppt)	Dissolved Oxygen (%)	ORP (mV)
GAUGE DATE	6/7/2016	(1)								
GAUGE TIME	1037	(2)	Did not save results on the meter.							
DTB (feet) Depth to Bottom	28.30	(3)								
DTW (feet) Depth to Water	11.50	(4)								
DTB - DTW	16.80									
Capacity per foot	0.163									
3 Well Volumes	8.22									
PURGE DATE	6/7/2016									
PURGE TIME										
SAMPLE DAY	6/7/2016									
SAMPLE TIME	1100									
Depth to Product										
Product Layer										

WEATHER CONDITIONS
Partly cloudy, breezy, 65-70 Deg F

WATER APPEARANCE
Clear with slight yellow tint, odor detected

SAMPLE LOG

Used new bailer to purge and collect samples. Purged water collected in a plastic container and disposed of at the bundle pad. Well was found with concrete base uprooted from the ground; well casing did not appear to be damaged - arranged to have the concrete base re-installed. Well was damaged by a driver backing up into the well and was not aware of the well installation.

INSTRUMENTS USED:

YSI 556 MPS instrument used to collect water quality parameters.
Water Level - Heron Instrument 100 feet DipperT electric water depth tape.
Disposable Polyethylene Bailer

Signature: _____

Cheryl Johnson / Environmental Specialist / Gallup Refinery