AP - 111

Facility-Wide GW Monitoring Work Plan- Updates

2015

State of New Mexico
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6313
Phone (505) 476-6000 Fax (505) 476-6030
www.env.nm.gov

SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

BUTCH TONGATE
Cabinet Secretary
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Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

January 31, 2018

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

RE: DISAPPROVAL
ANNUAL GROUNDWATER MONITORING REPORT:
GALLUP REFINERY – 2015
WESTERN REFINING SOUTHWEST INC., GALLUP REFINERY
EPA ID # NMD000333211
HWB-WRG-17-007

Dear Mr. Bailey:

The New Mexico Environment Department (NMED) has reviewed the *Annual Groundwater Monitoring Report: Gallup Refinery - 2015* (Report), dated August 2016, submitted on behalf of Western Refining Southwest Inc., Gallup Refinery (the Permittee). NMED hereby issues this Disapproval based upon deficiencies found upon review. The Permittee must address the following comments provided by both NMED and the New Mexico Energy Minerals and Natural Resources Department Oil Conservation Division (EMNRD) Oil Conservation Division (OCD):

Comment 1

The Report was written and submitted before receipt of NMED's comments regarding the 2014 Report. The Permittee must revise the Report to address NMED's comments regarding the 2014 Report (see NMED correspondence dated June 20, 2016 and June 1, 2017), as many of the

comments from the 2014 Report carry over to the 2015 Report. Revise the Report to address NMED's previous comments.

Comment 2

The Permittee included a red-line strikeout version with the Report. A red-line strikeout version is only required to be submitted with a *revised* document; however, the Report was a first-time submittal. Generally, when NMED disapproves a document, it must be re-submitted as a revised document with a red-line strikeout version that illustrates where all changes to text, tables and figures were made to aid in review of the revised document. When the revised Report is submitted pursuant to this correspondence, the Permittee must submit a red-line strikeout of the revisions along with the revised Report.

Comment 3

The Permittee has been including an analysis of uranium in groundwater samples per an NMED comment in the December 12, 2012 *Approval with Modifications for the 2010 Facility-Wide Groundwater Monitoring Report.* While some crude oil may contain uranium, the refinery is likely not a source of uranium in groundwater. The Permittee may discontinue the analysis of uranium in groundwater samples. Include this change in the next updated Facility-Wide Groundwater Monitoring Work Plan. No revision to the Report is necessary.

Comment 4

In Section 6, *Groundwater Monitoring Results*, page 26, the Permittee states, "[d]ue 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." The Permittee must elaborate why requirements for field preservation hinder separate analysis of nitrite and nitrate. Actual nitrate and nitrite concentrations provide valuable information regarding to evaluate groundwater conditions. Investigate the possibility of using alternative methods to obtain separate nitrate and nitrite concentrations (e.g., colorimeters), if applicable. Revise the Report to provide further discussion regarding the field methods and the reasons why nitrate and nitrite cannot be reported separately.

Comment 5

Although Diesel Range Organics (DRO), Gasoline Range Organics (GRO) and/or Motor Oil Range Organics (MRO) concentrations are compared with the screening levels to evaluate exceedances throughout the Report (Sections 6.1.2, 6.2.1, 6.2.2, 6.2.3, 6.6, and 6.7.5), all corresponding tables (Tables 8.3.1, 8.4.1, 8.5.1, 8.6, 8.15.1 and 8.18) indicate that these standards are not established (NE). Revise the Report to address the discrepancy. The groundwater standards referenced are Water Quality Control Commission (WQCC) standards, according to the Permittee's statement in Section 6.2.1, page 30; however, NMED is not aware of a Total Petroleum Hydrocarbon (TPH), DRO or GRO standard in the WQCC regulations. Provide the specific reference for the standards (e.g., NMAC title, chapter, part, section and

subsection numbers). NMED's *2015 Risk Assessment Guidance for Investigations and Remediation* did not contain TPH groundwater standards; however, the updated *2017 Guidance* includes TPH standards in Table 6-4 (page 95). In the response letter, acknowledge that TPH groundwater standards are available in the *2017 Guidance* and evaluate the TPH data in accordance with the standards in the 2017 Report.

Comment 6

There are multiple issues in Section 6.1.1, *Boundary Wells: BW-1A/1B/1C, BW-2A/2B/2C, BW-3A/3B/3C*, page 27:

1. The Permittee states, "[l]ow concentrations of bromide were detected in BW-2A, BW-2B, BW-2C, and BW-3B." Bromide also was detected in the sample collected from well BW-3C according to the Table 8.1.1 (General Chemistry Analytical Result Summary) in 2015. Revise the Report to include this detection in the discussion.
2. The Permittee states, "[c]hromium was previously detected in BW-1C (2012) and cadmium in BW-2C (2012)." These metals were not only detected but also detected above the standards from these wells. Revise the Report for clarification.
3. The Permittee states, "[n]o dissolved metals analyzed exceeded applicable standards; however, low concentrations of barium, iron, lead, and manganese were detected in most of the wells (Table 8.1.3)." Low concentrations of arsenic, uranium, and zinc also were detected according to Table 8.1.3 (Dissolved Metals Analytical Result Summary). Revise the Report to include these detections.
4. Elevated fluoride levels relative to the standard have been observed in most of the BW wells. Provide an explanation for the detections in the revised Report.

Comment 7

There are two errors in Section 6.1.2, *Land Treatment Unit: MW-1, MW-2, MW-4, MW-5, SMW-2, SMW-4,* page 28:

1. There is a typographical error on the sampling date of SMW-2 (8/17/17). Revise the Report to correct the date.
2. The Permittee states, "[l]ow concentrations of MTBE, not exceeding applicable standards (0.0.143 mg/L), have historically been detected in SMW-2 (Table 8.3)." There is a typographical error in the reported value (0.0.143 mg/L). Revise the Report accordingly. The correct value is 0.143 mg/L according to Table 8.3.

Comment 8

There are multiple issues in Section 6.2.1, *Groundwater Monitoring Wells: GMW-1, GMW-2, GMW-3,* page 30:

1. The Permittee states, "[t]he highest concentration of benzene (0.012 mg/L) for 2014 was recorded in the fourth quarter." The benzene concentration of 0.012 mg/L was also

detected in the first quarter of 2010, and the second quarter of 2015. Revise the Report to address the other detections.

2. The Permittee states, "[b]romide concentrations have consistently been detected in GWM-1 since 2006." The analytical result for bromide is not included in Table 8.4.1 (General Chemistry and DRO/GRO Analytical Result Summary). Revise the Report to include the bromide detection.
3. The Permittee states, "[l]ow concentrations of total chromium and zinc were detected during quarter three of 2015." The total chromium concentration was detected during the second quarter of 2015 and the total zinc concentration was detected during the first, second and third quarters of 2015. Revise the Report to address the detections.
4. The Permittee states, "[c]oncentrations of VOCs and SVOCs detected above the applicable standards in the third quarter 2015 include napthalene, 1-methyl naphthalene, benz(a)anthracene, benzo(a)pyrene, chrysene, fluorene, 1-methyl naphthalene, 2-methyl naphthalene, phenanthrene, and pyrene." There is a spelling error (napthalene). Revise the Report accordingly.
5. According to Table 8.4.4 (Volatile and Semi-Volatile Organic Compound Analytical Result Summary), the 2-methyl naphthalene concentration exceeded the standard but the value was not highlighted to indicate the exceedance. Revise the Report accordingly.
6. According to Table 8.4.4, the 1,2-dichloroethane (EDC) concentration in the sample collected from well GMW-1 was highlighted to indicate an exceedance during the August 2015 sampling event although it did not exceed the standard value of 0.005 mg/L. Revise the Report for accuracy.

Comment 9

In Section 6.2.2, *Groundwater Monitoring Wells*: *NAPIS-1, NAPIS-2, NAPIS-3, and KA-3,* page 31, the Permittee states, "[w]hen applicable, standing water is removed from the vault of the three sub-surface wells prior to opening and sampling each well. The standing water is placed into a container for proper disposal." The Permittee must ensure that surface water is prevented from entering the wells and maintain the well vault seals so that no water enters the vault.

Comment 10

Section 6.2.2, pages 32 and 33:

1. The Permittee states, "[l]ow concentrations of fluoride, chloride, nitrite, nitrate, and sulfate were detected in NAPIS-1 in 2015 (Table 8.5.1)." The nitrite concentrations have consistently exceeded the standard throughout 2015. Revise the Report to address the exceedance.
2. The Permittee states, "[c]hloride, nitrite and nitrate concentrations in NAPIS-3 exceeded applicable standards (250 mg/L, 10 mg/L and 10 mg/L, respectively) during most of 2015 and have historically exceeded these standards since 2008." The standard for nitrite is 1 mg/L rather than 10 mg/L according to the EPA MCLs (40 CFR 141.62). Revise the Report for accuracy.

3. The Permittee states, "[i]n NAPIS-3, total and dissolved uranium and total iron exceeded applicable standards during 2015 (Tables 8.5.2 and 8.5.3)." The dissolved iron concentration did not exceed the standard in the sample collected from well NAPIS-3 during 2015 according to Table 8.5.3 (Dissolved Metals Analytical Result Summary). On the other hand, the total manganese concentration exceeded the standard in the sample collected from well NAPIS-3 during the first quarter of 2015. The exceedance was not stated in the Report. Revise the Report accordingly.
4. The Permittee states, "[c]oncentrations of 1-methyl naphthalene (0.0061 mg/L) and naphthalene (0.0033 mg/L) exceeded applicable standards (0.0011 mg/L and 0.00165 mg/L, respectively) in NAPIS-2 during 2015." These values were not highlighted to indicate the exceedances in Table 8.5.4 (Volatile and Semi - Volatile Organic Compound Analytical Result Summary). Revise the Report to indicate the exceedances.

Comment 11
Although identical values of nitrate and nitrite concentrations are reported separately in most analytical tables, Table 8.9.1 reports the nitrate and nitrite concentrations together as one value "nitrate + nitrite as N". The method used by the Permittee to quantify the nitrate and nitrite concentrations is not acceptable. For all future monitoring, the method must be revised to provide actual and separate nitrate and nitrite concentrations. See Comment 4 above.

Comment 12
In Section 6.2.3, *Leak Detection Units (LDU): East LDU, Oil Sump LDU, West LDU*, page 33, the Permittee states, "[t]he LDUs were sampled for the following analytes in 2015: BTEX, MTBE, DRO, GRO, MRO, WQCC total and dissolved metals, and VOCs. Oil Sump LDU was dry all four quarters and therefore not sampled. There was not enough water in West LDU to collect a sample during the second quarter 2015." The fluid collected in LDUs is the unprocessed water leaking from the New American Petroleum Institute Separator (NAPIS). Although the fluid has been analyzed for various contaminants and compared with the standards according to OCD's directive, the problem has not been resolved. The sources of the leaks must be identified and repaired in the NAPIS. Submit a work plan that includes a schedule, to ensure this is completed in a timely manner. Alternatively, the Permittee may provide a discussion of recent repairs conducted to address the leaks in a separate letter report.

Comment 13
There are multiple issues in Section 6.2.3, pages 33 and 34:

1. The Permittee states, "[b]enzene, total xylenes, DRO, and GRO concentrations exceeded the applicable standards in the East LDU. Low concentrations of toluene and ethyl benzene were also detected in the East LDU for 2015." The toluene concentration exceeded the standard during the second and third quarters of 2015. Revise the Report to address the toluene exceedances.

2. The Permittee states, "[c]oncentrations of arsenic, barium and zinc were also present in these two wells and have historically been present in all three LDU wells." LDUs are not wells. Remove the designation as wells for the LDUs from the Report.
3. The Permittee states, "[c]hromium levels have fluctuated; falling below the applicable standards for the East LDU in September of 2010 through March of 2011and falling below applicable standards for the West LDU in quarter one and two for 2012 and 2013, respectively (Tables 8.6.1 and 8.6.2)." Because the fluid collected from LDUs is the unprocessed wastewater leaking from the NAPIS unit, the contaminant concentrations in LDUs will be directly influenced by the composition of the process flow. Collect an influent sample to the NAPIS when LDUs are sampled during future sampling events. It will be necessary to update the sampling and analysis plan in the revised Groundwater Monitoring Work Plan with this addition.
4. The Permittee states, "[c]oncentrations of 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, naphthalene, 2-methyl naphthalene, and 1-methylnaphthalene exceeded the EPA RSL and NMED standards in the East LDU. Concentrations of 1,2,4-trimethylbenzene, naphthalene, and 2-methylnaphthalene exceeded EPA RSL and NMED standards in the West LDU (Table 8.6.3)." Although the concentrations of naphthalene and 2-methyl naphthalene exceeded the standards, the values were not highlighted to indicate the exceedance in Table 8.6.3 (Volatile and Semi - Volatile Organic Compound Analytical Result Summary). Revise the Report to highlight the exceedances.

Comment 14

In Section 6.2.4, *Groundwater Monitoring Well: OAPIS-1*, pages 34 and 35, the Permittee states, "[t]otal cyanide exceeded the EPA RSL standard (0.0014 mg/L) during 2015 with the highest concentration recorded in quarter two (0.0887 mg/L)." Table 8.7.2 (Total Metals Analytical Result Summary) lists the MCL for cyanide as 0.2 mg/L. Revise the Report for accuracy.

Comment 15

In Section 6.2.4, page 34, the Permittee states, "[t]otal and dissolved arsenic, iron, and manganese concentrations exceeded the applicable standards in 2015 with the exception of dissolved arsenic." The dissolved arsenic concentration exceeded the standard in the sample collected from well OAPIS-1 during the second, third and fourth quarters of 2015 according to Table 8.7.3 (Dissolved Metals Analytical Result Summary). Also, these values were not highlighted to indicate the exceedance in Table 8.7.3. Revise the Report as necessary to address the exceedance.

Comment 16

Revise the Report to explain why wells STP1-NW and STP1-SW were installed, and how the locations for the wells were selected. Because the water sample analytical results for well STP1-NW indicate elevated chloride and nitrate concentrations relative to the applicable standards according to Table 8.8 (BTEX, General Chemistry Analytical Result Summary), the Permittee must discuss all issues associated with the operation of STP-1 and discuss any other potential sources for the elevated concentrations in the revised Report.

Comment 17
In Section 6.3.1, *Observation Wells: OW-13, OW-14, OW-29, and OW-30*, page 36, the Permittee states, "[B]TEX constituents were not detected in OW-29 or OW-30 during 2015; the wells have not had detectable BTEX concentrations since 2006. (Table 8.9)." Although the Permittee's statement is true, the statement must also address the fact that the benzene concentration has exceeded the standard (0.005 mg/L) in the samples collected from well OW-14 since 2010 according to Table 8.9 (BTEX Analytical Result Summary). In addition, the benzene concentration in well OW-14 has been increasing since 2009; the highest benzene concentration was observed at 6.2 mg/L in the last quarter of 2015. NMED received the *Revised Investigation Work Plan OW-14 Source Area* on April 18, 2016, which was before the Report was submitted; the work plan proposed an investigation to determine the cause of increasing benzene concentrations in well OW-14. Revise the Report to discuss the increasing benzene concentrations in well OW-14 and reference the work plan to indicate that the issue is being addressed.

Comment 18
In Section 6.3.1, page 36, the Permittee states, "[c]oncentrations of MTBE in OW-14, OW-29, and OW-30 during 2015 were all above the standard, with the highest being in OW-30 during the first quarter at 4.0 mg/L." Also, in Section 7.3, *Group C – Groundwater Monitoring*, page 52, the Permittee states, "[d]own gradient 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 north, north-west direction down-gradient from RW-1 and RW-2." If the MTBE plume had been moving to north or northwest from the vicinity of tank T-568 (MTBE source) with a mass transport velocity comparable to previous observations, MTBE should have been already detected in wells OW-50 and OW-52 by 2015. However, MTBE has not been detected in wells OW-50 and OW-52 as of 2015. An incomplete understanding of the groundwater flow direction may be the cause of the discrepancy. NMED has identified four approaches to address the issue. The Permittee must explore the approaches in order to understand the nature of plume expansion and coordinate with NMED to develop a course of action.

1. The MTBE plume may be migrating in a north, northwest direction with considerably slower mass transport velocity. The slower rate of mass transport may be contributed from various retardation factors (e.g., variability of hydraulic conductivity, adsorption and biodegradation). In this case, continuous monitoring of the MTBE concentration is recommended for the verification. No revision to the Report would be necessary.
2. The MTBE plume may be migrating in a northeast direction. Since there is no monitoring well to define northeastern extent of the plume beyond the property boundary, this approach would require the submittal of a work plan to install a monitoring well approximately 500 feet northeast of well OW-30 to delineate the plume. The proposed monitoring well must be screened across the Chinle-Alluvium interface.
3. Wells OW-50 and OW-52 may be located cross-gradient relative to the piezometric groundwater flow direction. A change of flow direction from north to west may be

occurring between well OW-13 (screened in the Sonsela formation) and well OW-29. This approach would require the submittal of a work plan to install a monitoring well screened across the Chinle-Alluvium interface between well OW-13 and well OW-29.

4. The MTBE plume may be migrating in a westerly direction. Although well OW-13 is appropriately located to define western boundary of the plume, well OW-13 is screened in the Sonsela formation; thus, the screened interval of well OW-13 is not monitoring the same stratigraphic units as other monitoring wells in the area; it will not provide relevant information to characterize the groundwater flow direction. This approach would require the submittal of a work plan to install a monitoring well screened across the Chinle-Alluvium interface in the vicinity of well OW-13.

Comment 19
Section 6.3.3, *Recovery Wells: RW-1, RW-2, RW-5, RW-6*, pages 38 and 39:

1. The Permittee states, "[p]urge water is collected and disposed upstream of the NAPIS." Provide a justification for placing the purge water into the leaking sewer line in the revised Report.
2. The Permittee states, "[h]ydrocarbon recovery from RW-1 has shown a steady decrease from 2005 through 2015. In 2015, total hydrocarbon recovery is estimated at 2.0 gallons in 55 gallons of water purged compared to the 2005 estimate of 431 gallons of hydrocarbons in 1,210 gallons of water." While this statement is true, it omits the fact that a persistent product thickness (from1.94 to 4.6 feet) has been recorded during 2015 monitoring events. Revise the Report to address the persistent product thickness.

Comment 20
The screened intervals of all RW wells were submerged below the water table during 2015 gauging events. When the screened interval is submerged below the water table, Separate Phase Hydrocarbon (SPH) will likely not be detected if present. Also, a well with a submerged screen will not provide accurate information regarding the vertical extent of the hydrocarbon smear zone. The average depth to groundwater in well RW-2 is approximately five feet higher than the top of the screen; the inappropriate depth of the screened interval may be contributing to the lack of observed SPH. Include a proposal to submit a work plan to abandon well RW-2 and replace it with a well screened across the water table.

Comment 21
In Section 6.4.1, *Process Wells: PW-2, PW-3, PW-4*, page 39, the Permittee states, "[t]he production wells are on a staggered 3-year sampling schedule, with the exception of PW-3 which is sampled annually since the detection of 2-methylnaphthalene exceeding the applicable standard in 2008." Even if there is no apparent hydraulic connection between the shallow and deep aquifers, pollutants may leach to the deep aquifer through well construction and because well PW-3 is surrounded by the facility infrastructure. Provide all available construction details for PW-3.

Comment 22

In Section 6.4.2, *Observation Wells: OW-1 and OW-10*, page 40, the Permittee states, "[i]n the last quarter of 2015, low concentrations of benzene, toluene, total xylenes, and MTBE were detected in OW-1, and low concentrations of toluene, ethylbenzene, total xylenes and MTBE were detected in OW-10." The detected contaminants in well OW-1 may indicate the leading edge of plume migration. The plume may be further expanding to the west of well OW-1. Although the installation of two shallow wells near well OW-1 and three clustered wells approximately 750 feet south of well OW-1 is proposed in the Permittee's *Work Plan SMW-2 Area Investigation and Boundary Well Installations*, dated October 2016, these proposed wells do not address the extent of the plume west of well OW-1. Propose a work plan to install a monitoring well screened within the Sonsela formation west of well OW-1. It should be noted that MTBE was not detected in the neighboring wells (wells MKTF-43 and MKTF-44), screened in the Chinle-Alluvium interface.

Comment 23

There are multiple issues in Section 6.6, *Constituent Levels for MKTF Wells*, pages 42 and 43:

1. The observation of SPH in MKTF wells must be included in the list of bullet points. Revise the Report accordingly.
2. The Permittee states, "[b]enzene 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-16, and MKTF-17 through MKTF-26." The benzene concentrations also exceeded the standard in the samples collected from wells MKTF-35 through MKTF-39 during the 2015 sampling events according to Table 8.15 (BTEX Analytical Results). Revise the Report for accuracy.
3. The Permittee states, "[t]oluene concentrations exceeded the standard of 0.75 mg/L in the following wells: MKTF-1, MKTF-10, MKTF-11, MKTF-20, and MKTF-23." The toluene concentration also exceeded the standard of 0.75 mg/L in the sample collected from well MKTF-16 during the sampling event in the second quarter of 2015 according to Table 8.15. Revise the Report accordingly.
4. The Permittee states, "[e]thylbenzene concentrations exceeded the standard of 0.7 mg/L in the following wells: MKTF-1, MKTF-10, MKTF-11, MKTF-16, and MKTF-19." The ethylbenzene concentration also exceeded the standard of 0.7 mg/L in the sample collected from well MKTF-36 during the sampling events in the first, second and third quarters of 2015 according to Table 8.15. Revise the Report accordingly.
5. The 2015 analytical data for well MKTF-15 is missing from Table 8.15.1 (General Chemistry Analytical Results). Include the data for well MKTF-15 in the revised Report; alternatively, provide the reason why it is not provided.
6. Although the fluoride concentration in well MKTF-2 (2.5 mg/L) exceeded the applicable standard (1.6 mg/L) in 2015, the value is not highlighted to indicate the exceedance in Table 8.15.1. Similarly, although the chloride concentration in well MKTF-39 (6,400 mg/L) exceeded the applicable standard (250 mg/L) in 2015, the value is not highlighted to indicate the exceedance in Table 8.15.1. Revise the Report to highlight the exceedances.

7. The sulfate concentrations in the samples collected from wells MKTF-29 (650 mg/L), MKTF-40 (890 mg/L) and MKTF-43 (1,700 mg/L) exceeded the standard (600 mg/L) in 2015 according to Table 8.15.1. These exceedances are not included in the list of bullet points. Include the exceedances in the revised Report.
8. Although the chromium concentration in the sample collected from well MKTF-33 (6.2E-03 mg/L) did not exceed the standard (0.05 mg/L) in 2015, the value was highlighted to indicate the exceedance in Table 8.15.2 (Total Metal Analytical Result Summary). Revise the Report as necessary.
9. The Permittee states, "[d]issolved metals concentrations above applicable standards were noted in the following wells (Table 8.15.3): Manganese: all wells except MKTF-30, MKTF-31, MKTF-32, MKTF-34, MKTF-41, and MKTF-44." The manganese concentration did not exceed the standard in well MKTF-28 during 2015 sampling event according to Table 8.15.3 (Dissolved Metals Analytical Result Summary). Revise the Report accordingly.
10. Page 43, the discussion of dissolved uranium and VOCs and SVOCs detections are stated in the same paragraph. Use new bullet points to address the findings regarding VOCs and SVOCs. Also, the discussion of VOCs must be separate from the discussion of SVOCs. Revise the Report accordingly.

Comment 24

In Section 6.6. page 44, a list of SVOCs and VOCs where concentrations exceeded the standards in MKTF wells during the 2015 sampling events is presented. However, there are multiple issues regarding the list:

1. Define the concentration value in parenthesis after each compound name in the revised Report. It is not clear whether the value represents maximum detected concentration or applicable standard value.
2. Provide specific designation(s) for MKTF well(s), where the concentration(s) exceeded the standard(s) in the revised Report. For example, the Permittee's statement "at least one of the MKTF wells…" is not sufficient.
3. Although 3,4-methylphenol is listed as a compound for which the concentration exceeded the standard, the exceedance was not detected in any MKTF well during 2015 according to Table 8.15.4 (Semi-Volatile Organic Compound Analytical Result Summary). Remove the compound from the list in the revised Report.
4. Although phenanthrene is listed as a compound for which the concentration exceeded the standard, the exceedance was not detected in any MKTF well during 2015 according to Table 8.15.4. Remove the compound from the list in the revised Report.
5. Although cis-1,2-DCE was detected above the standard in the samples collected from eleven MKTF wells in 2015 according to Table 8.15.5 (Volatile Organic Compounds Analytical Results), the compound is not listed. Revise the Report to add the compound in the list.
6. Although 1,1,1-trichloroethane was detected above the standard in the samples collected from two MKTF wells in 2015 according to Table 8.15.5, the compound is not listed. Revise the Report to add the compound in the list.

7. 1-methyl naphthalene is listed twice presumably because the compound appears as a target analyte in both VOCs and SVOCs. The discussion of VOCs and SVOCs must be separated in the revised Report. See Comment 23 (10).
8. Vinyl chloride is listed; however, the unit is missing in the parenthesis. Revise the Report to add the appropriate unit within the parenthesis.
9. Trichloroethane is listed with a standard of 0.005 mg/L. Specify whether the compound is 1,1,1-trichloroethane or 1,1,2-trichloroethane in the revised Report. If the compound is 1,1,2-trichloroethane, the value in the parenthesis will match with the standard of 0.005 mg/L. However, 1,1,2-trichloroethane was not detected above the standard in samples collected from any MKTF well in 2015. If the compound is 1,1,1-trichloroethane, the value in the parenthesis will not match, as its standard is 0.06 mg/L. 1,1,1-trichloroethane was detected above the standard in wells MKTF-9 and MKTF-25 during 2015, according to Table 8.15.5.

Comment 25

The chloride and sulfate concentrations in the sample collected from well MKTF-43 were recorded as 17,000 and 1,700 mg/L, respectively, in the August 2015 sampling event according to Table 8.15.1 (General Chemistry Analytical Results). The concentrations are the highest among the samples collected from all MKTF wells. Well MKTF-43 is located on the eastern perimeter of pond EP-9. The chloride and sulfate concentrations in the samples collected from pond EP-9 have been consistently high (exceeding 30,000 and 4,500 mg/L, respectively, in 2015) according to Table 8.16 (BTEX and General Chemistry Analytical Result Summary). The detected chloride and sulfate concentrations in the sample collected from well MKTF-44 were only 110 and 120 mg/L, respectively in the August 2015 sampling event. Well MKTF-44 is located on the western perimeter of pond EP-9. Based upon the data, it appears that the wastewater stored in pond EP-9 is leaking from the eastern perimeter and leaching into groundwater causing the elevated chloride and sulfate concentrations in well MKTF-43. According to the *revised Summary Report - Evaporation Pond Repairs*, dated February 15, 2017, the entire northern and parts of the eastern and western perimeters of pond EP-9 were strengthened and repaired in 2016. The repair may have already addressed the issue; however, during future sampling events, samples must be collected from the influent to pond EP-9 and wells MKTF-43 and MKFT-44 for further analysis of chloride and sulfate to verify whether the leak has been repaired. In addition, there is no monitoring well on the southern perimeter of pond EP-9. Submit a work plan to propose to install a monitoring well at the southern perimeter of pond EP-9 to evaluate for the presence of chloride and sulfate.

Comment 26

Concentrations of trichloroethylene (TCE), vinyl chloride, and EDC were detected in groundwater samples collected from MKTF wells. Since EDC is a lead scavenger, the Permittee must add analysis for EDB in all monitoring wells where EDC has been detected; this change must be incorporated into the next updated Facility-Wide Groundwater Monitoring Work Plan. The Permittee must use an analytical method capable of detecting EDB at concentrations less than 0.004 micrograms per liter (i.e., EPA Method 8011). No revision is required.

Comment 27
Vinyl chloride and cis-1,2-DCE were detected in samples collected from many MKTF wells according to Table 8.15.5 (Volatile Organic Compounds Analytical Results). The accumulation of these compounds may be occurring at the site. Evaluate the groundwater quality parameters pertinent to accumulation or degradation of vinyl chloride (e.g., concentrations of chlorinated compounds, groundwater quality parameters, and anions). Include all previously acquired data and interpretation of the existing data in the revised Report.

Comment 28
There are multiple issues on the tables presenting the analytical results for evaporation ponds EP-1 through 12B:

1. Table 8.16 (BTEX and General Chemistry Analytical Result Summary) presents analytical results of BTEX, MTBE, and anions. The analytical method for anions is not specified in the table. Revise the Report to specify the analytical method used for anions.
2. Both Table 8.16 and 8.16.1 (General Chemistry Analytical Result Summary) present identical analytical results for anions. It is redundant to present same data in two tables. Remove the data from one of the tables in the revised Report.
3. Both Table 8.16 and 8.16.1 include the specific conductance data. The measurement of specific conductance must be presented in a separate table along with other water quality parameters (e.g., dissolved oxygen concentration, redox potential). Include a water quality parameter summary table in the revised Report.
4. Although the arsenic concentration exceeded the standard in pond EP-8 during the September 2015 sampling event, according to Table 8.16.3 (Dissolved Metals Analytical Result Summary), it was not highlighted to indicate the exceedance. Revise the Report to indicate the exceedance.
5. The March 2015 SVOC analytical result for pond EP-12B is missing from Table 8.16.5 (Semi Volatile Organic Compound Analytical Result Summary). Provide the result in the revised Report; alternatively, explain why it is not provided.
6. There is a typographical error on the description of analytical method for pond EP-7 in Table 8.16.5. Revise the Report accordingly.

Comment 29
In Section 6.7.1, *Evaporation Ponds 1 through 12B*, pages 45 and 46, provides a discussion of the analytical results for pond EP-1 through 12B; however, there are multiple inaccuracies and discrepancies:

1. The Permittee states, "[t]he e-coli standard of 500 organisms/100 mL was exceeded in EP-2 (5,475 CFU/100 mL), EP-3 (24,196 CFU/100 mL), EP-4 (5,475 CFU/100mL), EP-5 (1,515 CFU/100mL), EP-12A (12,033 CFU/100mL), and EP-12B (>2,419.6 CFU/100mL) (Table 8.16.1)." The e-coli concentration in the sample collected from pond EP-12B is recorded as 17,329 CFU/100mL during the March 2015 sampling event according to Table 8.16.1 (General Chemistry Analytical Result Summary). Revise the Report accordingly.

2. The Permittee states, "[f]luoride, chloride and sulfate concentrations exceeded the applicable standards in each evaporation pond during 2015 (Table 8.16.2)." The concentrations of anions are presented in Table 8.16 and Table 8.16.1 (rather than Table 8.16.2). Revise the Report to correct the reference.
3. The Permittee states, "[t]otal metals concentrations in pond samples were detected as follows (Table 8.16.3):" Table 8.16.3 presents the summary for dissolved metals analytical results (not total metals analytical results). Revise the Report to correct the reference.
4. The Permittee states, "[d]etectable concentrations of barium and chromium were found in one or more samples, but were below applicable standards with the exception of exceedance of chromium in EP-6 (1.6 mg/L)." The total chromium concentration was detected in all evaporation pond samples and one concentration exceeded the standard (from pond EP-7) according to Table 8.16.2 (Total Metals Analytical Result Summary). The total and dissolved chromium concentrations in the sample collected from pond EP-6 during the 2015 sampling events were below the standard of 0.05 mg/L. Revise the Report accordingly.
5. The Permittee states, "[a] low concentration of mercury (0.0.00032 mg/L) was detected in one EP-1 sample, but the concentration was below the applicable standard." There is a typographical error in the value (0.0.00032 mg/L). Also, the last sampling event for pond EP-1 was conducted in 2014; thus, the finding is not applicable to the discussion of analytical result. Remove the statement from the revised Report.
6. The dissolved chromium concentrations exceeded the standard in the samples collected from ponds EP-7 (0.064 mg/L) and EP-9 (0.064 mg/L) according to Table 8.16.3; however, the exceedances were not noted. Address the exceedances in the revised Report.
7. The Permittee states, "[n]o VOCs were detected in any of the ponds during 2015 with the exception of low concentrations of acetone in EP-3 and EP -12B (Table 8.16.5)." The concentrations of VOCs are presented in Table 8.16.4 not Table 8.16.5. Revise the Report to correct the reference.
8. The Permittee states, "[p]henol concentrations exceeded the standard of 0.005 mg/L in September 2015 for EP-2 (0.22 mg/L)." The phenol concentration also exceeded the standard in the sample collected from pond EP-12B during the September 2015 sampling event. Address the EP-12B exceedance in the revised Report.
9. The Permittee states, "[l]ow concentrations of 3,4-methylphenol were detected in EP-1, EP-2, EP-3, and EP-12B but did not exceed the applicable standard of 0.093 mg/L (Table 8.16.6)." 3,4-methylphenol was also detected in pond EP-4 during the September 2015 sampling event. Address the detection in the revised Report. The last sampling event for pond EP-1 was conducted in 2014; thus, the discussion is not applicable for the 2015 analytical result. Remove the reference to EP-1 from the revised Report. Additionally, the concentrations of SVOCs are presented in Table 8.16.5 rather than Table 8.16.6. Revise the Report accordingly.

Comment 30

The chloride and sulfate concentrations and specific conductance in samples collected from pond EP-11 were one order of magnitude higher than the values from ponds EP-12A and EP-12B in 2015. Conversely, the e-coli concentration in the sample collected from pond EP-11 was two to

three orders of magnitude lower compared to the concentrations in samples collected from ponds EP-12A and EP-12B according to Table 8.16.1. From the data, it appears that the water in evaporation ponds does not flow from pond EP-11 to EP-12A and EP-12B. Provide an explanation for the increased e-coli concentrations in ponds EP-12A and EP-12B. Ensure that raw sewage is not being discharged directly into the evaporation ponds. If there is any new sanitary effluent discharge at the facility beyond the Pilot Travel Center, the Permittee must direct all sanitary effluent to the new WWTP (STP-1). Provide an explanation regarding all flow path(s) in the evaporation ponds and the e-coli concentration in ponds EP-12A and EP-12B in the revised Report.

Comment 31
In Section 6.7.4, *Outfall BW to EP-2*, page 47, the Permittee states, "[t]he BW to EP-2 sample was taken March 23, 2015." The sample was collected once in 2015; however, in *Executive Summary*, page 8, the Permittee states, "[i]t is sampled at its discharge point to the pond on a semi-annual basis for major cations/anions." Revise the Report to address the discrepancy. Also, on page 47, the boxes exhibiting the sampling location and date are blank. Revise the Report to fill in the boxes.

Comment 32
In Section 6.7.4, page 47, the Permittee states, "[B]W is defined as reverse osmosis water coming from the boiler unit." The sulfate concentration in sample collected at the discharge point has consistently exceeded the standard (600 mg/L) since 2010 according to Table 8.17 (General Chemistry and Total Recoverable Metals Analytical Result Summary). Provide an explanation for the elevated sulfate concentration in the revised Report.

Comment 33
There are three issues in Section 6.7.5, *Outfall STP1 to EP-2 Inlet*, page 47:

1. The Permittee states, "[t]he STP1 to EP-2 inlet is sampled on an annual basis". NMED's June 2016 Disapproval Comment 8 for the 2014 Report requires quarterly sampling. The Permittee must collect the sample on a quarterly basis rather than annual basis.
2. The boxes exhibiting the sampling location and date are blank. Revise the Report to add the information.
3. The Permittee states, "[B]OD and COD concentrations exceeded the applicable standards." The COD concentration (80.6 mg/L) was detected below the standard (<125 mg/L) in 2015 according to Table 8.18.1 (BOD/COD Analytical Result Summary). Revise the Report to accordingly.

Comment 34
In Section 6.8, *Additional Sampling and/or Changes*, page 47, the Permittee states, "[r]equired by NMED: sample wells upgradient from the NAPIS wells, OW-1, OW-10, and OW-11 and review analytical results to determine if uranium detections are similar in concentrations in unaffected wells." The Permittee may discontinue the analysis for uranium in groundwater samples. See Comment 3.

Comment 35
In Section 7.1, *Group A*, page 50, the Permittee states, "[n]o detectable concentration levels of BTEX constituents were found in these wells from 2006 through 2014." There is a typographical error (it should be through 2015). Revise the Report for accuracy.

Comment 36
In Section 7.2, *Group B – Groundwater Monitoring*, page 50, the Permittee states, "[b]enzene concentrations from all 2015 sampling events at GWM-1 have exceed[ed] applicable standards. This would indicate the potential for historical releases from the aeration lagoons." The Permittee must further discuss the causes of persistent BTEX and MTBE concentrations in well GMW-1 despite the fact that all discharges to the aeration lagoons ceased in 2013. The contaminant concentrations should exhibit decreasing trends if historical releases are the only cause of the contamination. Provide an explanation of persistent contaminant concentrations in well GMW-1 in the revised Report.

Comment 37
In Section 7.2, page 50, the Permittee states, "[t]here were no significant changes in contaminant detections noticed in the GMW wells." SPH appeared in well GMW-1 for the first time during the last quarter of 2015. The SPH appearance is a significant change from previous observations; revise the statement for accuracy in the revised Report.

Comment 38
In Section 7.2, page 50, the Permittee states, "[d]own gradient of the NAPIS on the west side, NAPIS-2 and KA-3 have had concentrations of benzene and MTBE above the applicable standards." The benzene concentration was below the detection limit in the samples collected from well KA-3 during 2015 according to Table 8.5 (BTEX Analytical Result Summary). Similarly, the MTBE concentration was detected but did not exceed the applicable standard in the samples collected from well KA-3 during 2015 according to Table 8.5. Revise the Report as necessary.

Comment 39
In Section 7.3, *Group C – Groundwater Monitoring*, page 51, the Permittee states, "[a]lthough 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." Well OW-13 is screened in the Sonsela formation. All other Group C wells (OW-14, OW-29, OW-30, OW-50, OW-52, RW-1, RW-2, RW-5, and RW-6) are screened in the Chinle-Alluvium interface. The increasing trend of MTBE concentration in well OW-13 indicates that the plume may be expanding laterally as well as vertically. The Permittee must investigate the expansion of MTBE plume. Propose to submit a work plan to install a monitoring well screened in the Sonsela formation between wells OW-13 and OW-29.

Comment 40

In Section 7.5, *Group E – Groundwater Monitoring*, pages 53 and 54, the Permittee states, "[t]o 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." The well screen intervals of many MKTF wells are submerged below the water table and are not suitable for SPH measurement. The following table (modified from *Section 6 Data Table*) shows the comparison in depths to the top of screened interval and fluid level in MKTF wells during the 2015 gauging events:

Date	Well ID	Depth to the top of well screen (ft - b.g.s.)	Depth to the top of fluid level (ft - b.g.s.)
3/11/2015	MKTF-01	5	3.46
6/9/2015			4.76
8/21/2015			3.84
11/4/2015			3.48
3/11/2015	MKTF-02	7	4.43
6/9/2015			5.1
8/21/2015			4.85
11/4/2015			4.8
3/16/2015	MKTF-04	10	10.58
6/4/2015			11.33
8/18/2015			10.97
11/3/2015			4.56
3/12/2015	MKTF-17	14	12.84
6/8/2015			13.43
8/18/2015			12.01
11/3/2015			12.37
3/17/2015	MKTF-18	17	9.24
6/8/2015			9.18
8/18/2015			9.15
11/3/2015			8.84
3/11/2015	MKTF-28	3	3.79
6/9/2015			2.55
8/20/2015			3.57
11/4/2015			2.89
3/11/2015	MKTF-29	10	-0.75
6/10/2015			-0.1
8/20/2015			-0.49
11/4/2015			-0.39
3/11/2015	MKTF-31	6	5.37

6/10/2015			5.14
8/21/2015			5.48
11/4/2015			5.53
3/12/2015	MKTF-41	22	17.54
6/9/2015			17.24
8/21/2015			17.37
11/5/2015			17.24
3/11/2015	MKTF-43	2	2.42
6/10/2015			0.85
8/21/2015			1.02
11/5/2015			2.34
3/12/2015	MKTF-44	38	35.9
6/10/2015			27.01
8/17/2015			28.69
11/9/2015			30.78

The highlighted values (both yellow and red) indicate that the fluid levels are higher than the level of screened intervals; thus, the well screens in these wells are submerged. Among the wells having submerged screens, wells MKTF-01, 02, 04, 17, 18 and 28 are located near the SPH plume and critical for more accurate SPH plume delineation. These wells must be replaced with wells with appropriate screened intervals. Propose to submit a work plan to abandon these wells and replace them with wells with appropriate screened intervals. In addition, well MKTF-29 has a fluid level above the ground surface elevation (see red highlighted values). Well MKTF-29 is located adjacent to the wastewater pipeline to the tanks T-27, 28 and 35. The elevated water level may be associated with a leak from the pipeline. Other possibilities include survey error and overflow from the sanitary lagoon located 100 feet southeast of well MKTF-29. Provide a discussion of the elevated water level in well MKTF-29 in the revised Report.

Comment 41

Figures 11.1, 11.2 and 11.3, *Groundwater Elevation vs. Time – 2015*, include the charts for the groundwater elevations in MKTF wells. It appears identical figures titled as Figures 11A, 11B and 11C are included subsequent to Figures 11.1,11.2 and 11.3. Delete the redundant figures (Figures 11A, 11B and 11C) from the revised Report. In addition, revise the charts to include the ground surface and SPH elevations.

Comment 42

There are multiple issues in Appendix B, Field Inspection Logs:

1. The field log for MKTF wells is presented as a table form in Appendix B, but does not include any water quality parameters (e.g., pH, temperature, conductivity). The table must be revised to include all water quality parameters. If water quality parameters have

not been collected previously from MKTF wells, collect measurements of pH, conductivity, temperature, dissolved oxygen and ORP during all future sampling events.

2. Water quality parameters must be recorded for every well where a groundwater sample is collected. Provide an explanation for the circumstances where data collection is not feasible.
3. All water quality parameters must be tabulated and presented in an organized manner. The final (stabilized) readings must be recorded in the table. Include the table in the revised Report.
4. The unit of dissolved oxygen concentration presented in the Field Inspection Logs is shown as a percent (%). Clarify whether the reported concentration represents the percent of the solubility limit at a given temperature. It is conventional to report the concentration with a unit in milligrams per liter (mg/L). Convert the unit of dissolved oxygen concentration from percent (%) to mg/L in the revised Report.
5. Some field inspection logs presented water quality readings although these wells were listed as dry (e.g., BW-3A 3rd Quarter). The others were left blank for water quality readings although the presence of water was indicated in the well (e.g., water appearance - clear, no odor detected in well BW-3C during the 3rd Quarter 2015). Ensure that the descriptions on the logs are accurate; revise the Report to correct all errors and omissions.
6. The dissolved oxygen readings fluctuate significantly. For example, initial readings decreased from 15.3 to 8.4%; then, the final reading suddenly increased to 40.3% in well OW-30 during the first quarter of 2015. The field techniques utilized during the measurement must be consistent. In addition, ensure the instrument is properly calibrated prior to use.

Comment 43

In Appendix E, Summary of *All Leaks, Spills and Releases*, the Permittee states, "[t]he wastewater believed to contain < .5 ppm benzene was vacuumed up with vacuum truck and placed back into the WW treatment system." Include a laboratory analytical report for the wastewater as an attachment to the Form C-141 in the revised Report.

The Permittee must address all comments in this Disapproval and submit a revised Report. Two hard copies and an electronic version must be submitted to NMED. Include a red-line strikeout version in electronic format showing where all revisions to the Report have been made. The revised Report must be accompanied with a response letter that details where revisions have been made, cross-referencing NMED's numbered comments. The revised Report must be submitted to NMED no later than **September 30, 2018**. In addition, submit a work plan to address Comments 18.2, 18.3, 18.4, 20, 22, 25, 39 and 40 and a letter report to address Comment 12 for NMED review no later than **October 30, 2018**.

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

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau
New Mexico Environment Department

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-17-007

Chavez, Carl J, EMNRD

From: VanHorn, Kristen, NMENV
Sent: Monday, August 22, 2016 8:20 AM
To: Riege, Ed
Cc: Hains, Allen (Allen.Hains@wnr.com); Johnson, Cheryl (Cheryl.Johnson@wnr.com); Chavez, Carl J, EMNRD; Cobrain, Dave, NMENV; Dhawan, Neelam, NMENV; king.laurie@epa.gov
Subject: Approval with Modifications 2015 Facility Wide Groundwater Monitoring Work Plan
Attachments: ApprovalwMods_2015_FWGWM_WP_August2016.pdf

Please see the attached correspondence.

If you have any questions, please contact me.

Thank you,
Kristen

Kristen Van Horn
NMED Hazardous Waste Bureau
2905 Rodeo Park Drive East
Building 1
Santa Fe, NM 87505
Phone: 505-476-6046
Email: *Kristen.VanHorn@state.nm.us*

NEW MEXICO
ENVIRONMENT DEPARTMENT

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Phone (505) 476-6000 Fax (505) 476-6030
www.env.nm.gov

SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

BUTCH TONGATE
Acting Cabinet Secretary
J. C. BORREGO
Acting Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

August 22, 2016

Mr. Ed Riege
Remediation Manager
Western Refining Southwest Inc., Gallup Refinery
92 Giant Crossing Road
Gallup, New Mexico 87301

RE: APPROVAL WITH MODIFICATIONS
FACILITY-WIDE GROUND WATER MONITORING
WORK PLAN – 2014 UPDATES FOR 2015
WESTERN REFINING SOUTHWEST INC., GALLUP REFINERY
EPA ID # NMD000333211
HWB-WRG-15-001

Dear Mr. Riege:

The New Mexico Environment Department (NMED) has reviewed the revised *Facility-Wide Ground Water Monitoring Work Plan – 2014 Updates for 2015*, dated September 21, 2015 submitted on behalf of Western Refining Southwest Inc., Gallup Refinery (Permittee). The Permittee addressed the issues cited in NMED's March 11, 2016 Rejection and hereby issues this Approval with the following modifications.

Comment 1

A red-line strikeout version of the revised Report was not included with the submittal; however, the Permittee emailed the red-line strikeout when NMED requested it. A red-line strikeout aids in review of revised documents, because it allows the reviewer to quickly review changes rather than review the entire document again. The red-line strikeout version must show where all changes have been made to the submittal including text, tables, and figures. For future submittals, please ensure that all of the components of the documents are included.

Comment 2
Comments regarding Table 1 (Gallup Refinery Groundwater Monitoring Schedule:

a) Remove the requirement discussed in Comment 10e since neither the Permittee or NMED can resolve where the requirement originated and revise Table 1 in all future submittals;

b) Table 1 indicates that the water quality parameters are not currently collected at the MKTF wells. Collection of water quality parameters is beneficial to monitor both cleanup and natural attenuation of contaminants. The Permittee must add the collection of water quality parameters to the requirements for the MKTF wells. Revise the table in future submittals to reflect this change; and

c) NMED Comment 7e stated that "[t]he Permittee requests that groundwater monitoring well SMW-2 sample analyses be reduced to VOCs and WQCC metals. SMW-2 is part of the "sentinel well" system around the closed RCRA Land Treatment Unit. Therefore, the Permittee must continue to sample, as required, at SMW-2 for major cations, anions, VOCs, GRO/DRO-extended, WQCC metals, and cyanide." NMED inadvertently left off SVOCs which have been required in the past. Revise Table 1 to include the requirement to analyze for SVOCs.

Comment 3
The Permittee added a note to the table in Appendix C-1 (Well Data 2014 Annual/Quarterly Sampling DTB/DTW Measurements) to explain the "0.00" water depth readings for OW-1. The note reads, "if 0.00 is indicated – means water is at top of casing (full)" it would be useful to also add that the well is under artesian conditions. In future submittals that include this table, edit the note to read that the well is under artesian conditions.

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: D. Cobrain NMED HWB
N. Dhawan NMED HWB
K. Van Horn NMED HWB
C. Chavez OCD
A. Hains WRG
C. Johnson WRG
L. King EPA Region 6

File: Reading File and WRG 2016 File
HWB-WRG-15-001

Facility Wide Ground Water Monitoring Work Plan – 2014 Updates for 2015

Western Refining Company
Gallup Refinery
92 Giant Crossing Road
Gallup, New Mexico 87301
505-722-3833

Submitted: February 23, 2015

REVISED: September 21, 2015

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.

William Carl McClain — February 23, 2015

William C. McClain, Jr.
Refinery Manager

Date

Prepared by:

Cheryl Johnson
Environmental Specialist

Reviewed by:

Ed Riege, M.P.H.
Environmental Manager

Executive Summary

Western Refining conducts quarterly, semi-annual and annual ground water monitoring at its Gallup facility on a site wide basis. The Ground Water Monitoring Work Plan (Plan) documents any additions or revisions in ground water monitoring and also details the sampling procedures used.

This Plan divides the facility into five monitoring groups. Group A consists of the boundary wells situated along the northwest corner of the refinery property and monitoring wells around the land treatment area (LTU). Group B consists of a cluster of wells at the aeration basin and two new wells added at the sanitary treatment pond 1 (STP-1) near the Waste Water Treatment Unit. Group C consists of the observation wells on the northeast section of the refinery and also included in this group are four product recovery wells. Group D includes the process/production wells and the four observation wells located on the south-southwest section of the property.

To date a total of 45 new monitoring wells have been installed to aid in delineating the extent of a hydrocarbon seep discovered in 2013 directly west of T-101, which includes the discovery of a pre-existing well located directly west of the truck loading rack. No visible markings or drill logs were available to identify this well. Western has labeled this well as MKTF-45 as this well is located in the vicinity of the ongoing seep investigation. These monitoring wells have been added as Group E. Not included in the grouping are sampling requirements for the evaporation ponds and effluent from the new sanitary treatment pond (STP-1). Designated wells and sample points in these areas are monitored on a quarterly, semi-annual and annual basis following the procedures presented in this Plan.

Gallup Refinery will periodically review facility-wide monitoring data, and assess the monitoring program presented in this Plan. Revisions to the Plan, as necessary, will then be presented annually for agency review and approval. These revisions may include, but not be limited to, a reduction or change in monitoring locations, monitoring frequency, and/or target chemicals to be analyzed.

Gallup follows the most current approved sampling/monitoring schedule from NMED; "Approval With Modifications Annual Ground Water Monitoring Report, Gallup Refinery 2010, Revision 1", dated December 12, 2012" and per concurrence in Comment 6 of NMED correspondence dated September 24, 2012, "Disapproval, Facility Wide Ground Water Monitoring Work Plan, 2011 Updates, to change monitoring frequency from quarterly to annual for wells OW-50 and OW-52.

We have created a monitoring work plan with quality assurance practices and controls as well as standard procedures for sampling, and a schedule of activities to monitor ground water at select locations of the Gallup Refinery. The persons responsible for the implementation and oversight of this plan are:

Refinery Manager
- William C. McClain, Jr.

Environmental Manager
- Ed Riege

Environmental Specialist
- Cheryl Johnson

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List of Acronyms

AL	Aeration Lagoon
API	American Petroleum Institute
BMP	Best Management Practices
BS	Blank Spike
BSD	Blank Spike Duplicate
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CFR	Code of Federal Regulations
DQO	Data Quality Objective
DRO	Diesel Range Organics
DTB	Depth to Bottom
DTW	Depth to Water
EP	Evaporation Pond
EPA	Environmental Protection Agency
FT.	Foot
FWGWMP	Facility Wide Ground Water Monitoring Plan
GPM	Gallons per minute
GRO	Gasoline Range Organics
HNO3	Nitric Acid
HWB	Hazardous Waste Bureau
IDW	Investigation Derived Waste
LDU	Leak Detection Unit
LTU	Land Treatment Unit
ML	Milliliter
MCL	Maximum Contaminant Level
MS	Matrix Spike
MSD	Matrix Spike Duplicate
MTBE	Methyl Tert Butyl Ether
NAIC	North American Industry Classification System

List of Acronyms – Continued

NAPIS	New American Petroleum Institute Separator
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NOI	Notice of Intent
OAPIS	Old American Petroleum Institute Separator
OB	Observation Well
OCD	Oil Conservation Division
PPE	Personal Protective Equipment
PPM	Parts per million
PSTB	Petroleum Storage Tank Bureau
PVC	Polyvinyl Chloride
PW	Process Well
QA	Quality Assurance
QC	Quality Control
RW	Recovery Well
RCRA	Resource Conservation and Recovery Act
SIC	Standard Industrial Classification
SOP	Standard Operating Procedure
SPH	Separate Phase Hydrocarbon
STP	Sanitary Treatment Pond
SVOC	Semi-volatile Organic Compound
SWMU	Solid Waste Management Unit
SWPP	Storm Water Pollution Prevention Program
TOC	Total Organic Content
VOC	Volatile Organic Compound
WQCC	Water Quality Control Commission
WWTP	Waste water treatment plant

1.0 Introduction

This Facility-Wide Ground Water Monitoring Work Plan (Plan) has been prepared for the implementation of a ground water monitoring program at the Gallup Refinery owned by Western Refining ("Gallup Refinery" or "Facility").

1.1 Scope of Activities

This Plan has been prepared to collect data that will be used to characterize the nature and extent of potential impacts to ground water at the Gallup Refinery. The monitoring plan is also designed to make the facility quickly aware of any levels of contaminants that exceed compliance standards.

This Plan divides the facility into five groups for periodic monitoring:

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

Group A consists of the boundary wells situated along the northwest corner of the refinery property and the monitoring wells around the LTU. Group B consists of a cluster of monitoring wells and leak detection units for the NAPIS at the aeration basin and at the new sanitary treatment pond. Group C includes the observation wells located on the northeast section of the plant and includes recovery wells from which small quantities of free product has been continually removed. Group D includes the process/production wells and four observation wells located on the south, southwest section of the refinery property. Group E includes a total of 45 new monitoring wells installed to delineate a hydrocarbon seep discovered west of Tank 101. Also included in this group is a pre-existing well located directly west of the truck loading rack. This well has been labeled as MKTF-45 as no markings or boring logs have been located to identify when this well was installed.

This plan also includes sampling requirements for the evaporation ponds and for the effluent from the sanitary treatment pond. Designated wells and sample points identified will be monitored on a quarterly, semi-annual and annual basis following the procedures presented in this Plan.

Gallup Refinery will periodically review facility-wide monitoring data, and assess the monitoring program presented in this Plan. Annual revisions to the Plan will be presented for agency review and approval. These revisions may include, but not be limited to, a reduction or change in monitoring locations, monitoring frequency, and/or target chemicals to be analyzed.

1.2 Facility Ownership and Operation

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

The owner is:

Western Refining (Parent Corporation)
123 W. Mills Avenue
El Paso, TX 79901

Operator: Western Refining Southwest Inc (Postal Address)
92 Giant Crossing Road
Gallup, New Mexico 87301

Western Refining Southwest Inc (physical address)
I-40, Exit 39 (17 Miles East of Gallup, NM)
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
- OCD Discharge Case Number AP-111.

The facility status is corrective action/compliance. Quarterly, semi-annual and annual ground water sampling is conducted at the facility to evaluate present contamination.

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.

2.0 Background Information

2.1 Historical and Current Site Use

Built in the 1950's, the Gallup Refinery is located within a rural and sparsely populated section of McKinley County in Jamestown, New Mexico, 17 miles east of Gallup, New Mexico. The setting is a high desert plain on the western slope of the Continental Divide. The nearest population centers are the Pilot (formerly Giant) Travel Center 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). 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 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 stock via a 4-inch diameter pipeline that comes in from the west along the Interstate 40 corridor from the Wingate Refining Wingate Facility (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 Gallup Refinery is a crude oil refining and petroleum products manufacturing facility. The Standard Industrial Classification (SIC) code is 2911 and the North American Industry Classification Code (NAIC) is 32411. There are no organic chemicals, plastics, or synthetic fibers manufactured that contribute to our process flow of waste water. We do not manufacture lubricating oils.

The refinery incorporates various processing units that convert 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 these feed stocks with hydrogen to make diesel fuel.

- Isomerization Unit - converts low octane hydrocarbon molecules into high octane molecules.

- Treater Unit - remove impurities from various intermediate and blending feed stocks to produce finished products that comply with sales specifications.

- Ammonium Thiosulfate Unit - accepts high H2S and ammonia containing gas streams from the Amine and the Sour Water Stripper units, and converts these into a useful fertilizer product, ammonium thiosulfate.

- Sulfur Recovery Unit - converts and recovers various sulfur compounds from the gases and liquids produced in other processing units to create a solid elemental sulfur byproduct.

As a result of these processing steps, the refinery produces a wide range of petroleum products including propane, butane, unleaded gasoline, diesel, and residual fuel. In addition to the afore-mentioned 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 and are all located above ground. Capacity of these tanks range in size 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 racks are used at the refinery to load out finished products and also receive crude oil, other feed stocks, additives, and chemicals.

Gasoline is delivered to the Pilot Travel Center via tanker truck. An underground diesel pipeline exits between the refinery and the Pilot Travel Center. As a result of an off-refinery release, the pipeline was purged of product, filled with nitrogen and temporarily placed out of service. Gallup Refinery worked with the New Mexico Environment Department (NMED) Petroleum Storage Tank Bureau (PSTB) and the New Mexico Oil Conservation Division (NMED-OCD) to place this line back in service. In 2013 the underground diesel line from Gallup Refinery to the Pilot 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 Pilot Travel Center. The diesel line was commissioned and put back in service on February 3, 2014.

A firefighting training facility is used to conduct employee firefighting training. Waste water from the facility, when training is conducted, is pumped into a tank which is then pumped out by a vacuum truck. The vacuum truck pumps the oily water into a process sewer leading to the New API Separator (NAPIS).

The process waste water system is a network of curbing, paving, catch basins, and underground piping used to collect waste water from various processing areas within the refinery. The waste water effluent then flows into the equalization tanks and the NAPIS where the oil is separated from water based on the principle that, given a quiet surface, oil will float to the water surface where it can be skimmed off. The skimmed slop is passed to a collection chamber where it is pumped back into the refinery process. The clarified water is routed to the new waste water treatment plant (WWTP) where benzene is removed and the treated water flows into the new pond STP-1. STP-1 consists of two bays, north and south and each bay is equipped with five aerators per bay. Effluent from STP-1 then flows into Evaporation Pond 2 and gravitated to the rest of the ponds.

During episodes of unit upsets or major storm events, the waste water is held in one of the three equalization tanks, T-35, T-27 and T-28 which are used to handle large process and storm water

flows allowing the flow to the NAPIS to be controlled. These tanks are also used to store waste water if problems are encountered with the downstream equipment, i.e., NAPIS and the WWTP.

The new WWTP was completed and put online in May of 2012 which resulted in the intermittent use of the benzene strippers during this period. In November of 2012, the benzene strippers were taken off line permanently and by January 2013, the benzene strippers were permanently dismantled and removed.

The storm water system is a network of valves, gates, berms, embankments, culverts, trenches, ditches, natural arroyos, and retention ponds that collect, convey, control, and release storm water that falls within or passes through refinery property. Storm water that falls within the processing areas is considered equivalent to process waste water and is sent to tanks T-35, T-27 and T-28 when needed before it reaches the NAPIS, WWTP, STP-1 and into Evaporation Pond 2 where flow is gravitated to the rest of the ponds. Storm water discharge from the refinery is very infrequent due to the arid desert-like nature of the surrounding geographical area.

At the evaporation ponds, waste water is converted into vapor via solar and mechanical wind-effect evaporation via two 80 gallons per minute electrically driven evaporation pond spraying snow machines located between ponds 4 and 5. Two additional 66 gallons per minute evaporation pond sprayers were installed in October 2014 between ponds 3 and 4 for a total of four evaporators. No waste water is discharged from the refinery to surface waters of the state.

The Gallup Refinery currently operates under the Multi-Sector Permit 2008 (MSGP-2008). Gallup Refinery submitted a new Notice of Intent (NOI) for coverage under the new MSGP. The refinery maintains a Storm Water Pollution Prevention Plan (SWPPP) that includes Best Management Practices (BMPs) for effective storm water pollution prevention. The refinery has constructed several new 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.

2.2 Potential Receptors

Potential receptors at the facility also include those that may arise from future land uses. Currently, these include on-site workers, nearby residents, wildlife, and livestock.[1] The major route to exposure of humans would be from contaminants reaching a drinking water well. Other routes could be from showering, cooking, etc. with contaminated ground water, raising crops and vegetables with contaminated ground water, or getting exposed to or fishing in surface water that has commingled with shallow ground water. Exposure can also occur through contact with soils and/or plants that have become contaminated themselves through contact with contaminated ground water. However, drinking water wells remain the primary route of possible exposure.

At this time, the nearest drinking water wells are located on-site at the southwest areas of the facility, at depths of approximately 3000 feet which are identified as process or production (PW) wells. These wells are designated as PW-2, PW-3 and PW-4 (See Figure 4 for location). These wells are operated by the facility to provide the refinery's process water, drinking water to nearby refinery-owned houses, to the refinery itself, and to the Pilot Travel Center. PW-2 and PW-4 are sampled every three years and PW-3 is on an annual sampling schedule which began in 2009 due to the detection of 2-methylnaphthalene and phenol during the 2007 annual sampling event conducted in January 2008. Annual sampling results from 2009 through 2014 have indicated no detection levels of volatile organic compounds (VOCs) or semi-volatile organic compounds (SVOCs). PW-3 sampling continues on an annual basis and Western has requested that this well be placed back on a 3 year schedule in Section 6.1(I).

Other than the on-site wells, there is no known drinking water wells located within a 4-mile radius of the site. The nearest drinking water wells that could be used by off-site residents are located to the northwest of the site at a distance slightly greater than 4-miles located within the Navajo community of Iyanbito (shown on the USGS Topographical Map - Gallup Quadrangle (Revised 1980)). These wells are northwest of the South Fork of the Puerco River which heads towards the

[1] Note: There is extensive and regular patrolling by security personnel of the facility which operates 24-hours – therefore, we can discount the possibility of an inadvertent or deliberate intruder becoming exposed to contamination in groundwater that has reached the surface in some form.

southwest from immediately north of the facility. As the shallowest ground water will generally flow in the direction of surface water flow, any possible shallow ground water contamination that left the facility either now or in the future would flow towards the southwest after leaving the facility and away from the community of Iyanbito. The Cibola National Forest lies in the south-east direction and there are no wells or residents in this protected area. Boundary monitoring wells along the southwest to northwest perimeter of the facility have not shown any evidence of contaminants except for low concentrations of bis(2-ethylhexyl)phthalate detected in the following wells: BW-3B in 2009, BW-3C in 2011 and BW-1C in 2013. The contaminant detected is suspected to be a laboratory contaminant or possibly from the PVC pipe materials used as casing for these wells. No detection of bis(2-ethylhexyl)phthalate was detected in any of the boundary wells in 2014.

Artesian conditions at some locations of the site lead to the possibility of ground water emerging onto the surface and thus being able to affect wildlife. No surface water on the site is used for human consumption or primary contact, such as immersion, or secondary contact, such as recreation. The man-made ponds on the site are routinely monitored and are a part of this Plan. Therefore, if they are in contact with shallow ground water that has exhibited elevated levels of contaminants, the Plan will detect any commingling of ground water and surface waters.

Fluctuating ground water elevations can smear contaminants into subsurface soil and rocks, and there is a possibility that plant roots could reach such contaminated soils and bio-concentrate contaminants creating another route of exposure to potential receptors, such as birds and animals that eat the plants. No food crops are currently grown on the site.

2.3 Type and characteristics of the waste and contaminants and any known and possible sources

The types of waste likely include – volatile and semi-volatile organic compounds, primarily hydrocarbons, but could include various other industrial chemicals such as solvents; acids; spent caustic solutions; and heavy metals present in spent chemicals and waste water. These wastes could be in the form of waste water, spent chemicals destined for off-site shipping and disposal packed in drums, sludge, and dry solids. Dry wastes could stem from wind-blown metallic powders

used as catalysts, and regular municipal solid wastes stored in covered containers destined for municipal landfills.

Most of the wastes and contaminants that could possibly reach ground water have the characteristic that they would biodegrade and naturally attenuate. However, any heavy metals present in dirt and sludge could possibly leach into ground water and would not attenuate. There is a possibility also that certain long-lived chemicals would not biodegrade, or, if they did, it would be at a very slow pace. Possible sources include leaks from buried pipes, tanks, surface spills, and historical dumping of wastes in remote areas of the site.

All above-ground large tanks have leak detection or equivalent systems, such as radar gauges. Pumps that could leak hydrocarbons are within containment areas, and all tanks are located inside earthen bermed areas to contain spills. The NAPIS has double walls and a leak detection system installed.

Similarly, surface impoundments can serve as a source of possible ground water contamination. In the past, waste water from the railroad loading rack flowed to a settling and separation lagoon south of the rack and flow exited at the north end where water leaving the lagoon was distributed across a flat open site known as the fan-out area. The free flow of liquids led to subsurface soil contamination. This area has been identified as SWMU No. 8 and has recently been cleaned up for a corrective action complete with controls status. Disposal of waste water into open fields is not practiced at the Gallup Refinery.

There are fourteen Solid Waste Management Units (SWMU) identified at the Gallup Refinery, and one closed land treatment Area. On December 31, 2013, the RCRA Post Closure Care Permit became effective under §20.4.1.901A(10) NMAC which identified an additional 20 Areas of Concern (AOCs) requiring corrective action and are listed below.

RCRA (Resource Conservation and Recovery Act) Regulated Units

- Land Treatment Unit (LTU)

SWMUs (Solid Waste Management Units)

- SWMU 1 – Aeration Basin
- SWMU 2 – Evaporation Ponds
- SWMU 3 – Empty Container Storage Area
- SWMU 4 – Old Burn Pit
- SWMU 5 – Landfill Areas
- SWMU 6 – Tank Farm
- SWMU 7 – Fire Training Area
- SWMU 8 – Railroad Rack Lagoon
- SWMU 9 – Drainage Ditch and the Inactive Land farm
- SWMU 10 – Sludge Pits
- SWMU 11 – Secondary Oil Skimmer
- SWMU 12 – Contact Wastewater Collection System
- SWMU 13 – Drainage Ditch between North and South Evaporation Ponds
- SWMU 14 – API Separator

AOCs (Areas of Concern)

- AOC 15 – New API Separator
- AOC 16 – New API Separator Overflow Tanks
- AOC 17 – Railroad Loading/Unloading Facility
- AOC 18 – Asphalt Tank Farm (tanks 701-709, 713, 714)
- AOC 19 – East Fuel Oil Loading Rack
- AOC 20 – Crude Slop and Ethanol Unloading Facility
- AOC 21 – Main Loading Racks
- AOC 22 – Loading Rack Additive Tank Farm
- AOC 23 – Retail Fuel Tank Farm (tanks 1-7, 912, 913, 1001, 1002)
- AOC 24 – Crude Oil Tank Farm (tanks 101 and 102)
- AOC 25 – Tank 573 (Kerosene Tank)
- AOC 26 – Process Units
- AOC 27 – Boiler and Cooling Unit Area
- AOC 28 – Warehouse and Maintenance Shop Area
- AOC 29 – Equipment Yard and Drum Storage Area
- AOC 30 – Laboratory
- AOC 31 – Tanks 27 and 28
- AOC 32 – Flare and Ancillary Tanks (tanks Z85V2, Z85V3, Z84-T105)
- AOC 33 – Storm Water Collection System
- AOC 34 – Scrap Yard
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Existing ground water monitoring wells effectively surround all of the above listed SWMUs and AOCs.

2.4 Summary of contaminant releases that could contribute to possible ground water contamination.

Spills and leaks are known to have occurred on the site in various locations. Although most hydrocarbons are rapidly picked up for recovery and contaminated soil is removed, some of the liquids present in a spill enter the subsurface. With precipitation, there is a possibility that some of the contaminants could leach and reach ground water.

Separate Phase Hydrocarbons (SPH) floating on shallow ground water has been found at the northeast end of the facility. A series of recovery wells were installed and SPH has been pumped out for several years. Recovery through hand-bailing continues on a quarterly basis indicating that the volume of SPH has continued to drop substantially from year to year in several of these recovery wells. In 2014, only Recovery Well (RW-1) had measureable levels of hydrocarbons. Trace levels of benzene have also been found in the wells in this area possibly linked to past spills. Recovery wells are listed as follows:

RECOVERY WELLS			
RW-1	RW-2	RW-5	RW-6

Years ago a small tank that held Methyl Tert Butyl Ether (MTBE) leaked and created a plume of MTBE in the shallow ground water at the northeast end of the refinery. This tank is no longer in service and was removed. MTBE has not been used at the refinery since April 2006. Several monitoring wells were installed at various depths to monitor SPH and MTBE contaminant plumes from historical contamination. These observation wells (OW) are located downstream on the northeast section of the plant and are designated as follows.

OBSERVATION WELLS					
OW-13	OW-14	OW-29	OW-30	OW-50	OW-52

A unit at the southwest end of the facility that is used to recover and recycle oil back into the process has also – through leakage and spills – caused some MTBE and hydrocarbon contamination in shallow ground water. This unit is known as the NAPIS and was put into service in October 2004. The NAPIS has one up-gradient well NAPIS-1, located on the east side and three down-gradient shallow monitoring wells, NAPIS-2, NAPIS-3 and KA-3 which are located along the west side. The NAPIS unit is also equipped with three leak detection units on the east and west bays and also at the oil sump section on the east bay.

The Aeration Basin, which is designated as SWMU No. 1 in the facility's RCRA Post-Closure Care Permit includes three cells, known as AL-1, AL-2 and holding pond 1 which is currently referred to as EP-1, although it is not an evaporation pond and is not part of the area covered by SWMU No. 2 – Evaporation Ponds. With the start up of the new Waste Water Treatment Plant in 2013, all waste water flow has been diverted to the WWTP and the lagoons and pond 1 are no longer receiving any waste water. Western has experienced intermittent discharges of oil and oily water into the lagoons and spills to ground surface while this was in operation. Most of these occurrences were the result of unit upsets and or large storm events affecting the old API Separator.

Two ground water monitoring wells (GWM-1, GWM-2)were installed immediately down gradient of the aeration lagoons in 2004 and 2005 in order to detect potential leakage from the aeration basin. GWM-3 was also installed in 2005 on the northwest corner of pond 1 (EP-1).

Analysis of ground water samples collected at GWM-1 and GWM-2 have indicated several organic constituents at concentrations above the screening levels in ground water which would indicate a potential for historical releases from the lagoons. GWM-2 and 3 upon installation in 2005 were found to be dry. Water was first detected in GWM-2 in the first quarter of 2008 and in GWM-3 in the third quarter of 2010. 24-hour notification of the finding was given to NMED and OCD respectively. Analysis of ground water samples collected from GWM-2 and GWM-3 have detected the presence of several constituents at concentration levels above applicable water quality standards such as fluoride, chloride, nitrates, and sulfates. No VOCs have been detected in GWM-2 or GWM-3.

Quarterly inspections in 2011 and 2012 continued to indicate an increase in measurable water levels in GWM-2 and GWM-3; however water levels began to decrease in late 2012. Continued quarterly inspections indicated no water level in GWM-2 and GWM-3 in 2013 and 2014. A request was made to NMED in the 2012 Updates to change analytical requirements from 8021B to 8260B + MTBE for a more detailed list of volatile organic compounds and currently awaiting approval for this change.

Both GWM-2 and GWM-3 have been included in the Aeration Basin Corrective Action Work Plan which began investigative soil and water sampling near the aeration basin in the third quarter of 2012 to support selection of a remedy for SWMU NO. 1 and determine the source of water detected in GWM-2 and GWM-3. Figure 4 shows the location of all of the active monitoring wells on the facility.

In February of 2012, Western submitted a "Revised Investigation Work Plan Solid Waste Management Unit (SWMU) No. 1 Aeration Basin to include sampling of soils and ground water surrounding the Aeration Basin to determine if there has been a release to the environment and to delineate any such release. In addition, information was collected to help determine the source of ground water that had been observed in monitoring wells GWM-2 and GWM-3. The work plan also included SWMU No. 14 Old API Separator soil and ground water sampling. A new well OAPIS-1 (SWMU 14-2) was installed on the northwest corner where the benzene strippers were located on July 17, 2012 by Enviro-Drill Inc. OAPIS-1 (SWMU 14-2) has been added to the 2014 Monitoring Schedule to be sampled on a quarterly basis.

In February of 2013, the influent to the aeration lagoons was routed to the new Waste Water Treatment Plant (WWTP). The aeration lagoons and pond 1 (EP-1), are no longer in service and are being investigated as described above. Pilot sanitary effluent was also routed to the WWTP in June of 2013.

In June of 2013 during a routine inspection a hydrocarbon seep was discovered in an isolated area approximately 100 yards west of Tank 101/102. A series of excavations were completed in the area of the seep including installation of six (6) temporary sumps for weekly hydrocarbon recovery. Through 2014 a total of 362,987 gallons of liquid (hydrocarbon and ground water) have been recovered from the site. There were a total of five (5) hand auger and 22 soil borings with temporary well completions completed at the start of the site investigation. An additional 25 permanent, flush mount and/or stick up monitoring wells have been installed with an addition of one pre-existing well which has been labeled as MKTF-45 and located in the vicinity of the site investigation. Western continues to further characterize potential source areas, recovery of liquids from the temporary sumps, and continued sampling of the monitoring wells for characterization and delineation purposes. A copy of the Well Installation boring logs are included in this report in Appendix E as well as the professional engineer's survey report included in Appendix F. An additional 27 wells will be added to the 2014 Ground Water Monitoring Schedule (see Appendix D).

3.0 Site Conditions

The Gallup Refinery is located within a rural and sparsely populated section of McKinley County. It is situated in the high desert plain on the western flank of the Continental Divide approximately 17 miles east of Gallup. The surrounding land is comprised primarily of public lands and is used for cattle and sheep grazing at low densities[2].

3.1 Current site topography and location of natural and manmade structures

Local topography consists of a gradually inclined 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.

3.2 Drainages

Surface water in this region consists of the man-made evaporation ponds and aeration basins located within the refinery, a livestock watering pond (Jon Myer's Pond) located 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 contain water only during, and immediately after, the occurrence of precipitation.

There are several stormwater conveyance ditches located throughout the refinery which are directed to discharge into contained basins where it is collected and recycled for use as process water, collected and allowed to evaporate, divert around regulated industrial activity or into two designated outfalls located on the east and west section of the property, identified as Outfall 1 and Outfall 2. Outfall 1 is located directly south of evaporation pond 8 on the western edge of the

[2] See, for example, the web site of McKinley County at http://www.co.mckinley.nm.us/

refinery's property boundary and equipped with four separate small diameter overflow pipelines, each with a manual flow valve for independent control. Outfall 2 is located north of the rail road loading rack on the eastern section of the facility. This outfall consists of a concrete barrier, valved to control discharges from a deep ditch that collects/ponds the runoff from the rail rack loading area.

Directly west of the crude tank area, there is also a concrete barrier, valved to control discharges from a culvert that carries stormwater flow from the truck loading rack area. This concrete barrier is located downstream of the "hydrocarbon seep area". The flow from this concrete barrier continues in a north-northwest direction alongside the sourthern bermed areas of the evaporation ponds 3, 4, 5 and 6 and outward towards the Outfall 1 area. At the new waste water treatment plant, there are three storm drains located on the south, southwest and west side of the waste water treatment plant. The DGF Feed Tank release entered the storm drain located on the southwest side of the plant which flowed downstream in a north-northwest direction between the aeration lagoons and STP-1. The flow exited from the underground culvert onto the ground at the northeast corner of Pond 2 into a conveyance ditch along the northern edge of pond 2 into a holding pond equipped with manual flow valves, located north of Pond 3. The discharge from this holding pond then flows north-northwest towards the Outfall 1 area.

3.3 Vegetation types

Surface vegetation consists of native xerophytic vegetation including grasses, shrubs, mall junipers, and some prickly pear cacti. Average rainfall at the refinery is less than 7 inches per year, although it can vary to slightly higher levels elsewhere in the county depending on elevation.

On alluvial fans on valley sides and drainage ways, the existing vegetation is usually alkali sacaton, western wheatgrass, Indian rice grass, blue grama, bottlebrush squirreltail, broom snakeweed, fourwing saltbush, threeawn, winterfat, mat muhly and spike muhly. On fan remnants on valley sides we usually find blue grama, western wheatgrass, Indian ricegrass, big sagebrush, galleta, bottlebrush squirreltail, fourwing saltbrush, needleandthread, oneseed juniper, sand dropseed, spineless horsebrush, rabbitbrush, and twoneedle pinyon.

3.4 Erosion features

The impacts of historic overgrazing are visible at the north-side of the facility, in the form of arroyos that formed when surface run-off cut through the ground and washed away soils that were not able to hold water with their ground cover lost to overgrazing. Now that the facility is fenced and no livestock grazing occurs on the site, vegetation has recovered in these areas. With the facility helping to bring back vegetation in its undeveloped areas the formation and deepening of erosion features on its land has decreased.

3.5 Subsurface conditions

3.5.1 Soil types and associations

Most of the soils found at the surface in the locations where wells are located consist of the Mentmore-Gish complex.[3] These soils occur in alluvial fans on valley sides and fan remnants on valley sides. The parent material for these soils is slope and fan alluvium derived from sandstone and shale. These are well drained soils with moderately slow (0.2 in/hr) to slow permeability (0.06 in/hr). In this association, the Gish and similar soils make up about 45 percent, the Mentmore and similar soils 35 percent, and minor components 20 percent. These minor components are - Berryhill and similar soils 10 percent, and Anodize and similar soils 10 percent. The typical profile for these soils is – 0 to 2 inches fine sandy loam, 2 to 72 inches of various kinds of clay loam.

Drill logs for various wells have been provided electronically to the NMED/HWB. From these well logs we can infer that the soils in the subsurface are generally composed of clays starting at the immediate subsurface, interbedded with narrow sand and silt layers. At about 100 to 150 feet, layers of mudstone, sandstone (from the Chinle formation, Petrified Forest group) and siltstone start to appear. Figure 3 shows a generalized relationship of soils in and around the Gallup Refinery.

[3] Soil Survey of McKinley County Area, New Mexico, McKinley County and Parts of Cibola and San Juan Counties, Natural Resources Conservation Service (NRCS), US Department of Agriculture, available at - http://soildatamart.nrcs.usda.gov/Manuscripts/NM692/0/McKinley.Area%20NM.pdf

3.5.2 Stratigraphy

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 this surface layer is the Chinle Formation, which consists of low permeability clay stones and siltstones that comprise the shale of this formation. As such, the Chinle Formation effectively serves as an aquiclude. 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 aquiclude, 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.

3.5.3 Presence and flow direction of ground water

Ground water 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). Ground water 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 less than 10^{-2} centimeters per second in the gravelly sands immediately overlying the Chinle Formation up to 10^{-8} centimeters per second in the clay soil layers located near the surface.

Shallow ground water located under refinery property generally flows along the upper contact of the Chinle Formation. The prevailing flow direction is from the southeast and toward the northwest. In the past, a subsurface ridge has been identified that was thought to deflect some flow in a northeast direction in the vicinity of the refinery tank farm. This is not clear from the present data.

4.0 Investigation Methods

The purpose of this section is to describe the types of activities that will be conducted and the methods that will be used as part of this Plan. Appendix B provides more detailed information on actual sampling procedures that will be used.

4.1 Ground water Sampling Methodology

All monitoring wells scheduled for sampling during a ground water sampling event will be sampled within 15 working days of the start of the monitoring and sampling event.

Appendix C contains the well data summary tables for 2014. C-1 and C-1.1 provides the annual and quarterly DTW (depth to water) and DTB (depth to bottom) measurements for 2014 as well as corrected water table elevation with respect to wells that have separate phase hydrocarbon levels. C-2 and C-2.1 provides the corrected well elevation summary table for 2014 which includes date of establishment, ground elevation, top of casing elevation, well casing stick-up length, well depth, screening levels, and stratigraphic units in which the wells are located. Appendix C-3 includes well elevations for the artesian wells also known as Process or Production wells (PW). Information provided for the artesian wells was gathered from well boring logs. These wells are encased and therefore measurement for depth to bottom was not field verified.

4.1.1 Well Gauging

At the beginning of each quarterly, semi-annual, or annual sampling event, all monitoring and recovery wells listed in Appendix D, Ground Water Monitoring Schedule, will be gauged to record the depth to SPH (if present), the DTW and the DTB of the well. The gauging will be performed

using an oil/water interface probe attached to a measuring tape capable of recording measurements to the nearest 0.01 foot. Each monitoring well is field verified with the well number on the well casing or adjacent to the well to ensure that samples are collected at the correct well location. Wells also have a permanent marked reference point on the well casing from which ground water levels and well depths are measured.

Gauging measurements will be recorded on a field gauging form. Data obtained from the gauging will be reported in the annual ground water monitoring report. The data will be used to develop groundwater contour maps and SPH thickness isopleths which will also be included in the annual report.

4.1.2 Well Purging

Each monitoring well will be purged by removing ground water prior to sampling in order to ensure that formation water is being sampled. Generally, at least three well volumes (or a minimum of two if the well has low recharge rate) will be purged from each well prior to sampling. Field water quality measurements must stabilize for a minimum of three consecutive readings before purging will be discontinued. Field water quality measurements will include pH, electrical conductivity, temperature, and dissolved oxygen (DO) %. Field water quality measurement stability will be determined when field parameter readings stabilize to within ten percent between readings for three consecutive measurements. Once the readings are within ten percent, purging will stop and the well is ready for sample collection. The volume of ground water purged, the instruments used, and the readings obtained at each interval will be recorded on the field-monitoring log. Well purging and sampling will be performed using 1 inch x 3 foot disposable polyethylene bailers for ground water sampling and/or appropriately decontaminated portable sampling pumps.

4.2 Ground water Sample Collection

Ground water samples will be obtained from each well within 24 hours of the completion of well purging. Sample collection methods will be documented in the field monitoring reports. The samples will be transferred to the appropriate, clean, laboratory-prepared containers provided by

the analytical laboratory. Sample handling and chain-of-custody (COC) procedures are described in more detail in Appendix B. Decontamination procedures for reusable water sampling equipment are described in Appendix B.

All purged ground water and decontamination water from monitoring wells will be drained into the refinery waste water treatment system upstream of the NAPIS. The procedures for disposing materials are described in Appendix B.

Ground water samples intended for metals analysis will be submitted to the laboratory as total metals samples. Ground water samples obtained for dissolved metals analysis will be filtered through disposable filters with a 0.45 micrometers mesh size.

4.2.1 Sample Handling

All sample containers are supplied by the contracted analytical laboratory and shipped to Western in sealed coolers. Chemical preservation is also provided by the laboratory through pre-preserved bottle ware. Collection of containerized ground water samples are in the order of most volatile to least volatile, such as: VOCs, SVOCs, metals, phenols, cyanide, sulfate, chloride, and nitrates. Immediately after the samples are collected, they will be stored in a cooler with ice or other appropriate storage method until they are delivered to the analytical laboratory. Standard COC procedures as detailed in Appendix B will be followed for all samples collected. All samples will be submitted to the laboratory as soon as possible to allow the laboratory to conduct the analyses within the specified method holding times. Details of the general sample handling procedures are provided in Appendix B.

The following shipping procedures will be performed during each sampling event:

- Individual sample containers will be packed to prevent breakage and transported in a sealed cooler with ice or other suitable coolant or other EPA or industry-wide accepted method. The drainage hole at the bottom of the cooler will be sealed and secured in case of sample container leakage.
- Each cooler or other container will be delivered directly to the analytical laboratory.

- Glass bottles will be separated in the shipping container by cushioning material to prevent breakage.
- Plastic containers will be protected from possible puncture during shipping using cushioning material.
- The COC form and sample request form will be shipped inside the sealed storage container to be delivered to the laboratory.
- Signed and dated COC seals will be applied to each cooler prior to transport of samples from the site.

4.3 Analytical Methods

Ground water and surface water samples collected during the monitoring events will be analyzed for the constituents listed in Appendix D. In addition, for various locations the list of metals is modified to either be the Skinner list of the NM Water Quality Control Commission list or RCRA 8 metals list. Appendix D provides a summary of target analytes for each EPA analytical method.

4.4 Quality Assurance Procedures

Contract analytical laboratories will maintain internal quality assurance programs in accordance with EPA and industry accepted practices and procedures. At a minimum, the laboratories will use a combination of standards, blanks, surrogates, duplicates, matrix spike/matrix spike duplicates (MS/MSD), blank spike/blank spike duplicates (BS/BSD), and laboratory control samples to demonstrate analytical Quality Assurance/Quality Control (QA/QC). The laboratories will establish control limits for individual chemicals or groups of chemicals based on the long-term performance of the test methods. In addition, the laboratories will establish internal QA/QC that meets EPA's laboratory certification requirements. The specific procedures to be completed are identified in the following sections.

4.4.1 Equipment Calibration Procedures and Frequency

The laboratory's equipment calibration procedures, calibration frequency, and calibration standards will be in accordance with the EPA test methodology requirements and documented in the laboratory's quality assurance (QA) and Standard Operating Procedures (SOP) manuals. All instruments and equipment used by the laboratory will be operated, calibrated, and maintained according to the manufacturers' guidelines and recommendations. Operation, calibration, and

maintenance will be performed by personnel who have been properly trained in these procedures. A routine schedule and record of instrument calibration and maintenance will be kept on file at the laboratory.

4.4.2 Field QA/QC Samples

Field duplicates and trip blanks may be obtained for quality assurance during sampling activities. The samples will be handled as described in Section 4.4.3.

Trip blanks will accompany laboratory sample bottles and shipping and storage containers intended for VOC analyses. Trip blanks will consist of a sample of analyte free de-ionized water placed in an appropriate sample container. Trip blanks will be analyzed at a frequency of one for each shipping event involving twenty or more samples. Generally, a trip blank will only be placed in one of the containers, if more than one container is used to ship the set of samples.

4.4.3 Laboratory QA/QC Samples

Analytical procedures will be evaluated by analyzing reagent or method blanks, surrogates, MS/MSDs, BS/BSDs and/or laboratory duplicates, as appropriate for each method. The laboratory QA/QC samples and frequency of analysis to be completed will be documented in the cited EPA or other test methodologies. At a minimum, the laboratory will analyze laboratory blanks, MS/MSDs, BS/BSDs and laboratory duplicates at a frequency of one in twenty for all batch runs requiring EPA test methods and a frequency of one in ten for non-EPA test methods. Laboratory batch QA/QC samples will be project specific.

4.4.4 Laboratory Deliverables

The analytical data package will be prepared in accordance with EPA-established Level II analytical support protocol which will include:

- Transmittal letter, including information about the receipt of samples, the testing methodology performed, any deviations from the required procedures, any problems encountered in the analysis of the samples, any data quality exceptions, and any corrective actions taken by the laboratory relative to the quality of the data contained in the report;

- Sample analytical results, including sampling date; date of sample extraction or preparation; date of sample analysis; dilution factors and test method identification; water sample results in consistent units (milligrams per liter or micrograms per liter (µg/L)); and detection limits for undetected analytes. Results will be reported for all field samples, including field duplicates and blanks, submitted for analysis;
- Method blank results, including reporting limits for undetected analytes;
- Surrogate recovery results and corresponding control limits for samples and method blanks (organic analyses only);
- Laboratory duplicate results for inorganic analyses, including relative percent differences and corresponding control limits;
- Sample COC documentation;
- Holding times and conditions;
- Conformance with required analytical protocol(s);
- Instrument calibration;
- Blanks;
- Detection/quantitative limits;
- Recoveries of surrogates and/or matrix spikes (MS/MSDs);
- Variability for duplicate analyses;
- Completeness;
- Data report formats;

Data deliverables provided by the laboratory that include analysis of organic compounds will also include the following:

- A cover letter referencing the procedure used and discussing any analytical problems, deviations, and modifications, including signature from authority representative certifying to the quality and authenticity of data as reported;
- A report of sample collection, extraction, and analysis dates, including sample holding conditions,
- Tabulated results for samples in units as specified, including data qualification in conformance with EPA protocol, and definition of data descriptor codes;
- Final extract volumes (and dilutions required), sample size, wet-to-dry weight ratios, and instrument practical detection/quantitative limit for each analyte,
- Analyte concentrations with reporting units identified, including data qualification and a description of the qualifiers,
- Quantification of analytes in all blank analyses, as well as identification of method blank associated with each sample,
- Recovery assessments and a replicate sample summary, including all surrogate spike recovery data with spike levels/concentrations for each sample and all MS/MSD results (recoveries and spike amounts).

4.4.5 Review of Field and Laboratory QA/QC Data

The sample data, field, and laboratory QA/QC results will be evaluated for acceptability with respect to the data quality objectives (DQOs). Each group of samples will be compared with the DQOs and evaluated using data validation guidelines contained in EPA guidance documents: Guidance Document for the Assessment of RCRA Environmental Data Quality, National Functional Guidelines for Organic Data Review, and Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses, and the most recent version of SW-846, and industry-accepted QA/QC methods and procedures.

The laboratory will notify the Gallup Refinery Project Manager of data quality exceptions within one business day of identifying the data quality exception in order to allow for sample re-analysis, if possible. The Gallup Refinery Project Manager will contact NMED within one business day of receipt of laboratory notification of data quality exceptions in order to discuss the implementations and determine whether the data will still be considered acceptable, or if sample re-analysis or re-sampling is necessary.

4.4.6 Blanks, Field Duplicates, Reporting Limits and Holding Times

4.4.6.1 Blanks

The analytical results of field blanks and field rinsate blanks will be reviewed to evaluate the adequacy of the equipment decontamination procedures and the possibility of cross-contamination caused by decontamination of sampling equipment. The analytical results of trip blanks will be reviewed to evaluate the possibility for contamination resulting from the laboratory-prepared sample containers or the sample transport containers. The analytical results of laboratory blanks will be reviewed to evaluate the possibility of contamination caused by the analytical procedures. If contaminants are detected in field or laboratory blanks, the sample data will be qualified, as appropriate.

4.4.6.2 Field Duplicates

Field duplicates will consist of two samples either split from the same sample device or collected sequentially. Field duplicate ground water samples will be collected at a frequency of one per ten regular samples and will be analyzed for the full set of analyses used for the regular sample collected. At a minimum, one duplicate sample per sampling day must always be obtained.

4.4.6.3 Method Reporting Limits

Method reporting limits for sample analyses will be established at the lowest level practicable for the method and analyte concentrations and will not exceed ground water or surface water cleanup standards and screening levels. Detection limits that exceed established standards or screening levels and are reported as "not detected" will be considered data quality exceptions and an explanation for its acceptability for use will be provided.

4.4.6.4 Holding Times

Per EPA protocol the sampling, extraction, and analysis dates will be reviewed to confirm that extraction and analyses were completed within the recommended holding times. Appropriate data qualifiers will be noted if holding times are exceeded.

4.4.7 Representativeness and Comparability

4.4.7.1 Representativeness

Representativeness is a qualitative parameter related to the degree to which the sample data represent the relevant specific characteristics of the media sampled. Procedures will be implemented to assure representative samples are collected and analyzed, such as repeated measurements of the same parameter at the same location over several distinct sampling events. Any procedures or variations that may affect the collection or analysis of representative samples will be noted and the data will be qualified.

4.4.7.2 Comparability

Comparability is a qualitative parameter related to whether similar sample data can be compared. To assure comparability, analytical results will be reported in appropriate units for comparison with

other data (past studies, comparable sites, screening levels, and cleanup standards), and standard collection and analytical procedures will be implemented. Any procedure or variation that may affect comparability will be noted and the data will be qualified.

4.4.8 Laboratory Reporting, Documentation, Data Reduction, and Corrective Action

Upon receipt of each laboratory data package, data will be evaluated against the criteria outlined in the previous sections. Any deviation from the established criteria will be noted and the data will be qualified. A full review and discussion of analytical data QA/QC and all data qualifiers will be submitted as appendices or attachments to the ground water monitoring reports. Data validation procedures for all samples will include checking the following, when appropriate:

- Holding times
- Detection limits
- Field equipment rinsate blanks
- Field blanks
- Field Duplicates
- Trip blanks
- Reagent blanks
- Laboratory duplicates
- Laboratory blanks
- Laboratory matrix spikes
- Laboratory matrix spike duplicates
- Laboratory blank spikes
- Laboratory blank spike duplicates
- Surrogate recoveries

If significant quality assurance problems are encountered, appropriate corrective action will be implemented. All corrective action will be reported and the corrected data will be qualified.

5.0 Monitoring and Sampling Program

The primary objective of ground water monitoring is to provide data which will be used to assess ground water quality at and near the facility. Ground water elevation data will also be collected to evaluate ground water flow conditions. The ground water monitoring program for the facility will consist of sample collection and analysis from a series of monitoring wells, recovery wells, outfalls, and evaporation pond locations.

The monitoring network is divided into five investigation areas (Group A, B, C, D and E). The sampling frequency, analyses and target analytes will vary for each investigation area including outfalls and evaporation pond location. The combined data from these investigation areas will be used to assess ground water quality beneath and immediately down-gradient of the facility, and evaluate local ground water flow conditions.

Samples will not be collected from monitoring wells that have measurable SPH. For wells that are purged dry, samples will be collected if recharge volume is sufficient for sample collection within 24 hours. Wells not sampled due to insufficient recharge will be documented in the field log.

The following sections outline the monitoring program for each investigation area.

5.1 Group A Through Group E

5.1.1 Sampling Locations

The location of the monitoring, recovery wells and leak detection units are shown in Figure 4. The following wells will be sampled (as described in Appendix D):

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

5.2 Evaporation Ponds, Outfalls

5.2.1 Sampling Locations

The following outfalls and ponds will be sampled (as described in Appendix D, Table 1). (Note: these outfalls are from one section of the waste water treatment system to another – they do not discharge to any location outside the facility).

OUTFALLS		
STP-1 to EP-2		
Boiler Water Inlet to EP-2		
PONDS		
Pond 1 – No longer in service	EP-5	EP-9
EP-2	EP-6	EP-11
EP-3	EP-7	EP-12A
EP-4	EP-8	EP-12B

6.0 Monitoring Program Revisions

Upon review of the analytical results from the monitoring events under this Plan, historic facility-wide monitoring data, available soil boring data, and other related information Western Refining will assess the monitoring program presented in this Plan. Revisions to the Plan, as necessary, will then be presented for agency review and approval on an annual basis. These revisions may include, but not be limited to, a reduction or change in monitoring locations, monitoring frequency, and/or target analytes listed in Appendix D, Table 1.

6.1 Requests for Modifications to Sampling Plan

A. Gallup Refinery has installed twenty-nine (29) monitoring wells to be added to the 2014 sampling plan for 2015 and are listed as follows:

MKTF-19	MKTF-25	MKTF-31	MKTF-37	MKTF-43
MKTF-20	MKTF-26	MKTF-32	MKTF-38	MKTF-44
MKTF-21	MKTF-27	MKTF-33	MKTF-39	MKTF-45
MKTF-22	MKTF-28	MKTF-34	MKTF-40	
MKTF-23	MKTF-29	MKTF-35	MKTF-41	STP1-NW
MKTF-24	MKTF-30	MKTF-36	MKTF-42	STP1-SW

MKTF 19 through 34 were all developed in early 2014 and have been sampled and or inspected for four consecutive quarters. A review of the quarterly analytical laboratory data does not indicate any significant changes over time that would warrant continued quarterly monitoring. Western requests sampling frequency to be changed to an annual basis for wells MKTF-19 through MKTF-26, MKTF-28, MKTF-36, MKTF-37, MKTF-38, MKTF-39, MKTF-40, MKTF-43, and MKTF-44 beginning in 2015.

As soon as four quarters of monitoring on MKTF 27, MKTF-29, MKTF-30, MKTF-31, MKTF-32, MKTF-33, MKTF-34, MKTF-41 and MKTF-42 (perimeter wells) have been completed and laboratory analyses indicate no significant increase in concentration, sampling frequency will be changed to semi-annual to monitor plume stability. If the initial quarterly monitoring indicates an obvious increase in concentration trend, Western will continue to monitor individual wells on a quarterly basis for one more year at which time Western may request to modify sampling frequency and/or change analyte test methods. Samples will not be collected from monitoring wells that have a measureable separate phase hydrocarbon (SPH) level.

Sampling will be analyzed for VOCs, SVOCs, Water Quality Control Commission (WQCC) metals (total and dissolved), gasoline range organics (GRO), diesel range organics (DRO) extended, and major cations and anions.

B. STP1-NW and STP1-SW. Initial sampling began in the second quarter of 2014. Analytical data for the past three quarters indicate no detection of BTEX, VOCs, or SVOCs in STP1-NW. No detection of fluid has been detected in STP1-SW in 2014. Based on the analytical data, Western requests changing test methods to VOCs and WQCC Metals and change the sampling frequency of these wells to an Annual basis beginning in 2015.

C. OW-1 and OW-10: (Carry over from 2013 Update Request). Change the quarterly analytical sampling test methods to: VOCs, and Major Cations/Anions, Arsenic and Uranium. Analytical data indicates no DRO/GRO/MRO has ever been detected in either of these wells. Recent installations of wells listed in 6.1A above are all up-gradient from these two wells. There are also the boundary wells which are monitored annually.

D. BW-1A, BW-1B, BW-1C, BW-2A, BW-2B, BW-2C, BW-3A, BW-3B, BW-3C: (Carry over from 2013 Update Request). Change to RCRA metals (total and dissolved) and drop SVOCs, continue with Major cations/anions and VOCs. Only the analyte bis(2-ethylhexyl) phthalate has been detected in BW-3B, BW-3C and in BW-1C. The detection of this SVOC may possibly be a lab contaminant or from PVC pipe materials used as casing for these wells).

E. OW-11: (Carry over from 2013 Update Request). Reduce analyses to major cations/anions and WQCC Metals (total and dissolved). No VOCs or SVOCs has been detected in this well with exception of single hit of bis(2-ethylhexyl)phthalate which may possibly be a lab contaminant or from PVC pipe materials used as casing for this well).

F. OW-50 and OW-52: Reduce analyses to BTEX plus MTBE and WQCC metals (total and dissolved). NO VOCs or SVOCs have been detected in either of these wells with the exception of a single hit of bis(2-ethylhexyl)phthalate in OW-50 on March 16, 2010 which may possibly be a lab contaminant or from PVC pipe materials used as casing for this well).

G. SMW-2: (Carry over from 2013 Update Request). Reduce analyses to only VOCs and WQCC Metals. Analytical data indicate no detection of DRO/GRO/MRO or SVOCs.

H. RW-1, RW-2, RW-5 and RW-6: (Carry over from 2013 Update Request). Remove from annual sampling schedule as these wells are hydrocarbon recovery wells. These wells will continue to be inspected on a quarterly basis.

I. PW-3: Return to 3 year sampling schedule to begin in 2017. (Carry over from 2013 Update Request). No VOCs or SVOCs have been detected since August 2008 to present and has been sampled annually for five consecutive years with no significant changes.

J. MKTF 1-18: MKTF 1 through 18 have been sampled and or inspected on a quarterly basis for all of 2014. A review of the quarterly laboratory results does not indicate any significant changes over time that would warrant continued quarterly monitoring. Western requests quarterly sampling frequency be changed to annual beginning 2015.

K. Revise statement "All wells including the recovery wells containing separate phase hydrocarbons", to read "Annual sampling for all wells that are not currently on an annual schedule will also include Major cations/anions, VOC, SVOC, WQCC metals." Do not sample wells that have an SPH level.

These additions and revisions have been incorporated into Table 1: Ground Water Monitoring Schedule in Appendix D pending approval from NMED and OCD. Western will continue with the most current monitoring schedule per approval from NMED dated December 12, 2012, "Approval With Modifications Annual Ground Water Monitoring Report, Gallup Refinery 2010, Revision 1", and per concurrence in Comment 6 of NMED correspondence dated September 24, 2012, "Disapproval, Facility Wide Ground Water Monitoring Work Plan, 2011 Updates, to change monitoring frequency from quarterly to annual for wells OW-50 and OW-52.

Appendix A – Left Blank

Appendix B: Gallup Field Sampling Collection and Handling Standard Procedures

Field Data Collection: Elevation and Purging

All facility monitoring wells and recovery wells are gauged as required through the year. Gallup does not have any recovery well pumps that need to be shut off and removed prior to water elevation measurements.

Each monitoring well is field verified with the well number on the well casing or adjacent to the well to ensure that samples are collected at the correct well location. Wells also have a permanent marked reference point on the well casing from which ground water levels and well depths are measured. The portable pump intake is lowered to the midpoint of the listed screened interval for each specific well using the markings identified on the pump hose which are set every ten feet. In wells with dedicated pumps, the pumps have been installed at the midpoint of the screened interval.

All water/product levels are measured to an accuracy of the nearest 0.01 foot using an electrical conductivity based meter, the Heron Instruments 100 ft. DipperT electric water depth tape complying with US GGG-T-106E, EEC Class II. After determining water levels, well volumes are calculated using the appropriate conversion factors for a given well based on its internal diameter. Volume is equal to the height of the liquid column times the internal cross-sectional area of the well.

Generally, at least three well volumes (or a minimum of two if the well has low recharge) are purged from each well prior to sampling. Field water quality parameters measured during purging (pH, electrical conductivity, temperature, and dissolved oxygen), must stabilize to within 10% for a minimum of three consecutive measurements before collection of ground water samples from each well.

Before sample collection can begin, the water collected from each monitoring well must be fresh aquifer water. Well evacuation replaces stagnant well water with fresh aquifer water. The water level in the well, total depth of well and thickness of floating product (if any) will be measured using the DipperT electric water depth tape. If product is present, a ground water sample is typically not obtained.

If a well is pumped or bailed dry before two or three well volumes can be evacuated, it requires only that sufficient time elapse for an adequate volume of water to accumulate for the sampling event. The first sample will be tested for pH, temperature, specific conductivity and dissolved oxygen (%). The well will be retested for pH, temperature, specific conductivity and dissolved oxygen (%) after sampling as a measure of purging efficiency and as a check on the stability of the water samples over time. All well evacuation information will be recorded in a log book.

Wells MW-1, MW-2, MW-4, MW-5, BW-1C, BW-2A, BW-2B, BW-3B, SMW-4, OW-1, OW-10, OW-13, OW-14, OW-29 and OW-30 are each equipped with a dedicated electrical pump. The remaining wells are purged using a portable Grundfos pump. Recovery wells and NAPIS-1, NAPIS-2, NAPIS-3 and KA-3 are hand-bailed as well as GWM-1, GWM-2, GWM-3 and OAPIS-1 is hand-bailed if the presence of water is detected.

New wells MKTF 1 thru 45 and STP1-NW and STP1-SW are all hand-bailed if the presence of water is detected. If SPH is detected in any of these wells, no samples are collected.

Purged well water from wells is collected in fifty-five gallon drums or totes and drained to the process sewer upstream of the NAPIS. The water is treated in the refinery's waste water treatment system.

Sampling Equipment at Gallup

The following sampling equipment is maintained at Gallup and used by the sampling personnel:

- Heron Instruments 100 ft. DipperT electric water depth tape complying with US GGG-T-106E, EEC Class II.

- Pall Corporation Acro 50A 0.45 micron disposable filter used with 60 ml. disposable syringes for filtering water in the field.
- YSI pH/Conductivity meter Model 63, calibrated with a one-point, two-point, or three-point calibration procedure using pH standards of 7, 4 and 10.
- IQ Scientific Instruments, pH/Temperature/Conductivity/ Dissolved Oxygen meter, Model IQ1806LP.
- Grundfos 2-inch pumps with Grundfos 115-volt AC–to-DC converter.

Calibration and maintenance procedures will be performed according to the manufacturer's specifications.

Order of Collection

Samples will be collected in the order listed below:

Parameter	**Bottle Type**
VOC, SVOC	40 ml VOA vials, (H2SO4)
TOC	1 liter glass jar, H2SO4
Extractable Organics	1 liter glass jar with Teflon™ cap
Metals* Total and Dissolved	500 ml, 125 ml plastic, HNO3
Phenols, Cyanide	1 liter glass jar
Chloride, Sulfate, Nitrates	1 liter plastic, no preservative

* Prefiltration bottle for dissolved metals which is subsequently filtered in the field and transferred to a pint plastic bottle with HNO3 preservative.

Filtration

Ground water samples are filtered prior to dissolve metals analysis. For dissolved metals, sample water is poured into a jar and then extracted with a syringe. The syringe is then used to force the sample water through a 0.45 micron pore filter paper filter into the proper sample bottle to collect dissolved metals samples. Filtration must be performed within two hours of sample collection. Pour the filtrate into a sample bottle containing HNO3 preservative.

For samples destined for total metals analysis, do not filter the sample, and preserve with HNO3 to pH <2 in the field.

Gallup sampling personnel carry a cell phone when gathering ground water and other water samples. While sampling procedures are generally well known and the appropriate sample bottles are ordered to match each sampling event, occasional questions do arise from unforeseen circumstances which may develop during sampling. At such times, sampling personnel contact Hall Environmental Analytical Laboratory to verify that sampling is correctly performed.

Sample Handling Procedures

At a minimum, the following procedures will be used when collecting samples:

- Neoprene, nitrile, or other protective gloves will be worn when collecting samples. New disposable gloves will be used to collect each sample.
- All samples collected for chemical analysis will be transferred into clean sample containers supplied by the analytical laboratory. The sample container will be clearly marked. Sample container volumes and preservation methods will be in accordance with the most recent standard EPA and industry accepted practices for use by accredited analytical laboratories. Sufficient sample volume will be obtained for the laboratory to complete the method-specific QC analyses on a laboratory-batch basis.
- Sample labels and documentation will be completed for each sample.

Immediately after the samples are collected, they will be stored in a cooler with ice or other appropriate storage method until they are delivered to the analytical laboratory. Standard chain-of-custody procedures, as described in Section 4.2.1 of this Plan, will be followed for all samples collected. All samples will be submitted to the laboratory to allow the laboratory to conduct the analyses within the method holding times.

General Well Sampling Procedures

For safety protection and sampling purity, rubber gloves are worn and changed between each activity.

Prepare for sampling event by making out sample bottle labels and have bottles separated into plastic bags for each well to be sampled and placed in an ice chest ready to take into the field. Bring along a note book and sample log. Document weather conditions, sample date and time. Fill

in label with location, date, time, analysis, preservative, and your name. Start sampling by adjusting converter speed for each well. Affix sample label and fill bottle according to lab instructions. For samples intended for VOC analysis, use bottles with septa lids, fill bottle to neck and add final amount of water with cap to form meniscus. Turn bottles upside down to examine for bubbles, if bubbles are detected in the vial, repeat collection procedure. If no bubbles show, secure lids and pack in bubble wrap and place in cooler until sampling is completed.

Decontaminate equipment that is not dedicated for use in a particular well. Refrigerate completed samples until shipping to lab. Be sure to check holding times and arrange for appropriate shipping method. Be sure that the field effort is adequately staffed and equipped. Check QC requirements before departing—QC samples require additional equipment and supplies.

Surface Water Sample Collection

At the evaporation ponds, samples will be collected as a grab sample at the pond edge near the inlets. This location will be noted in the field notebooks. The sampler will avoid disturbing sediment and gently allow the sample container to fill making sure that undue disturbance does not allow volatile contaminants to be lost. The sample bottle will be used for the sample collection in a shallow location near the bank. If a separate bottle and/or bailer are used to refill the sample container, this will be duly noted in the field log books. The decision to use a separate bottle/bailer will be made, if at all, by the sampler and the reasons for doing so will be noted in the field log book.

Upon arrival at the field site, the sampler will set out safety equipment such as traffic cones and signs (if required). The vehicle will be parked a sufficient distance away so as to prevent sample contamination from emissions. Appropriate sample containers and gloves must be used for the type of analyses to be performed.

Decontamination Procedures

The objective of the decontamination procedures is to minimize the potential for cross-contamination

The majority of field equipment used for ground water sampling will be disposable and, therefore, not require decontamination. In order to prevent cross-contamination, field equipment that comes into contact with water or soil will be decontaminated between each sampling location. The decontamination procedure will consist of washing the equipment with a non-phosphate detergent solution (examples include Fantastik™, Liqui-Nox®), followed by two rinses of distilled water and air dried.

Decontamination water and rinsate will be contained and disposed of the same way as purge water, as described in Section 4.2. Decontamination procedures and the cleaning agents used will be documented in the daily field log.

Field Equipment Calibration Procedures

Field equipment requiring calibration will be calibrated to known standards, in accordance with the manufacturers' recommended schedules and procedures. Calibration checks will be conducted daily and the instruments will be recalibrated if necessary. Calibration measurements will be recorded in the daily field logs.

If field equipment becomes inoperable, its use will be discontinued until the necessary repairs are made. A properly calibrated replacement instrument will be used in the interim. Instrumentation used during sampling events will be recorded in the daily field logs.

Collection and Management of Investigation Derived Waste

Investigation derived waste (IDW) generated during each groundwater sampling event may include purge water, decontamination water, excess sample material, and disposable sampling equipment. All water from all wells generated during sampling and decontamination activities will be temporarily stored in labeled 55-gallon drums until placed in the refinery wastewater treatment system upstream of the API separator. All other solid waste generated during sampling activities (including sampling gloves, tubing, etc) will be disposed of with the Refinery's general municipal waste.

Documentation of Field Activities

Daily field activities, including observations and field procedures, will be recorded using indelible ink on field sampling forms. The original field forms will be maintained at Gallup Refinery. Completed forms will be maintained in a bound and sequentially numbered field file for reference during field activities. The daily record of field activities will include the following information:

- Well ID/ Evaporation pond location/ Outfall
- 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

Sample Custody

All samples collected for analysis will be recorded in the field report or data sheets. Chain-of-custody forms will be completed at the end of each sampling day, prior to the transfer of samples off site, and will accompany the samples during shipment to the laboratory. A signed and dated custody seal will be affixed to the lid of the shipping container. Upon receipt of the samples at the laboratory, the custody seals will be broken, the chain-of-custody form will be signed as received by the laboratory, and the conditions of the samples will be recorded on the form. The original chain-of-custody form will remain with the laboratory. Gallup Refinery will maintain copies of all chain-of-custody forms generated as part of sampling activities. Copies of the chain-of-custody records will be included with all draft and final laboratory reports submitted to NMED and OCD.

APPENDIX C

WELL DATA 2014 ANNUAL/QUARTERLY SAMPLING - REVISION 1
DTB/DTW MEASUREMENTS

Date of Installation	Well ID Number	Inspection or Sample Date	Casing Diameter (Inch)	2014 Survey [6] Ground Level Elevations (ft)	2014 Survey [6] Well Casing Rim Elevations (ft)	2014 Survey [6] Ground Elevation Inside Steel Sleeve (ft)	Stick-up length (ft)	2014 [6] Survey Well Casing Bottom Elevations (ft)	Total Well Depth (ft)	Depth to SPH (ft)	SPH [2] Column Thickness (ft)	Depth to Water (ft)	Ground water Elevation [3] (ft)	Corrected Water Table [4] Elevation (factor 0.8) (ft)	Screened Interval Depth Top to Bottom (ft)	2012 Stratigraphic unit in which screen exists	Purge Volume = 3 Well Vol (gal)
11/10/2003	BW-1A	9/8/2014	2.00	6,883.17	6,885.12	6,884.93	1.95	6,847.50	46.06	N/A	N/A	DRY	DRY	N/A	30 - 35	Upper Sand	N/A
10/28/2003	BW-1B	9/8/2014	2.00	6,883.17	6,885.78	6,885.72	2.61	6,818.33	76.29	N/A	N/A	DRY	DRY	N/A	54.6 - 64.6	Chinle/Alluvium Interface	N/A
11/10/2003	BW-1C	9/10/2014	2.00	6,883.17	6,885.68	6,885.64	2.51	6,749.29	145.29	N/A	N/A	12.97	6,872.71	N/A	125 -135	Sonsela	63.37
Date of Installation	**Well ID Number**	**Inspection or Sample Date**	**Casing Diameter (Inch)**	**2011 Survey [1] Ground Level Elevations (ft)**	**2011 Survey [1] Well Casing Rim Elevations (ft)**	**2011 Survey [1] Ground Elevation Inside Steel Sleeve (ft)**	**Stick-up length (ft)**	**2011 Survey [1] Well Casing Bottom Elevations (ft)**	**Total Well Depth (ft)**	**Depth to SPH (ft)**	**SPH [2] Column Thickness (ft)**	**Depth to Water (ft)**	**Ground water Elevation [3] (ft)**	**Corrected Water Table [4] Elevation (factor 0.8) (ft)**	**Screened Interval Depth Top to Bottom (ft)**	**2012 Stratigraphic unit in which screen exists**	**Purge Volume = 3 Well Vol (gal)**
11/10/2003	BW-1A	**See 2014 Survey**	2.00	**6,874.10**	**6,876.68**	**6,872.30**	**2.58**	**6,839.06**	**37.62**						**30 - 35**	Upper Sand	N/A
10/28/2003	BW-1B	**See 2014 Survey**	2.00	**6,874.13**	**6,876.94**	**6,876.26**	**2.81**	**6,809.49**	**67.45**						**54.6 - 64.6**	Chinle/Alluvium Interface	N/A
11/10/2003	BW-1C	**See 2014 Survey**	2.00	**6,873.95**	**6,876.78**	**6,872.28**	**2.83**	**6,740.39**	**136.39**						**125 -135**	Sonsela	63.37
11/10/2003	BW-2A	9/9/2014	2.00	6,871.88	6,874.69	6,870.45	2.81	6,807.12	67.57	N/A	N/A	32.25	6,842.44	N/A	55 - 65	Upper Sand	17.35
10/28/2003	BW-2B	9/9/2014	2.00	6,871.66	6,874.50	6,870.06	2.84	6,782.24	92.26	N/A	N/A	28.15	6,846.35	N/A	80 - 90	Chinle/Alluvium Interface	45.12
10/28/2003	BW-2C	9/10/2014	2.00	6,872.90	6,875.30	6,872.02	2.40	6,722.46	152.84	N/A	N/A	20.70	6,854.60	N/A	139.5 - 149.5	Sonsela	64.77
6/15/2004	BW-3A	9/8/2014	2.00	6,875.94	6,878.39	6,875.08	2.45	6,826.04	52.35	N/A	N/A	DRY	DRY	N/A	39.5 - 49.5	Upper Sand	N/A
10/15/2003	BW-3B	9/10/2014	2.00	6,876.16	6,878.59	6,875.41	2.43	6,809.19	69.40	N/A	N/A	33.25	6,845.34	N/A	63 - 73	Chinle/Alluvium Interface	17.79
7/20/2004	BW-3C	9/10/2014	2.00	6,875.72	6,877.95	6,875.27	2.23	6,723.40	154.55	N/A	N/A	7.83	6,870.12	N/A	144.5 - 154.5	Sonsela	71.59
9/25/1981	OW-11	9/12/2014	4.00	6,922.05	6,923.51	6,921.80	1.46	6,857.72	65.79	N/A	N/A	20.11	6,903.40	N/A	43 - 65	Sonsela	100.14
12/15/1980	OW-12	9/12/2014	4.00	6,939.57	6,940.69	6,939.04	1.12	6,811.84	128.85	N/A	N/A	47.78	6,892.91	N/A	117.8 - 137.8	Sonsela	179.93
10/14/1981	MW-1	9/16/2014	5.00	6,876.63	6,878.12	6,876.79	1.49	6,747.29	130.83	N/A	N/A	7.11	6,871.01	N/A	117.72 - 127.72	Sonsela	378.52
10/15/1981	MW-2	9/16/2014	5.00	6,878.39	6,880.30	6,878.41	1.91	6,742.82	137.48	N/A	N/A	9.20	6,871.10	N/A	112 - 122	Sonsela	391.8
10/16/1981	MW-4	9/17/2014	5.00	6,879.89	6,881.63	6,879.34	1.74	6,759.91	121.72	N/A	N/A	7.68	6,873.95	N/A	101 - 121	Sonsela	348.9
7/21/1986	MW-5	9/17/2014	4.00	6,880.20	6,882.83	6,881.77	2.63	6,752.00	130.83	N/A	N/A	11.38	6,871.45	N/A	115 - 125	Sonsela	365.18
9/26/1985	SMW-2	9/11/2014	2.00	6,881.63	6,883.97	6,879.07	2.34	6,831.17	52.80	N/A	N/A	25.10	6,858.87	N/A	34.31 - 54.31	Chinle/Alluvium and Upper	13.43
9/25/1985	SMW-4	9/11/2014	2.00	6,877.63	6,879.52	6,875.72	1.89	6,809.84	69.68	N/A	N/A	29.10	6,850.42	N/A	51.7 - 71.7	Chinle/Alluvium Interface	19.78
10/5/2009	OW-50	9/15/2014	2.00	6,912.63	6,914.21	6,911.46	1.58	6,850.21	64.00	N/A	N/A	16.86	6,897.35	N/A	48 - 63	Chinle/Alluvium Interface	23.49
10/5/2009	OW-52	9/15/2014	2.00	6,906.53	6,907.68	6,905.31	1.15	6,829.94	77.74	N/A	N/A	15.80	6,891.88	N/A	64 - 79	Chinle/Alluvium Interface	29.69
1/5/1981	OW-1	3/7/2014	4.00	6,866.32	6,866.62	6,866.44	0.30	6,772.07	94.55	N/A	N/A	0.00	6,866.62	N/A	89.3 - 99.3	Sonsela	177.7
		6/3/2014	4.00	6,866.32	6,866.62	6,866.44	0.30	6,772.07	94.55	N/A	N/A	0.00	6,866.62	N/A	89.3 - 99.3	Sonsela	177.7
		9/11/2014	4.00	6,866.32	6,866.62	6,866.44	0.30	6,772.07	94.55	N/A	N/A	0.01	6,866.61	N/A	89.3 - 99.3	Sonsela	182.58
		11/10/2014	4.00	6,866.32	6,866.62	6,866.44	0.30	6,772.07	94.55	N/A	N/A	0.00	6,866.62	N/A	89.3 - 99.3	Sonsela	184.37
11/25/1980	OW-10	3/7/2014	4.00	6,873.67	6,874.91	6,872.59	1.24	6,814.58	60.33	N/A	N/A	0.00	6,874.91	N/A	40 - 60	Sonslea	125.5
		6/3/2014	4.00	6,873.67	6,874.91	6,872.59	1.24	6,814.58	60.33	N/A	N/A	1.45	6,873.46	N/A	40 - 60	Sonsela	116.7
		9/12/2014	4.00	6,873.67	6,874.91	6,872.59	1.24	6,814.58	60.33	N/A	N/A	2.33	6,872.58	N/A	40 - 60	Sonsela	131.89
		11/10/2014	4.00	6,873.67	6,874.91	6,872.59	1.24	6,814.58	60.33	N/A	N/A	2.80	6,872.11	N/A	40 - 60	Sonsela	133.93
12/10/1980	OW-13	3/7/2014	4.00	6,918.95	6,920.07	6,915.33	1.12	6,820.92	99.15	N/A	N/A	21.77	6,898.30	N/A	78.2 - 98.2	Sonsela	170.07

Appendix C-1 - (Continued)

Date of Installation	Well ID Number	Inspection or Sample Date	Casing Diameter (Inch)	2011 Survey [1] Ground Level Elevations (ft)	2011 Survey [1] Well Casing Rim Elevations (ft)	2011 Survey [1] Ground Elevation Inside Steel Sleeve (ft)	Stick-up length (ft)	2011 Survey [1] Well Casing Bottom Elevations (ft)	Total Well Depth (ft)	Depth to SPH (ft)	SPH [2] Column Thickness (ft)	Depth to Water (ft)	Ground water Elevation [3] (ft)	Corrected Water Table [4] Elevation (factor 0.8) (ft)	Screened Interval Depth Top to Bottom (ft)	2012 Stratigraphic unit in which screen exists	Purge Volume = 3 Well Vol (gal)
		6/3/2014	4.00	6,918.95	6,920.07	6,915.33	1.12	6,820.92	99.15	N/A	N/A	21.95	6,898.12	N/A	78.2 - 98.2	Sonsela	169.63
		9/15/2014	4.00	6,918.95	6,920.07	6,915.33	1.12	6,820.92	99.15	N/A	N/A	22.61	6,897.46	N/A	78.2 - 98.2	Sonsela	169.5
		11/10/2014	4.00	6,918.95	6,920.07	6,915.33	1.12	6,820.92	99.15	N/A	N/A	22.45	6,897.62	N/A	78.2 - 98.2	Sonsela	170.43
12/17/1980	OW-14	3/7/2014	4.00	6,924.55	6,926.65	6,924.40	2.10	6,880.13	46.52	N/A	N/A	24.12	6,902.53	N/A	35 - 45	Chinle/Alluvium Interface	48.24
		6/3/2014	4.00	6,924.55	6,926.65	6,924.40	2.10	6,880.13	46.52	N/A	N/A	24.15	6,902.50	N/A	35 - 45	Chinle/Alluvium Interface	48.02
		9/15/2014	4.00	6,924.55	6,926.65	6,924.40	2.10	6,880.13	46.52	N/A	N/A	24.40	6,902.25	N/A	35 - 45	Chinle/Alluvium Interface	47.95
		11/10/2014	4.00	6,924.55	6,926.65	6,924.40	2.10	6,880.13	46.52	N/A	N/A	24.25	6,902.40	N/A	35 - 45	Chinle/Alluvium Interface	48.68
8/23/1996	OW-29	3/7/2014	4.00	6,913.89	6,917.00	6,912.09	3.11	6,865.92	51.08	N/A	N/A	18.85	6,898.15	N/A	37.5 - 47.5	Chinle/Alluvium Interface	70.06
		6/2/2014	4.00	6,913.89	6,917.00	6,912.09	3.11	6,865.92	51.08	N/A	N/A	18.95	6,898.05	N/A	37.5 - 47.5	Chinle/Alluvium Interface	71.93
	OW-29	9/15/2014	4.00	6,913.89	6,917.00	6,912.09	3.11	6,865.92	51.08	N/A	N/A	19.35	6,897.65	N/A	37.5 - 47.5	Chinle/Alluvium Interface	69.66
		11/11/2014	4.00	6,913.89	6,917.00	6,912.09	3.11	6,865.92	51.08	N/A	N/A	19.16	6,897.84	N/A	37.5 - 47.5	Chinle/Alluvium Interface	70.55
8/28/1996	OW-30	3/7/2014	4.00	6,921.81	6,924.69	6,919.84	2.88	6,874.79	49.90	N/A	N/A	23.42	6,901.27	N/A	37.9 - 47.9	Chinle/Alluvium Interface	57.5
		6/3/2014	4.00	6,921.81	6,924.69	6,919.84	2.88	6,874.79	49.90	N/A	N/A	23.51	6,901.18	N/A	37.9 - 47.9	Chinle/Alluvium Interface	57.05
		9/17/2014	4.00	6,921.81	6,924.69	6,919.84	2.88	6,874.79	49.90	N/A	N/A	23.84	6,900.85	N/A	37.9 - 47.9	Chinle/Alluvium Interface	56.83
		11/11/2014	4.00	6,921.81	6,924.69	6,919.84	2.88	6,874.79	49.90	N/A	N/A	23.70	6,900.99	N/A	37.9 - 47.9	Chinle/Alluvium Interface	57.72
7/8/2004	GWM-1	3/11/2014	2.00	6,910.22	6,912.61	6,908.36	2.39	6,886.41	26.20	N/A	N/A	18.92	6,893.69	N/A	17.5 - 23.5	Chinle/Alluvium Interface	4.56
		6/5/2014	2.00	6,910.22	6,912.61	6,908.36	2.39	6,886.41	26.20	N/A	N/A	19.10	6,893.51	N/A	17.5 - 23.5	Chinle/Alluvium Interface	4.28
		9/12/2014	2.00	6,910.22	6,912.61	6,908.36	2.39	6,886.41	26.20	N/A	N/A	19.56	6,893.05	N/A	17.5 - 23.5	Chinle/Alluvium Interface	4.07
		11/13/2014	2.00	6,910.22	6,912.61	6,908.36	2.39	6,886.41	26.20	N/A	N/A	20.08	6,892.53	N/A	17.5 - 23.5	Chinle/Alluvium Interface	3.81
9/25/2005	GWM-2	3/11/2014	2.00	6,910.32	6,913.09	6,908.05	2.77	6,894.28	18.81	N/A	N/A	DRY	DRY	N/A	3.2 - 16.2	Chinle/Alluvium Interface	1
		6/5/2014	2.00	6,910.32	6,913.09	6,908.05	2.77	6,894.28	18.81	N/A	N/A	DRY	DRY	N/A	3.2 - 16.2	Chinle/Alluvium Interface	0.84
		9/12/2014	2.00	6,910.32	6,913.09	6,908.05	2.77	6,894.28	18.81	N/A	N/A	DRY	DRY	N/A	3.2 - 16.2	Chinle/Alluvium Interface	0.45
		11/11/2014	2.00	6,910.32	6,913.09	6,908.05	2.77	6,894.28	18.81	N/A	N/A	DRY	DRY	N/A	3.2 - 16.2	Chinle/Alluvium Interface	0.21
9/25/2005	GWM-3	3/11/2014	2.00	6,907.35	6,910.25	6,905.48	2.90	6,892.45	17.80	N/A	N/A	DRY	DRY	N/A	3 - 15	Chinle/Alluvium Interface	NA
		6/5/2014	2.00	6,907.35	6,910.25	6,905.48	2.90	6,892.45	17.80	N/A	N/A	DRY	DRY	N/A	3 - 15	Chinle/Alluvium Interface	NA
		9/12/2014	2.00	6,907.35	6,910.25	6,905.48	2.90	6,892.45	17.80	N/A	N/A	DRY	DRY	N/A	3 - 15	Chinle/Alluvium Interface	NA
		11/11/2014	2.00	6,907.35	6,910.25	6,905.48	2.90	6,892.45	17.80	N/A	N/A	DRY	DRY	N/A	3 - 15	Chinle/Alluvium Interface	NA
3/14/2008	NAPIS-1	3/10/2014	2.00	6,913.62	6,913.86	6,913.56	0.24	6,900.33	13.53	N/A	N/A	6.78	6,907.08	N/A	3.7 - 13.7	Chinle/Alluvium Interface	2.78
		6/5/2014	2.00	6,913.62	6,913.86	6,913.56	0.24	6,900.33	13.53	N/A	N/A	6.86	6,907.00	N/A	3.7 - 13.7	Chinle/Alluvium Interface	2.76
		9/11/2014	2.00	6,913.62	6,913.86	6,913.56	0.24	6,900.33	13.53	N/A	N/A	6.85	6,907.01	N/A	3.7 - 13.7	Chinle/Alluvium Interface	3.37
		11/11/2014	2.00	6,913.62	6,913.86	6,913.56	0.24	6,900.33	13.53	N/A	N/A	6.96	6,906.90	N/A	3.7 - 13.7	Chinle/Alluvium Interface	3.36
3/14/2008	NAPIS-2	3/10/2014	2.00	6,913.40	6,912.65	6,912.54	-0.75	6,899.04	13.61	N/A	N/A	8.03	6,904.62	N/A	4.2 - 14.2	Chinle/Alluvium Interface	2.16
		6/5/2014	2.00	6,913.40	6,912.65	6,912.54	-0.75	6,899.04	13.61	N/A	N/A	8.20	6,904.45	N/A	4.2 - 14.2	Chinle/Alluvium Interface	2.25
		9/11/2014	2.00	6,913.40	6,912.65	6,912.54	-0.75	6,899.04	13.61	N/A	N/A	8.10	6,904.55	N/A	4.2 - 14.2	Chinle/Alluvium Interface	2.58
		11/11/2014	2.00	6,913.40	6,912.65	6,912.54	-0.75	6,899.04	13.61	N/A	N/A	8.20	6,904.45	N/A	4.2 - 14.2	Chinle/Alluvium Interface	2.65
3/14/2008	NAPIS-3	3/10/2014	2.00	6,913.38	6,912.76	6,912.53	-0.62	6,882.34	30.42	N/A	N/A	8.90	6,903.86	N/A	25.4 - 30-4	Chinle/Alluvium Interface	10.43
		6/5/2014	2.00	6,913.38	6,912.76	6,912.53	-0.62	6,882.34	30.42	N/A	N/A	8.85	6,903.91	N/A	25.4 - 30-4	Chinle/Alluvium Interface	10.65
		9/11/2014	2.00	6,913.38	6,912.76	6,912.53	-0.62	6,882.34	30.42	N/A	N/A	7.97	6,904.79	N/A	25.4 - 30-4	Chinle/Alluvium Interface	10.51
		11/13/2014	2.00	6,913.38	6,912.76	6,912.53	-0.62	6,882.34	30.42	N/A	N/A	9.18	6,903.58	N/A	25.4 - 30-4	Chinle/Alluvium Interface	10.67
6/11/2007	KA-3	3/10/2014	2.00	6,913.29	6,912.52	6,912.20	-0.77	6,889.32	23.20	N/A	N/A	8.03	6,904.49	N/A	15 - 25	Chinle/Alluvium Interface	6.91
		6/5/2014	2.00	6,913.29	6,912.52	6,912.20	-0.77	6,889.32	23.20	N/A	N/A	7.95	6,904.57	N/A	15 - 25	Chinle/Alluvium Interface	7
		9/11/2014	2.00	6,913.29	6,912.52	6,912.20	-0.77	6,889.32	23.20	N/A	N/A	9.00	6,903.52	N/A	15 - 25	Chinle/Alluvium Interface	7.26
		11/11/2014	2.00	6,913.29	6,912.52	6,912.20	-0.77	6,889.32	23.20	N/A	N/A	8.00	6,904.52	N/A	15 - 25	Chinle/Alluvium Interface	7.48

Appendix C-1 - (Continued)

Date of Installation	Well ID Number	Inspection or Sample Date	Casing Diameter (Inch)	2011 Survey [1] Ground Level Elevations (ft)	2011 Survey [1] Well Casing Rim Elevations (ft)	2011 Survey [1] Ground Elevation Inside Steel Sleeve (ft)	Stick-up length (ft)	2011 Survey [1] Well Casing Bottom Elevations (ft)	Total Well Depth (ft)	Depth to SPH (ft)	SPH [2] Column Thickness (ft)	Depth to Water (ft)	Ground water Elevation [3] (ft)	Corrected Water Table [4] Elevation (factor 0.8) (ft)	Screened Interval Depth Top to Bottom (ft)	2012 Stratigraphic unit in which screen exists	Purge Volume = 3 Well Vol (gal)
7/17/2012	OAPIS-1	3/10/2014	2.00	6,914.37	6,916.73	6,916.50	2.36	6,888.37	28.30	N/A	N/A	11.50	6,905.23	N/A	16 - 26	Chinle/Alluvium Interface	8.37
		6/5/2014	2.00	6,914.37	6,916.73	6,916.50	2.36	6,888.37	28.30	N/A	N/A	11.75	6,904.98	N/A	17 - 26	Chinle/Alluvium Interface	8.22
		9/12/2014	2.00	6,914.37	6,916.73	6,916.50	2.36	6,888.37	28.30	N/A	N/A	11.11	6,905.62	N/A	18 - 26	Chinle/Alluvium Interface	8.61
		11/11/2014	2.00	6,914.37	6,916.73	6,916.50	2.36	6,888.37	28.30	N/A	N/A	17.21	6,899.52	N/A	19 - 26	Chinle/Alluvium Interface	8.51
3/28/1995	RW-1	3/14/2014	4.00	6,942.86	6,946.06	6,941.25	3.20	6,903.02	43.04	28.11	3.54	31.65	6,914.41	6917.242	25 - 40	Chinle/Alluvium Interface	NA
	RW-1	6/9/2014	4.00	6,942.86	6,946.06	6,941.25	3.20	6,903.02	43.04	28.05	5.01	33.06	6,913.00	N\A	25 - 40	Chinle/Alluvium Interface	NA
		9/18/2014	4.00	6,942.86	6,946.06	6,941.25	3.20	6,903.02	43.04	28.31	Not Recorded	Not Recorded [5]	N/A	N\A	25 - 40	Chinle/Alluvium Interface	19
		11/13/2014	4.00	6,942.86	6,946.06	6,941.25	3.20	6,903.02	43.04	28.15	4.89	33.04	6,913.02	6916.932	25 - 40	Chinle/Alluvium Interface	NA
3/29/1995	RW-2	3/17/2014	4.00	6,926.40	6,928.53	6,925.02	2.13	6,888.73	39.80	0.00	0.00	24.59	6,903.94	6903.94	26.1 - 36.1	Chinle/Alluvium Interface	NA
		6/9/2014	4.00	6,926.40	6,928.53	6,925.02	2.13	6,888.73	39.80	0.00	0.00	23.79	6,904.74	6904.74	26.1 - 36.1	Chinle/Alluvium Interface	NA
		9/18/2014	4.00	6,926.40	6,928.53	6,925.02	2.13	6,888.73	39.80	0.00	0.00	23.95	6,904.58	6904.58	26.1 - 36.1	Chinle/Alluvium Interface	10
		11/13/2014	4.00	6,926.40	6,928.53	6,925.02	2.13	6,888.73	39.80	0.00	0.00	23.90	6,904.63	6904.63	26.1 - 36.1	Chinle/Alluvium Interface	NA
8/27/1997	RW-5	3/14/2014	4.00	6,941.53	6,943.57	6,940.82	2.04	6,903.98	39.59	0.00	0.00	27.92	6,915.65	6915.65	29.5 - 39.5	Chinle/Alluvium Interface	NA
		6/9/2014	4.00	6,941.53	6,943.57	6,940.82	2.04	6,903.98	39.59	0.00	0.00	28.80	6,914.77	6914.77	29.5 - 39.5	Chinle/Alluvium Interface	NA
		9/18/2014	4.00	6,941.53	6,943.57	6,940.82	2.04	6,903.98	39.59	0.00	0.00	28.81	6,914.76	6914.76	29.5 - 39.5	Chinle/Alluvium Interface	15
		11/13/2014	4.00	6,941.53	6,943.57	6,940.82	2.04	6,903.98	39.59	0.00	0.00	28.70	6,914.87	6914.87	29.5 - 39.5	Chinle/Alluvium Interface	NA
8/27/1997	RW-6	3/17/2014	4.00	6,941.96	6,944.01	6,941.49	2.05	6,903.11	40.90	0.00	0.00	28.04	6,915.97	6915.97	28.5 - 38.5	Chinle/Alluvium Interface	NA
		6/23/2014	4.00	6,941.96	6,944.01	6,941.49	2.05	6,903.11	40.90	0.00	0.00	28.85	6,915.16	6915.16	28.5 - 38.5	Chinle/Alluvium Interface	NA
		9/18/2014	4.00	6,941.96	6,944.01	6,941.49	2.05	6,903.11	40.90	0.00	0.00	28.89	6,915.12	6915.12	28.5 - 38.5	Chinle/Alluvium Interface	20
		11/13/2014	4.00	6,941.96	6,944.01	6,941.49	2.05	6,903.11	40.90	0.00	0.00	28.83	6,915.18	6915.18	28.5 - 38.5	Chinle/Alluvium Interface	NA

DEFINITIONS:
DTB - Depth to Bottom
DTW - Depth to Water
SPH = Separate Phase Hydrocarbons
N/A = Not Available
Negative number in Stick Up Length column indicates well is located at or below ground level.
Depth to Water Column - if 0.00 is indicated - means water is at top of casing (full). Dry indicates no water was detected.

NOTES:

1. *Elevation data from NMED's "Approval with Modifications, Requirement to Resurvey Ground water Monitoring Wells and Recovery Wells", dated 9/26/12.*
2. *Ground water elevation - Depth to SPH = SPH Column Thickness.*
3. *2011 Survey Well Casing Rim elevation - depth to water measurement.*
4. *Corrected Water Table Elevation applies only if SPH thickness column measurement exists. (0.8 X SPH thickness + Ground Water Elevation)*
5. *DTW measurement not recorded at time of gauging.*
6. *BW-1A, B, C: Height and width of berm was increased where these wells are located for repairs. Berm work at all evaporation ponds from April through August for berm repairs (erosion). Casings were extended and all three wells were resurveyed by HEI (Hammon Enterprises Inc) upon completion.*

Appendix C-1.1

WELL DATA 2014 ANNUAL/QUARTERLY SAMPLING
DTB/DTW MEASUREMENTS FOR MKTF 1 - MKTF 45 WELLS

Date of Installation	Date of Survey [1]	Well ID Number	Inspection or Sample Date	Casing Diameter (Inch)	Ground Level Elevations (ft)	Well Casing Rim Elevations (ft)	Ground Elevation Inside Steel Sleeve (ft)	Stick-up length (ft)	Well Casing Bottom Elevation (ft)	Total Well Depth (ft)	Depth to SPH (ft)	SPH [2] Column Thickness (ft)	Depth to Water (ft)	Ground water Elevation (ft)	Corrected Water Table[3] Elevation (Factor 0.8) (ft)	Screened Interval Depth Top to Bottom (ft)	Stratigraphic unit in which screen exists
11/14/2013	1/21/2014	MKTF-01	1/13/2014	4.00	6,918.28	6,920.67	6,920.67	2.39	6,903.25	17.42	7.90	0.44	8.34	6,912.33	6912.68	5 - 15	Chinle/Alluvium Interface
			2/12/2014	4.00	6,918.28	6,920.67	6,920.67	2.39	6,903.25	17.42	6.73	0.75	7.48	6,913.19	6913.79	5 - 15	Chinle/Alluvium Interface
			3/11/2014	4.00	6,918.28	6,920.67	6,920.67	2.39	6,903.25	17.42	6.10	0.28	6.38	6,914.29	6914.51	5 - 15	Chinle/Alluvium Interface
			6/6/2014	4.00	6,918.28	6,920.67	6,920.67	2.39	6,903.25	17.42	0.00	0.00	7.00	6,913.67	6913.67	5 - 15	Chinle/Alluvium Interface
			9/15/2014	4.00	6,918.28	6,920.67	6,920.67	2.39	6,903.25	17.42	6.94	0.04	6.98	6,913.69	6913.72	5 - 15	Chinle/Alluvium Interface
			11/14/2014	4.00	6,918.28	6,920.67	6,920.67	2.39	6,903.25	17.42	7.30	0.02	7.32	6,913.35	6913.37	5 - 15	Chinle/Alluvium Interface
11/14/2013	1/21/2014	MKTF-02	1/13/2014	4.00	6,915.00	6,917.45	6,917.18	2.45	6,896.97	20.48	0.00	0.00	7.49	6,909.96	6909.96	7 - 17	Chinle/Alluvium Interface
			2/12/2014	4.00	6,915.00	6,917.45	6,917.18	2.45	6,896.97	20.48	0.00	0.00	7.48	6,909.97	6909.97	7 - 17	Chinle/Alluvium Interface
			3/11/2014	4.00	6,915.00	6,917.45	6,917.18	2.45	6,896.97	20.48	0.00	0.00	7.03	6,910.42	6910.42	7 - 17	Chinle/Alluvium Interface
			6/6/2014	4.00	6,915.00	6,917.45	6,917.18	2.45	6,896.97	20.48	0.00	0.00	7.60	6,909.85	6909.85	7 - 17	Chinle/Alluvium Interface
			9/15/2014	4.00	6,915.00	6,917.45	6,917.18	2.45	6,896.97	20.48	0.00	0.00	8.41	6,909.04	6909.04	7 - 17	Chinle/Alluvium Interface
			11/14/2014	4.00	6,915.00	6,917.45	6,917.18	2.45	6,896.97	20.48	0.00	0.00	8.21	6,909.24	6909.24	7 - 17	Chinle/Alluvium Interface
11/7/2013	1/21/2014	MKTF-03	1/15/2014	4.00	6,931.73	6,931.69	6,930.85	-0.04	6,913.24	18.45	8.10	1.30	9.40	6,922.29	6923.33	3 - 18	Chinle/Alluvium Interface
			2/13/2014	4.00	6,931.73	6,931.69	6,930.85	-0.04	6,913.24	18.45	0.00	0.00	8.33	6,923.36	6923.36	3 - 18	Chinle/Alluvium Interface
			3/11/2014	4.00	6,931.73	6,931.69	6,930.85	-0.04	6,913.24	18.45	8.15	0.92	9.07	6,922.62	6923.36	3 - 18	Chinle/Alluvium Interface
			6/4/2014	4.00	6,931.73	6,931.69	6,930.85	-0.04	6,913.24	18.45	8.85	0.47	9.32	6,922.37	6922.75	3 - 18	Chinle/Alluvium Interface
			9/15/2014	4.00	6,931.73	6,931.69	6,930.85	-0.04	6,913.24	18.45	9.06	0.10	9.16	6,922.53	6922.61	3 - 18	Chinle/Alluvium Interface
			11/13/2014	4.00	6,931.73	6,931.69	6,930.85	-0.04	6,913.24	18.45	9.31	NA[4]	NA[4]	NA[4]	NA[4]	3 - 18	Chinle/Alluvium Interface
11/12/2013	1/21/2014	MKTF-04	1/15/2014	4.00	6,933.90	6,933.57	6,933.24	-0.33	6,911.42	22.15	0.00	0.00	10.28	6,923.29	6923.29	10 - 22	Chinle/Alluvium Interface
			2/13/2014	4.00	6,933.90	6,933.57	6,933.24	-0.33	6,911.42	22.15	0.00	0.00	10.68	6,922.89	6922.89	10 - 22	Chinle/Alluvium Interface
			3/11/2014	4.00	6,933.90	6,933.57	6,933.24	-0.33	6,911.42	22.15	0.00	0.00	10.20	6,923.37	6923.37	10 - 22	Chinle/Alluvium Interface
			6/4/2014	4.00	6,933.90	6,933.57	6,933.24	-0.33	6,911.42	22.15	0.00	0.00	10.99	6,922.58	6922.58	10 - 22	Chinle/Alluvium Interface
			9/15/2014	4.00	6,933.90	6,933.57	6,933.24	-0.33	6,911.42	22.15	0.00	0.00	11.09	6,922.48	6922.48	10 - 22	Chinle/Alluvium Interface
			11/13/2014	4.00	6,933.90	6,933.57	6,933.24	-0.33	6,911.42	22.15	0.00	0.00	11.35	6,922.22	6922.22	10 - 22	Chinle/Alluvium Interface
11/20/2013	1/21/2014	MKTF-05	1/13/2014	4.00	6,939.49	6,942.22	6,941.95	2.73	6,924.47	17.75	15.04	0.06	15.10	6,927.12	6927.17	4 - 14	Chinle/Alluvium Interface
			2/13/2014	4.00	6,939.49	6,942.22	6,941.95	2.73	6,924.47	17.75	15.33	0.04	15.37	6,926.85	6926.88	4 - 14	Chinle/Alluvium Interface
			3/11/2014	4.00	6,939.49	6,942.22	6,941.95	2.73	6,924.47	17.75	0.00	0.00	15.23	6,926.99	6926.99	4 - 14	Chinle/Alluvium Interface
			6/4/2014	4.00	6,939.49	6,942.22	6,941.95	2.73	6,924.47	17.75	15.60	0.05	15.65	6,926.57	6926.61	4 - 14	Chinle/Alluvium Interface
			9/15/2014	4.00	6,939.49	6,942.22	6,941.95	2.73	6,924.47	17.75	15.30	0.36	15.66	6,926.56	6926.85	4 - 14	Chinle/Alluvium Interface
			11/13/2014	4.00	6,939.49	6,942.22	6,941.95	2.73	6,924.47	17.75	15.79	0.38	16.17	6,926.05	6926.35	4 - 14	Chinle/Alluvium Interface
11/11/2013	1/21/2014	MKTF-06	1/13/2014	4.00	6,944.24	6,946.81	6,946.63	2.57	6,923.04	23.77	18.14	0.17	18.31	6,928.50	6928.64	8 - 20	Chinle/Alluvium Interface
			2/13/2014	4.00	6,944.24	6,946.81	6,946.63	2.57	6,923.04	23.77	18.34	0.43	18.77	6,928.04	6928.38	8 - 20	Chinle/Alluvium Interface
			3/11/2014	4.00	6,944.24	6,946.81	6,946.63	2.57	6,923.04	23.77	18.20	0.75	18.95	6,927.86	6928.46	8 - 20	Chinle/Alluvium Interface
			6/6/2014	4.00	6,944.24	6,946.81	6,946.63	2.57	6,923.04	23.77	NA[5]	NA[5]	14.00	6,932.81	NA[5]	8 - 20	Chinle/Alluvium Interface
			9/15/2014	4.00	6,944.24	6,946.81	6,946.63	2.57	6,923.04	23.77	18.15	0.75	18.90	6,927.91	6928.51	8 - 20	Chinle/Alluvium Interface
			11/14/2014	4.00	6,944.24	6,946.81	6,946.63	2.57	6,923.04	23.77	18.58	NA[4]	NA[4]	NA[4]	NA[4]	8 - 20	Chinle/Alluvium Interface
11/11/2013	1/21/2014	MKTF-07	1/13/2014	4.00	6,944.40	6,947.18	6,947.06	2.78	6,929.56	17.62	11.91	1.10	13.01	6,934.17	6935.05	4 - 14	Chinle/Alluvium Interface
			2/13/2014	4.00	6,944.40	6,947.18	6,947.06	2.78	6,929.56	17.62	11.88	1.12	13.00	6,934.18	6935.08	4 - 14	Chinle/Alluvium Interface
			3/11/2014	4.00	6,944.40	6,947.18	6,947.06	2.78	6,929.56	17.62	11.70	1.15	12.85	6,934.33	6935.25	4 - 14	Chinle/Alluvium Interface
			6/6/2014	4.00	6,944.40	6,947.18	6,947.06	2.78	6,929.56	17.62	NA[5]	NA[5]	13.10	6,934.08	NA[5]	4 - 14	Chinle/Alluvium Interface
			9/15/2014	4.00	6,944.40	6,947.18	6,947.06	2.78	6,929.56	17.62	12.00	1.60	13.60	6,933.58	6934.86	4 - 14	Chinle/Alluvium Interface
			11/14/2014	4.00	6,944.40	6,947.18	6,947.06	2.78	6,929.56	17.62	13.32	NA[4]	NA[4]	NA[4]	NA[4]	4 - 14	Chinle/Alluvium Interface

Appendix C-1.1 (Continued)

Date of Installation	Date of Survey [1]	Well ID Number	Inspection or Sample Date	Casing Diameter (Inch)	Ground Level Elevations (ft)	Well Casing Rim Elevations (ft)	Ground Elevation Inside Steel Sleeve (ft)	Stick-up length (ft)	Well Casing Bottom Elevation (ft)	Total Well Depth (ft)	Depth to SPH (ft)	SPH [2] Column Thickness (ft)	Depth to Water (ft)	Ground water Elevation (ft)	Corrected Water Table[3] Elevation (Factor 0.8) (ft)	Screened Interval Depth Top to Bottom (ft)	Stratigraphic unit in which screen exists
11/11/2013	1/21/2014	MKTF-08	1/13/2014	4.00	6,944.02	6,947.09	6,942.67	3.07	6,925.11	21.98	14.20	0.42	14.62	6,932.47	6932.81	8 - 18	Chinle/Alluvium Interface
			2/13/2014	4.00	6,944.02	6,947.09	6,942.67	3.07	6,925.11	21.98	14.25	0.44	14.69	6,932.40	6932.75	8 - 18	Chinle/Alluvium Interface
			3/11/2014	4.00	6,944.02	6,947.09	6,942.67	3.07	6,925.11	21.98	14.21	0.44	14.65	6,932.44	6932.79	8 - 18	Chinle/Alluvium Interface
			6/6/2014	4.00	6,944.02	6,947.09	6,942.67	3.07	6,925.11	21.98	14.30	0.70	15.00	6,932.09	6932.65	8 - 18	Chinle/Alluvium Interface
			9/15/2014	4.00	6,944.02	6,947.09	6,942.67	3.07	6,925.11	21.98	14.36	0.69	15.05	6,932.04	6932.59	8 - 18	Chinle/Alluvium Interface
			11/14/2014	4.00	6,944.02	6,947.09	6,942.67	3.07	6,925.11	21.98	14.88	NA[4]	NA[4]	NA[4]	NA[4]	8 - 18	Chinle/Alluvium Interface
11/11/2013	1/21/2014	MKTF-09	1/13/2014	4.00	6,943.57	6,946.50	6,945.90	2.93	6,923.80	22.70	0.00	0.00	14.78	6,931.72	6931.72	7 - 19	Chinle/Alluvium Interface
			2/13/2014	4.00	6,943.57	6,946.50	6,945.90	2.93	6,923.80	22.70	0.00	0.00	14.82	6,931.68	6931.68	7 - 19	Chinle/Alluvium Interface
			3/11/2014	4.00	6,943.57	6,946.50	6,945.90	2.93	6,923.80	22.70	0.00	0.00	14.80	6,931.70	6931.70	7 - 19	Chinle/Alluvium Interface
			6/5/2014	4.00	6,943.57	6,946.50	6,945.90	2.93	6,923.80	22.70	0.00	0.00	14.90	6,931.60	6931.60	7 - 19	Chinle/Alluvium Interface
			9/15/2014	4.00	6,943.57	6,946.50	6,945.90	2.93	6,923.80	22.70	0.00	0.00	14.89	6,931.61	6931.61	7 - 19	Chinle/Alluvium Interface
			11/14/2014	4.00	6,943.57	6,946.50	6,945.90	2.93	6,923.80	22.70	0.00	0.00	15.21	6,931.29	6931.29	7 - 19	Chinle/Alluvium Interface
10/31/2013	1/21/2014	MKTF-10	1/13/2014	4.00	6,937.51	6,937.16	6,936.63	-0.35	6,921.17	15.99	0.00	0.00	8.75	6,928.41	6928.41	7 - 17	Chinle/Alluvium Interface
			2/13/2014	4.00	6,937.51	6,937.16	6,936.63	-0.35	6,921.17	15.99	0.00	0.00	8.89	6,928.27	6928.27	7 - 17	Chinle/Alluvium Interface
			3/11/2014	4.00	6,937.51	6,937.16	6,936.63	-0.35	6,921.17	15.99	0.00	0.00	8.88	6,928.28	6928.28	7 - 17	Chinle/Alluvium Interface
			6/5/2014	4.00	6,937.51	6,937.16	6,936.63	-0.35	6,921.17	15.99	0.00	0.00	8.90	6,928.26	6928.26	7 - 17	Chinle/Alluvium Interface
			9/15/2014	4.00	6,937.51	6,937.16	6,936.63	-0.35	6,921.17	15.99	0.00	0.00	8.99	6,928.17	6928.17	7 - 17	Chinle/Alluvium Interface
			11/14/2014	4.00	6,937.51	6,937.16	6,936.63	-0.35	6,921.17	15.99	0.00	0.00	10.05	6,927.11	6927.11	7 - 17	Chinle/Alluvium Interface
10/31/2013	1/21/2014	MKTF-11	1/15/2014	4.00	6,931.61	6,931.34	6,930.86	-0.27	6,913.20	18.14	0.00	0.00	8.49	6,922.85	6922.85	8 - 18	Chinle/Alluvium Interface
			2/13/2014	4.00	6,931.61	6,931.34	6,930.86	-0.27	6,913.20	18.14	0.00	0.00	8.64	6,922.70	6922.70	8 - 18	Chinle/Alluvium Interface
			3/11/2014	4.00	6,931.61	6,931.34	6,930.86	-0.27	6,913.20	18.14	0.00	0.00	8.50	6,922.84	6922.84	8 - 18	Chinle/Alluvium Interface
			6/5/2014	4.00	6,931.61	6,931.34	6,930.86	-0.27	6,913.20	18.14	0.00	0.00	9.20	6,922.14	6922.14	8 - 18	Chinle/Alluvium Interface
			9/15/2014	4.00	6,931.61	6,931.34	6,930.86	-0.27	6,913.20	18.14	0.00	0.00	9.35	6,921.99	6921.99	8 - 18	Chinle/Alluvium Interface
			11/13/2014	4.00	6,931.61	6,931.34	6,930.86	-0.27	6,913.20	18.14	0.00	0.00	9.55	6,921.79	6921.79	8 - 18	Chinle/Alluvium Interface
11/7/2013	1/21/2014	MKTF-12	1/13/2014	4.00	6,939.70	6,942.11	6,941.88	2.41	6,916.51	25.60	19.26	0.27	19.53	6,922.58	6922.80	12 - 22	Chinle/Alluvium Interface
			2/12/2014	4.00	6,939.70	6,942.11	6,941.88	2.41	6,916.51	25.60	19.45	0.42	19.87	6,922.24	6922.58	12 - 22	Chinle/Alluvium Interface
			3/11/2014	4.00	6,939.70	6,942.11	6,941.88	2.41	6,916.51	25.60	19.15	0.28	19.43	6,922.68	6922.90	12 - 22	Chinle/Alluvium Interface
			6/4/2014	4.00	6,939.70	6,942.11	6,941.88	2.41	6,916.51	25.60	19.74	0.08	19.82	6,922.29	6922.35	12 - 22	Chinle/Alluvium Interface
			9/15/2014	4.00	6,939.70	6,942.11	6,941.88	2.41	6,916.51	25.60	19.81	1.19	21.00	6,921.11	6922.06	12 - 22	Chinle/Alluvium Interface
			11/17/2014	4.00	6,939.70	6,942.11	6,941.88	2.41	6,916.51	25.60	20.20	1.18	21.38	6,920.73	6921.67	12 - 22	Chinle/Alluvium Interface
11/12/2013	1/21/2014	MKTF-13	1/13/2014	4.00	6,933.67	6,935.18	6,934.83	1.51	6,913.93	21.25	12.80	0.30	13.10	6,922.08	6922.32	8 - 18	Chinle/Alluvium Interface
			2/12/2014	4.00	6,933.67	6,935.18	6,934.83	1.51	6,913.93	21.25	12.98	0.34	13.32	6,921.86	6922.13	8 - 18	Chinle/Alluvium Interface
			3/11/2014	4.00	6,933.67	6,935.18	6,934.83	1.51	6,913.93	21.25	12.67	0.33	13.00	6,922.18	6922.44	8 - 18	Chinle/Alluvium Interface
			6/4/2014	4.00	6,933.67	6,935.18	6,934.83	1.51	6,913.93	21.25	14.60	0.65	15.25	6,919.93	6920.45	8 - 18	Chinle/Alluvium Interface
			9/15/2014	4.00	6,933.67	6,935.18	6,934.83	1.51	6,913.93	21.25	14.61	1.14	15.75	6,919.43	6920.34	8 - 18	Chinle/Alluvium Interface
			11/17/2014	4.00	6,933.67	6,935.18	6,934.83	1.51	6,913.93	21.25	14.93	1.40	16.33	6,918.85	6919.97	8 - 18	Chinle/Alluvium Interface
11/12/2013	1/21/2014	MKTF-14	1/13/2014	4.00	6,925.65	6,928.02	6,927.80	2.37	6,910.56	17.46	7.38	1.61	8.99	6,919.03	6920.32	4 - 14	Chinle/Alluvium Interface
			2/12/2014	4.00	6,925.65	6,928.02	6,927.80	2.37	6,910.56	17.46	7.60	1.17	8.77	6,919.25	6920.19	4 - 14	Chinle/Alluvium Interface
			3/11/2014	4.00	6,925.65	6,928.02	6,927.80	2.37	6,910.56	17.46	7.27	1.15	8.42	6,919.60	6920.52	4 - 14	Chinle/Alluvium Interface
			6/4/2014	4.00	6,925.65	6,928.02	6,927.80	2.37	6,910.56	17.46	7.91	0.82	8.73	6,919.29	6919.95	4 - 14	Chinle/Alluvium Interface
			9/15/2014	4.00	6,925.65	6,928.02	6,927.80	2.37	6,910.56	17.46	8.30	0.45	8.75	6,919.27	6919.63	4 - 14	Chinle/Alluvium Interface
			11/17/2014	4.00	6,925.65	6,928.02	6,927.80	2.37	6,910.56	17.46	8.57	0.37	8.94	6,919.08	6919.38	4 - 14	Chinle/Alluvium Interface

Appendix C-1.1 (Continued)

Date of Installation	Date of Survey [1]	Well ID Number	Inspection or Sample Date	Casing Diameter (Inch)	Ground Level Elevations (ft)	Well Casing Rim Elevations (ft)	Ground Elevation Inside Steel Sleeve (ft)	Stick-up length (ft)	Well Casing Bottom Elevation (ft)	Total Well Depth (ft)	Depth to SPH (ft)	SPH [2] Column Thickness (ft)	Depth to Water (ft)	Ground water Elevation (ft)	Corrected Water Table[3] Elevation (Factor 0.8) (ft)	Screened Interval Depth Top to Bottom (ft)	Stratigraphic unit in which screen exists
10/29/2013	1/21/2014	MKTF-15	1/13/2014	2.00	6,943.74	6,943.48	6,943.19	-0.26	6,924.00	19.48	0.00	0.00	13.88	6,929.60	6929.60	9 - 19	Chinle/Alluvium Interface
			2/13/2014	2.00	6,943.74	6,943.48	6,943.19	-0.26	6,924.00	19.48	0.00	0.00	13.88	6,929.60	6929.60	9 - 19	Chinle/Alluvium Interface
			3/11/2014	2.00	6,943.74	6,943.48	6,943.19	-0.26	6,924.00	19.48	0.00	0.00	13.86	6,929.62	6929.62	9 - 19	Chinle/Alluvium Interface
			6/5/2014	2.00	6,943.74	6,943.48	6,943.19	-0.26	6,924.00	19.48	0.00	0.00	13.81	6,929.67	6929.67	9 - 19	Chinle/Alluvium Interface
			9/15/2014	2.00	6,943.74	6,943.48	6,943.19	-0.26	6,924.00	19.48	0.00	0.00	13.71	6,929.77	6929.77	9 - 19	Chinle/Alluvium Interface
			11/14/2014	2.00	6,943.74	6,943.48	6,943.19	-0.26	6,924.00	19.48	13.50	1.05	14.55	6,928.93	6929.77	9 - 19	Chinle/Alluvium Interface
11/7/2013	1/21/2014	MKTF-16	1/13/2014	2.00	6,951.00	6,950.58	6,950.58	-0.42	6,936.48	14.10	0.00	0.00	9.45	6,941.13	6941.13	4 - 14	Chinle/Alluvium Interface
			2/13/2014	2.00	6,951.00	6,950.58	6,950.58	-0.42	6,936.48	14.10	0.00	0.00	9.63	6,940.95	6940.95	4 - 14	Chinle/Alluvium Interface
			3/11/2014	2.00	6,951.00	6,950.58	6,950.58	-0.42	6,936.48	14.10	0.00	0.00	9.66	6,940.92	6940.92	4 - 14	Chinle/Alluvium Interface
			6/5/2014	2.00	6,951.00	6,950.58	6,950.58	-0.42	6,936.48	14.10	0.00	0.00	10.52	6,940.06	6940.06	4 - 14	Chinle/Alluvium Interface
			9/15/2014	2.00	6,951.00	6,950.58	6,950.58	-0.42	6,936.48	14.10	0.00	0.00	10.60	6,939.98	6939.98	4 - 14	Chinle/Alluvium Interface
			11/18/2014	2.00	6,951.00	6,950.58	6,950.58	-0.42	6,936.48	14.10	0.00	0.00	11.66	6,938.92	6938.92	4 - 14	Chinle/Alluvium Interface
11/14/2013	1/21/2014	MKTF-17	1/13/2014	2.00	6,945.79	6,945.76	6,945.64	-0.03	6,921.65	24.11	0.00	0.00	8.81	6,936.95	6936.95	14 - 24	Chinle/Alluvium Interface
			2/13/2014	2.00	6,945.79	6,945.76	6,945.64	-0.03	6,921.65	24.11	0.00	0.00	9.81	6,935.95	6935.95	14 - 24	Chinle/Alluvium Interface
			3/11/2014	2.00	6,945.79	6,945.76	6,945.64	-0.03	6,921.65	24.11	0.00	0.00	10.00	6,935.76	6935.76	14 - 24	Chinle/Alluvium Interface
			6/6/2014	2.00	6,945.79	6,945.76	6,945.64	-0.03	6,921.65	24.11	0.00	0.00	11.28	6,934.48	6934.48	14 - 24	Chinle/Alluvium Interface
			9/15/2014	2.00	6,945.79	6,945.76	6,945.64	-0.03	6,921.65	24.11	0.00	0.00	11.27	6,934.49	6934.49	14 - 24	Chinle/Alluvium Interface
			11/18/2014	2.00	6,945.79	6,945.76	6,945.64	-0.03	6,921.65	24.11	0.00	0.00	12.75	6,933.01	6933.01	14 - 24	Chinle/Alluvium Interface
11/15/2013	1/21/2014	MKTF-18	1/13/2014	2.00	6,950.97	6,950.65	6,950.17	-0.32	6,925.27	25.38	0.00	0.00	8.33	6,942.32	6942.32	17 - 27	Chinle/Alluvium Interface
			2/13/2014	2.00	6,950.97	6,950.65	6,950.17	-0.32	6,925.27	25.38	0.00	0.00	8.33	6,942.32	6942.32	17 - 27	Chinle/Alluvium Interface
			3/11/2014	2.00	6,950.97	6,950.65	6,950.17	-0.32	6,925.27	25.38	0.00	0.00	8.09	6,942.56	6942.56	17 - 27	Chinle/Alluvium Interface
			6/6/2014	2.00	6,950.97	6,950.65	6,950.17	-0.32	6,925.27	25.38	0.00	0.00	8.45	6,942.20	6942.20	17 - 27	Chinle/Alluvium Interface
			9/15/2014	2.00	6,950.97	6,950.65	6,950.17	-0.32	6,925.27	25.38	0.00	0.00	8.81	6,941.84	6941.84	17 - 27	Chinle/Alluvium Interface
			11/18/2014	2.00	6,950.97	6,950.65	6,950.17	-0.32	6,925.27	25.38	0.00	0.00	9.46	6,941.19	6941.19	17 - 27	Chinle/Alluvium Interface
4/30/2014	1/21/2014	MKTF-19	6/4/2014	2.00	6,944.89	6,944.67	6,944.34	-0.22	6,927.20	17.47	0.00	0.00	11.91	6,932.76	6932.76	10 - 20	Chinle/Alluvium Interface
			9/24/2014	2.00	6,944.89	6,944.67	6,944.34	-0.22	6,927.20	17.47	0.00	0.00	12.47	6,932.20	6932.20	10 - 20	Chinle/Alluvium Interface
			11/18/2014	2.00	6,944.89	6,944.67	6,944.34	-0.22	6,927.20	17.47	0.00	0.00	13.76	6,930.91	6930.91	10 - 20	Chinle/Alluvium Interface
4/30/2014	1/21/2014	MKTF-20	6/4/2014	4.00	6,951.89	6,951.78	6,951.17	-0.11	6,941.89	9.89	0.00	0.00	7.91	6,943.87	6943.87	2 - 10	Chinle/Alluvium Interface
			9/23/2014	4.00	6,951.89	6,951.78	6,951.17	-0.11	6,941.89	9.89	0.00	0.00	8.38	6,943.40	6943.40	2 - 10	Chinle/Alluvium Interface
			11/18/2014	4.00	6,951.89	6,951.78	6,951.17	-0.11	6,941.89	9.89	0.00	0.00	8.40	6,943.38	6943.38	2 - 10	Chinle/Alluvium Interface
4/30/2014	1/21/2014	MKTF-21	6/4/2014	4.00	6,952.68	6,952.57	6,952.00	-0.11	6,942.68	9.89	0.00	0.00	7.68	6,944.89	6944.89	2 - 10	Chinle/Alluvium Interface
			9/23/2014	4.00	6,952.68	6,952.57	6,952.00	-0.11	6,942.68	9.89	0.00	0.00	8.39	6,944.18	6944.18	2 - 10	Chinle/Alluvium Interface
			11/18/2014	4.00	6,952.68	6,952.57	6,952.00	-0.11	6,942.68	9.89	0.00	0.00	8.00	6,944.57	6944.57	2 - 10	Chinle/Alluvium Interface
4/30/2014	1/21/2014	MKTF-22	6/4/2014	2.00	6,939.76	6,942.31	6,938.57	2.55	6,907.06	35.25	0.00	0.00	26.25	6,916.06	6916.06	22 - 32	Chinle/Alluvium Interface
			9/23/2014	2.00	6,939.76	6,942.31	6,938.57	2.55	6,907.06	35.25	0.00	0.00	0.00	6,942.31	6942.31	22 - 32	Chinle/Alluvium Interface
			11/17/2014	2.00	6,939.76	6,942.31	6,938.57	2.55	6,907.06	35.25	0.00	0.00	26.67	6,915.64	6915.64	22 - 32	Chinle/Alluvium Interface
4/30/2014	1/21/2014	MKTF-23	6/4/2014	2.00	6,927.23	6,929.98	6,925.79	2.75	6,909.62	20.36	0.00	0.00	14.85	6,915.13	6915.13	7 - 17	Chinle/Alluvium Interface
			9/23/2014	2.00	6,927.23	6,929.98	6,925.79	2.75	6,909.62	20.36	0.00	0.00	15.39	6,914.59	6914.59	7 - 17	Chinle/Alluvium Interface
			11/17/2014	2.00	6,927.23	6,929.98	6,925.79	2.75	6,909.62	20.36	0.00	0.00	15.27	6,914.71	6914.71	7 - 17	Chinle/Alluvium Interface

Appendix C-1.1 (Continued)

Date of Installation	Date of Survey [1]	Well ID Number	Inspection or Sample Date	Casing Diameter (Inch)	Ground Level Elevations (ft)	Well Casing Rim Elevations (ft)	Ground Elevation Inside Steel Sleeve (ft)	Stick-up length (ft)	Well Casing Bottom Elevation (ft)	Total Well Depth (ft)	Depth to SPH (ft)	SPH [2] Column Thickness (ft)	Depth to Water (ft)	Ground water Elevation (ft)	Corrected Water Table[3] Elevation (Factor 0.8) (ft)	Screened Interval Depth Top to Bottom (ft)	Stratigraphic unit in which screen exists
4/30/2014	1/21/2014	MKTF-24	6/4/2014	2.00	6,926.07	6,928.72	6,924.62	2.65	6,898.25	30.47	0.00	0.00	21.50	6,907.22	6907.22	18 - 28	Chinle/Alluvium Interface
			9/23/2014	2.00	6,926.07	6,928.72	6,924.62	2.65	6,898.25	30.47	0.00	0.00	22.57	6,906.15	6906.15	18 - 28	Chinle/Alluvium Interface
			11/14/2014	2.00	6,926.07	6,928.72	6,924.62	2.65	6,898.25	30.47	0.00	0.00	22.21	6,906.51	6906.51	18 - 28	Chinle/Alluvium Interface
4/30/2014	1/21/2014	MKTF-25	6/6/2014	2.00	6,913.35	6,916.19	6,911.79	2.84	6,896.76	19.43	0.00	0.00	10.88	6,905.31	6905.31	6 - 16	Chinle/Alluvium Interface
			9/23/2014	2.00	6,913.35	6,916.19	6,911.79	2.84	6,896.76	19.43	0.00	0.00	12.13	6,904.06	6904.06	6 - 16	Chinle/Alluvium Interface
			11/14/2014	2.00	6,913.35	6,916.19	6,911.79	2.84	6,896.76	19.43	0.00	0.00	11.46	6,904.73	6904.73	6 - 16	Chinle/Alluvium Interface
4/30/2014	1/21/2014	MKTF-26	6/4/2014	2.00	6,912.55	6,915.31	6,911.35	2.76	6,898.16	17.15	0.00	0.00	8.63	6,906.68	6906.68	4 - 14	Chinle/Alluvium Interface
			9/23/2014	2.00	6,912.55	6,915.31	6,911.35	2.76	6,898.16	17.15	0.00	0.00	9.30	6,906.01	6906.01	4 - 14	Chinle/Alluvium Interface
			11/14/2014	2.00	6,912.55	6,915.31	6,911.35	2.76	6,898.16	17.15	0.00	0.00	8.72	6,906.59	6906.59	4 - 14	Chinle/Alluvium Interface
4/30/2014	1/21/2014	MKTF-27	6/4/2014	2.00	6,915.36	6,917.90	6,914.18	2.54	6,903.18	14.72	0.00	0.00	7.67	6,910.23	6910.23	1 - 12	Chinle/Alluvium Interface
			9/23/2014	2.00	6,915.36	6,917.90	6,914.18	2.54	6,903.18	14.72	0.00	0.00	8.60	6,909.30	6909.30	1 - 12	Chinle/Alluvium Interface
			11/14/2014	2.00	6,915.36	6,917.90	6,914.18	2.54	6,903.18	14.72	0.00	0.00	8.15	6,909.75	6909.75	1 - 12	Chinle/Alluvium Interface
4/30/2014	1/21/2014	MKTF-28	6/6/2014	2.00	6,918.67	6,921.52	6,917.51	2.85	6,905.36	16.16	0.00	0.00	11.80	6,909.72	6909.72	3 - 13	Chinle/Alluvium Interface
			9/23/2014	2.00	6,918.67	6,921.52	6,917.51	2.85	6,905.36	16.16	0.00	0.00	6.20	6,915.32	6915.32	3 - 13	Chinle/Alluvium Interface
			11/14/2014	2.00	6,918.67	6,921.52	6,917.51	2.85	6,905.36	16.16	0.00	0.00	6.00	6,915.52	6915.52	3 - 13	Chinle/Alluvium Interface
4/30/2014	1/21/2014	MKTF-29	6/6/2014	2.00	6,898.83	6,901.62	6,897.67	2.79	6,878.78	22.84	0.00	0.00	2.14	6,899.48	6899.48	10 - 20	Chinle/Alluvium Interface
			9/23/2014	2.00	6,898.83	6,901.62	6,897.67	2.79	6,878.78	22.84	0.00	0.00	4.40	6,897.22	6897.22	10 - 20	Chinle/Alluvium Interface
			11/14/2014	2.00	6,898.83	6,901.62	6,897.67	2.79	6,878.78	22.84	0.00	0.00	3.05	6,898.57	6898.57	10 - 20	Chinle/Alluvium Interface
4/30/2014	1/21/2014	MKTF-30	6/4/2014	2.00	6,898.10	6,900.80	6,896.68	2.70	6,877.60	23.20	0.00	0.00	14.71	6,886.09	6886.09	10 - 20	Chinle/Alluvium Interface
			9/23/2014	2.00	6,898.10	6,900.80	6,896.68	2.70	6,877.60	23.20	0.00	0.00	15.89	6,884.91	6884.91	10 - 20	Chinle/Alluvium Interface
			11/17/2014	2.00	6,898.10	6,900.80	6,896.68	2.70	6,877.60	23.20	0.00	0.00	15.87	6,884.93	6884.93	10 - 20	Chinle/Alluvium Interface
4/30/2014	1/21/2014	MKTF-31	6/4/2014	2.00	6,904.26	6,906.87	6,903.11	2.61	6,884.06	22.81	0.00	0.00	7.70	6,899.17	6899.17	6 - 21	Chinle/Alluvium Interface
			9/23/2014	2.00	6,904.26	6,906.87	6,903.11	2.61	6,884.06	22.81	0.00	0.00	8.35	6,898.52	6898.52	6 - 21	Chinle/Alluvium Interface
			11/17/2014	2.00	6,904.26	6,906.87	6,903.11	2.61	6,884.06	22.81	0.00	0.00	8.40	6,898.47	6898.47	6 - 21	Chinle/Alluvium Interface
4/30/2014	1/21/2014	MKTF-32	6/4/2014	2.00	6,908.44	6,911.11	6,907.16	2.67	6,883.36	27.75	0.00	0.00	16.52	6,894.59	6894.59	9 - 24	Chinle/Alluvium Interface
			9/23/2014	2.00	6,908.44	6,911.11	6,907.16	2.67	6,883.36	27.75	0.00	0.00	16.68	6,894.43	6894.43	9 - 24	Chinle/Alluvium Interface
			11/17/2014	2.00	6,908.44	6,911.11	6,907.16	2.67	6,883.36	27.75	0.00	0.00	16.48	6,894.63	6894.63	9 - 24	Chinle/Alluvium Interface
4/30/2014	1/21/2014	MKTF-33	6/6/2014	2.00	6,936.59	6,939.75	6,936.59	3.16	6,906.55	33.20	0.00	0.00	23.40	6,916.35	6916.35	20 - 30	Chinle/Alluvium Interface
			9/23/2014	2.00	6,936.59	6,939.75	6,936.59	3.16	6,906.55	33.20	0.00	0.00	23.69	6,916.06	6916.06	20 - 30	Chinle/Alluvium Interface
			11/17/2014	2.00	6,936.59	6,939.75	6,936.59	3.16	6,906.55	33.20	0.00	0.00	23.79	6,915.96	6915.96	20 - 30	Chinle/Alluvium Interface
4/30/2014	1/21/2014	MKTF-34	6/6/2014	2.00	6,942.42	6,945.35	3,943.52	2.93	6,917.67	27.68	0.00	0.00	18.59	6,926.76	6926.76	9 - 24	Chinle/Alluvium Interface
			9/23/2014	2.00	6,942.42	6,945.35	3,943.52	2.93	6,917.67	27.68	0.00	0.00	19.08	6,926.27	6926.27	9 - 24	Chinle/Alluvium Interface
			11/17/2014	2.00	6,942.42	6,945.35	3,943.52	2.93	6,917.67	27.68	0.00	0.00	19.58	6,925.77	6925.77	9 - 24	Chinle/Alluvium Interface
11/19/2014	1/21/2014	MKTF-35[6]	11/20/2014	2.00	6,951.90	6,951.65	6,951.25	-0.25	6,935.20	16.45	0.00	0.00	9.65	6,942.00	6942.00	6 - 16	Chinle/Alluvium Interface
11/19/2014	1/21/2014	MKTF-36[6]	11/20/2014	2.00	6,950.67	6,950.12	6,949.87	-0.55	6,934.67	15.45	0.00	0.00	7.99	6,942.13	6942.13	5 15	Chinle/Alluvium Interface
11/18/2014	1/21/2014	MKTF-37[6]	11/20/2014	2.00	6,959.07	6,958.87	6,958.62	-0.20	6,934.27	24.60	0.00	0.00	15.05	6,943.82	6943.82	4 - 24	Chinle/Alluvium Interface
11/20/2014	1/21/2014	MKTF-38[6]	N/A	2.00	6,955.17	6,954.89	6,954.54	-0.28	6,934.60	20.29	N/A	N/A	N/A	N/A	N/A	5 - 20	Chinle/Alluvium Interface

Appendix C-1.1 (Continued)

Date of Installation	Date of Survey [1]	Well ID Number	Inspection or Sample Date	Casing Diameter (Inch)	Ground Level Elevations (ft)	Well Casing Rim Elevations (ft)	Ground Elevation Inside Steel Sleeve (ft)	Stick-up length (ft)	Well Casing Bottom Elevation (ft)	Total Well Depth (ft)	Depth to SPH (ft)	SPH [2] Column Thickness (ft)	Depth to Water (ft)	Ground water Elevation (ft)	Corrected Water Table[3] Elevation (Factor 0.8) (ft)	Screened Interval Depth Top to Bottom (ft)	Stratigraphic unit in which screen exists
11/14/2014	1/21/2014	MKTF-39[6]	11/18/2014	2.00	6,953.97	6,953.75	6,953.12	-0.22	6,938.55	15.20	0.00	0.00	10.25	6,943.50	6943.50	5 - 15	Chinle/Alluvium Interface
11/13/2014	1/21/2014	MKTF-40[6]	11/18/2014	2.00	6,891.35	6,894.33	6,890.48	2.98	6,870.69	23.64	0.00	0.00	19.94	6,874.39	6874.39	5 - 20	Chinle/Alluvium Interface
11/14/2014	1/21/2014	MKTF-41[6]	11/18/2014	2.00	6,891.11	6,893.64	6,889.80	2.53	6,853.54	40.10	0.00	0.00	26.90	6,866.74	6866.74	22 - 37	Chinle/Alluvium Interface
11/12/2014	1/21/2014	MKTF-42[6]	11/18/2014	2.00	6,890.42	6,892.95	6,888.75	2.53	6,859.80	33.15	0.00	0.00	18.79	6,874.16	6874.16	10 - 30	Chinle/Alluvium Interface
11/11/2014	1/21/2014	MKTF-43[6]	11/18/2014	2.00	6,874.12	6,876.90	6,873.22	2.78	6,861.47	15.43	0.00	6.95	6.95	6,869.95	6875.51	2 - 12	Chinle/Alluvium Interface
11/11/2014	1/21/2014	MKTF-44[6]	11/18/2014	2.00	6,867.41	6,869.95	6,866.06	2.54	6,818.80	51.15	0.00	0.00	48.80	6,821.15	6821.15	38 - 48	Chinle/Alluvium Interface
Pre-existing	1/21/2014	MKTF-45[7]	2/10/2015	4.00	6,948.63	6,949.59	6,948.27	0.96	6,919.35	30.24	13.58	2.94	16.52	6,933.07	6935.42	20 - 30	Chinle/Alluvium Interface

DEFINITIONS:
DTB - Depth to Bottom
DTW - Depth to Water
N/A - Not Available
SPH - Separate Phase Hydrocarbons

NOTES:
1) Wells surveyed by a licensed professional surveyor- DePauli Engineering.
2) Depth to SPH - Depth to Water Measurement = SPH Column Thickness.
3) Corrected Water Table Elevaton applies only if SPH thickness column measurement exists. (0.8 X SPH thickness + Ground Water Elevation)
4) DTW Measurement not recorded.
5) DTP not recorded - Water level meter working intermittently.
6) MKTF 35 - 44 - New wells installed in November and developed on listed dates.
7) MKTF 45 - Existing well found with no original markings or drill logs. Added to list of marketing wells.

Appendix C-2

2014 CORRECTED WELL ELEVATION SUMMARY TABLE
Revision 6 - January 2015

Date of Installation	Well ID Number	Survey Measurement date	2011 Verified Casing Diameter (Inch)	2011 Survey Ground Level Elevation (feet)	2011 Survey Well Casing Rim Elevation (feet)	2011 Measuring Point Description	2011 Survey Stick up Length (feet)	2011 Survey Well Casing Bottom Elevation (feet)	2011 Survey Total Well Depth (feet)	Screened Interval Depth Top to Bottom (feet)	Stratigraphic unit in which screen exists
11/10/2003	BW-1A	6/7/2011	2.00	6,874.10	6,876.68	North edge PVC casing	2.58	6,839.06	37.62	30 - 35	Upper Sand
10/28/2003	BW-1B	6/7/2011	2.00	6,874.13	6,876.94	North edge PVC casing	2.81	6,809.49	67.45	54.6 - 64.6	Chinle/Alluvium Interface
11/10/2003	BW-1C	6/7/2011	2.00	6,873.95	6,876.78	North edge PVC casing	2.83	6,740.39	136.39	125 -135	Sonsela
11/10/2003	BW-2A	6/7/2011	2.00	6,871.88	6,874.69	North edge PVC casing	2.81	6,807.12	67.57	55 - 65	Upper Sand
10/28/2003	BW-2B	6/7/2011	2.00	6,871.66	6,874.50	North edge PVC casing	2.84	6,782.24	92.26	80 - 90	Chinle/Alluvium Interface
10/28/2003	BW-2C	6/7/2011	2.00	6,872.90	6,875.30	North edge PVC casing	2.40	6,722.46	152.84	139.5 - 149.5	Sonsela
6/15/2004	BW-3A	6/7/2011	2.00	6,875.94	6,878.39	North edge PVC casing	2.45	6,826.04	52.35	39.5 - 49.5	Upper Sand
10/15/2003	BW-3B	6/7/2011	2.00	6,876.16	6,878.59	North edge PVC casing	2.43	6,809.19	69.40	63 - 73	Chinle/Alluvium Interface
7/20/2004	BW-3C	6/7/2011	2.00	6,875.72	6,877.95	North edge PVC casing	2.23	6,723.40	154.55	144.5 - 154.5	Sonsela
1/5/1981	OW-1 [1]	6/7/2011	4.00	6,866.32	6,866.62	North edge PVC casing	0.30	6,772.07	94.55	89.3 - 99.3	Sonsela
11/25/1980	OW-10	6/7/2011	4.00	6,873.67	6,874.91	North edge PVC casing	1.24	6,814.58	60.33	40 - 60	Sonsela
9/25/1981	OW-11	6/7/2011	4.00	6,922.05	6,923.51	North edge PVC casing	1.46	6,857.72	65.79	43 - 65	Sonsela
12/15/1980	OW-12	6/7/2011	4.00	6,939.57	6,940.69	North edge PVC casing	1.12	6,811.84	128.85	117.8 - 137.8	Sonsela
12/10/1980	OW-13	6/7/2011	4.00	6,918.95	6,920.07	North edge PVC casing	1.12	6,820.92	99.15	78.2 - 98.2	Sonsela
12/17/1980	OW-14	6/7/2011	4.00	6,924.55	6,926.65	North edge PVC casing	2.10	6,880.13	46.52	35 - 45	Chinle/Alluvium Interface
8/23/1996	OW-29	6/7/2011	4.00	6,913.89	6,917.00	North edge PVC casing	3.11	6,865.92	51.08	37.5 - 47.5	Chinle/Alluvium Interface
8/28/1996	OW-30	6/7/2011	4.00	6,921.81	6,924.69	North edge PVC casing	2.88	6,874.79	49.90	37.9 - 47.9	Chinle/Alluvium Interface
10/5/2009	OW-50	6/7/2011	2.00	6,912.63	6,914.21	North edge PVC casing	1.58	6,850.21	64.00	48 - 63	Chinle/Alluvium Interface
10/5/2009	OW-52	6/7/2011	2.00	6,906.53	6,907.68	North edge PVC casing	1.15	6,829.94	77.74	64 - 79	Chinle/Alluvium Interface
10/14/1981	MW-1	6/7/2011	5.00	6,876.63	6,878.12	North edge PVC casing	1.49	6,747.29	130.83	117.72 - 127.72	Sonsela
10/15/1981	MW-2	6/7/2011	5.00	6,878.39	6,880.30	North edge PVC casing	1.91	6,742.82	137.48	112 - 122	Sonsela
10/16/1981	MW-4	6/7/2011	5.00	6,879.89	6,881.63	North edge PVC casing	1.74	6,759.91	121.72	101 - 121	Sonsela
7/21/1986	MW-5	6/7/2011	4.00	6,880.20	6,882.83	North edge aluminum casing	2.63	6,752.00	130.83	115 - 125	Sonsela
3/28/1995	RW-1	6/7/2011	4.00	6,942.86	6,946.06	North edge PVC casing	3.20	6,903.02	43.04	25 - 40	Chinle/Alluvium Interface
3/29/1995	RW-2	6/7/2011	4.00	6,926.40	6,928.53	North edge PVC casing	2.13	6,888.73	39.80	26.1 - 36.1	Chinle/Alluvium Interface
8/27/1997	RW-5	6/7/2011	4.00	6,941.53	6,943.57	West Edge PVC Casing (Existing Mark)	2.04	6,903.98	39.59	29.5 - 39.5	Chinle/Alluvium Interface
8/27/1997	RW-6	6/7/2011	4.00	6,941.96	6,944.01	North edge PVC casing	2.05	6,903.11	40.90	28.5 - 38.5	Chinle/Alluvium Interface
9/26/1985	SMW-2	6/7/2011	2.00	6,881.63	6,883.97	North edge aluminum casing	2.34	6,831.17	52.80	34.31 - 54.31	Chinle/Alluvium Interface and Upper Sand
9/25/1985	SMW-4	6/7/2011	2.00	6,877.63	6,879.52	North edge aluminum casing	1.89	6,809.84	69.68	51.7 - 71.7	Chinle/Alluvium Interface
7/8/2004	GWM-1	6/7/2011	2.00	6,910.22	6,912.61	North edge PVC casing	2.39	6,886.41	26.20	17.5 - 23.5	Chinle/Alluvium Interface
9/25/2005	GWM-2	6/7/2011	2.00	6,910.32	6,913.09	North edge PVC casing	2.77	6,894.28	18.81	3.2 - 16.2	Chinle/Alluvium Interface
9/25/2005	GWM-3	6/7/2011	2.00	6,907.35	6,910.25	North edge PVC casing	2.90	6,892.45	17.80	3 - 15	Chinle/Alluvium Interface
3/14/2008	NAPIS-1	6/7/2011	2.00	6,913.62	6,913.86	North edge PVC casing	0.24	6,900.33	13.53	3.7 - 13.7	Chinle/Alluvium Interface
3/14/2008	NAPIS-2	6/7/2011	2.00	6,913.40	6,912.65	North edge PVC casing	-0.75	6,899.04	13.61	4.2 - 14.2	Chinle/Alluvium Interface
3/14/2008	NAPIS-3	6/7/2011	2.00	6,913.38	6,912.76	North edge PVC casing	-0.62	6,882.34	30.42	25.4 - 30.4	Chinle/Alluvium Interface
6/11/2007	KA-3	6/7/2011	2.00	6,913.29	6,912.52	North edge PVC casing	-0.77	6,889.32	23.20	15 - 25	Chinle/Alluvium Interface

Appendix C-2 - (Continued)

Date of Installation	Well ID Number	Survey Measurement date	2011 Verified Casing Diameter (Inch)	2011 Survey Ground Level Elevation (feet)	2011 Survey Well Casing Rim Elevation (feet)	2011 Measuring Point Description	2011 Survey Stick up Length (feet)	2011 Survey Well Casing Bottom Elevation (feet)	2011 Survey Total Well Depth (feet)	Screened Interval Depth Top to Bottom (feet)	Stratigraphic unit in which screen exists
7/17/2012	OAPIS-1	4/2/2013	2.00	6,916.50	6,916.73	Northwest edge PVC casing	0.23	6,890.73	26.00	14 - 26	Chinle/Alluvium Interface
2014 REVISIONS/ADDITIONS TO SUMMARY TABLE											
5/30/2014	BW-1A [2]	9/15/2014	2.00	6,883.17	6,885.12	North edge top of PVC	1.95	6,847.50	46.06	38 - 43	Upper Sand
5/30/2014	BW-1B [2]	9/15/2014	2.00	6,883.17	6,885.78	North edge top of PVC	2.61	6,818.33	76.29	63.4 - 73.4	Chinle/Alluvium Interface
5/30/2014	BW-1C [2]	9/15/2014	2.00	6,883.17	6,885.68	North edge top of PVC	2.51	6,749.29	145.29	133.9 - 143.9	Sonsela
5/6/2014	STP1-NW [3]	9/15/2014	2.00	6,904.50	6,904.47	North edge top of PVC	-0.03	6,854.47	50.00	20 - 50	Chinle/Alluvium Interface
5/6/2014	STP1-SW [3]	9/15/2014	2.00	6,912.40	6,912.38	North edge top of PVC	-0.02	6,880.38	32.00	15 - 30	Chinle/Alluvium Interface

DEFINITIONS:
NA = Not applicable
Stick up length is determined by subtracting 2011 Survey Ground Level Elevation from 2011 Survey Well Casing Rim Elevation. Negative values indicate well is a flush mount.
2011 Survey Well Casing Bottom Elevation is determined by subtracting the 2011 Survey Well Casing Rim Elevation from the 2011 Survey Total Well Depth Measurement.
Total well depth was determined using a bottom sensing meter, Testwell Water level meter with bottom sensing indicator.
Screened interval for each well was verfied to the well boring logs. Settlement may have occurred since installation of well which is why total well depth is higher or equal to the screened interval levels.

NOTES:

1) OW-1 original stick up length was measured to the top of the pvc casing which is connected to the well shroud with a rubber coupling.
2011 survey measurement was taken to the top segment of pvc casing not connected to the rubber coupling. (Coupling is where elevation is referenced)
2) BW-1A, B, C: Height of berm was increased where these wells are located and casings had to be extended.
Berm work at all evaporation ponds from April through August to increase outside slope and height. Three wells were resurveyed by HEI (Hammon Enterprises Inc) upon completion.
3) New wells installed on the west end of the north and south bays of the sanitary treatment pond (STP-1)

2014 WELL ELEVATION SUMMARY TABLE

MKTF-01 through MKTF-45

Date of Installation	Well ID Number	Survey Measurement Date [1]	Casing Diameter (Inch)	Ground Level Elevations (ft)	Well Casing Rim Elevations (ft)	Ground Elevation Inside Steel Sleeve (ft)	Measuring Point Description	Stick-up length (ft)	Well Casing Bottom Elevations (ft)	Total Well Depth [2] (ft)	Screened Interval Depth Top to Bottom (ft)	Stratigraphic unit in which screen exists
11/14/2013	MKTF-01	1/21/2014	4.00	6,918.28	6,920.67	6,920.67	North edge PVC Casing	2.39	6,903.25	17.42	5 - 15	Chinle/Alluvium Interface
11/14/2013	MKTF-02	1/21/2014	4.00	6,915.00	6,917.45	6,917.18	North edge PVC Casing	2.45	6,896.97	20.48	7 - 17	Chinle/Alluvium Interface
11/7/2013	MKTF-03	1/21/2014	4.00	6,931.73	6,931.69	6,930.85	North edge PVC Casing	-0.04	6,913.24	18.45	3 - 18	Chinle/Alluvium Interface
11/12/2013	MKTF-04	1/21/2014	4.00	6,933.90	6,933.57	6,933.24	North edge PVC Casing	-0.33	6,911.42	22.15	10 - 22	Chinle/Alluvium Interface
11/20/2013	MKTF-05	1/21/2014	4.00	6,939.49	6,942.22	6,941.95	North edge PVC Casing	2.73	6,924.47	17.75	4 - 14	Chinle/Alluvium Interface
11/11/2013	MKTF-06	1/21/2014	4.00	6,944.24	6,946.81	6,946.63	North edge PVC Casing	2.57	6,923.04	23.77	8 - 20	Chinle/Alluvium Interface
11/11/2013	MKTF-07	1/21/2014	4.00	6,944.40	6,947.18	6,947.06	North edge PVC Casing	2.78	6,929.56	17.62	4 - 14	Chinle/Alluvium Interface
11/11/2013	MKTF-08	1/21/2014	4.00	6,944.02	6,947.09	6,942.67	North edge PVC Casing	3.07	6,925.11	21.98	8 - 18	Chinle/Alluvium Interface
11/11/2013	MKTF-09	1/21/2014	4.00	6,943.57	6,946.50	6,945.90	North edge PVC Casing	2.93	6,923.80	22.70	7 - 19	Chinle/Alluvium Interface
10/31/2013	MKTF-10	1/21/2014	4.00	6,937.51	6,937.16	6,936.63	North edge PVC Casing	-0.35	6,921.17	15.99	7 - 17	Chinle/Alluvium Interface
10/31/2013	MKTF-11	1/21/2014	4.00	6,931.61	6,931.34	6,930.86	South edge PVC Casing	-0.27	6,913.20	18.14	8 - 18	Chinle/Alluvium Interface
11/7/2013	MKTF-12	1/21/2014	4.00	6,939.70	6,942.11	6,941.88	North edge PVC Casing	2.41	6,916.51	25.60	12 - 22	Chinle/Alluvium Interface
11/12/2013	MKTF-13	1/21/2014	4.00	6,933.67	6,935.18	6,934.83	North edge PVC Casing	1.51	6,913.93	21.25	8 - 18	Chinle/Alluvium Interface
11/12/2013	MKTF-14	1/21/2014	4.00	6,925.65	6,928.02	6,927.80	North edge PVC Casing	2.37	6,910.56	17.46	4 - 14	Chinle/Alluvium Interface
10/29/2013	MKTF-15	1/21/2014	2.00	6,943.74	6,943.48	6,943.19	North edge PVC Casing	-0.26	6,924.00	19.48	9 - 19	Chinle/Alluvium Interface
11/7/2013	MKTF-16	1/21/2014	2.00	6,951.00	6,950.58	6,950.58	North edge PVC Casing	-0.42	6,936.48	14.10	4 - 14	Chinle/Alluvium Interface
11/14/2013	MKTF-17	1/21/2014	2.00	6,945.79	6,945.76	6,945.64	North edge PVC Casing	-0.03	6,921.65	24.11	14 - 24	Chinle/Alluvium Interface
11/15/2013	MKTF-18	1/13/2014	2.00	6,950.97	6,950.65	6,950.17	North edge PVC Casing	-0.32	6,925.27	25.38	17 - 27	Chinle/Alluvium Interface
11/5/2013	MKTF-19	4/30/2014	2.00	6,944.89	6,944.67	6,944.34	North edge PVC Casing	-0.22	6,927.20	17.47	10 - 20	Chinle/Alluvium Interface
2/10/2014	MKTF-20	4/30/2014	4.00	6,951.89	6,951.78	6,951.17	North edge PVC Casing	-0.11	6,941.89	9.89	2 - 10	Chinle/Alluvium Interface
2/10/2014	MKTF-21	4/30/2014	4.00	6,952.68	6,952.57	6,952.00	North edge PVC Casing	-0.11	6,942.68	9.89	2 - 10	Chinle/Alluvium Interface
4/30/2014	MKTF-22	4/30/2014	2.00	6,939.76	6,942.31	6,938.57	North edge PVC Casing	2.55	6,907.06	35.25	22 - 32	Chinle/Alluvium Interface
4/30/2014	MKTF-23	4/30/2014	2.00	6,927.23	6,929.98	6,925.79	North edge PVC Casing	2.75	6,909.62	20.36	7 - 17	Chinle/Alluvium Interface
4/30/2014	MKTF-24	4/30/2014	2.00	6,926.07	6,928.72	6,924.62	North edge PVC Casing	2.65	6,898.25	30.47	18 - 28	Chinle/Alluvium Interface
4/30/2014	MKTF-25	4/30/2014	2.00	6,913.35	6,916.19	6,911.79	North edge PVC Casing	2.84	6,896.76	19.43	6 - 16	Chinle/Alluvium Interface
4/30/2014	MKTF-26	4/30/2014	2.00	6,912.55	6,915.31	6,911.35	North edge PVC Casing	2.76	6,898.16	17.15	4 - 14	Chinle/Alluvium Interface

C-2.1 - (Continued)

Date of Installation	Well ID Number	Survey Measurement Date [1]	Casing Diameter (Inch)	Ground Level Elevations (ft)	Well Casing Rim Elevations (ft)	Ground Elevation Inside Steel Sleeve (ft)	Measuring Point Description	Stick-up length (ft)	Well Casing Bottom Elevations (ft)	Total Well Depth [2] (ft)	Screened Interval Depth Top to Bottom (ft)	Stratigraphic unit in which screen exists
4/30/2014	MKTF-27	4/30/2014	2.00	6,915.36	6,917.90	6,914.18	North edge PVC Casing	2.54	6,903.18	14.72	2 - 12	Chinle/Alluvium Interface
4/30/2014	MKTF-28	4/30/2014	2.00	6,918.67	6,921.52	6,917.51	North edge PVC Casing	2.85	6,905.36	16.16	3 - 13	Chinle/Alluvium Interface
4/30/2014	MKTF-29	4/30/2014	2.00	6,898.83	6,901.62	6,897.67	North edge PVC Casing	2.79	6,878.78	22.84	10 - 20	Chinle/Alluvium Interface
4/30/2014	MKTF-30	4/30/2014	2.00	6,898.10	6,900.80	6,896.68	North edge PVC Casing	2.70	6,877.60	23.20	10 - 20	Chinle/Alluvium Interface
4/30/2014	MKTF-31	4/30/2014	2.00	6,904.26	6,906.87	6,903.11	North edge PVC Casing	2.61	6,884.06	22.81	6 - 21	Chinle/Alluvium Interface
4/30/2014	MKTF-32	4/30/2014	2.00	6,908.44	6,911.11	6,907.16	North edge PVC Casing	2.67	6,883.36	27.75	9.5 - 24.5	Chinle/Alluvium Interface
4/30/2014	MKTF-33	4/30/2014	2.00	6,936.59	6,939.75	6,936.59	North edge PVC Casing	3.16	6,906.55	33.20	20 - 30	Chinle/Alluvium Interface
4/30/2014	MKTF-34	4/30/2014	2.00	6,942.42	6,945.35	6,943.52	North edge PVC Casing	2.93	6,917.67	27.68	9.5 - 24.5	Chinle/Alluvium Interface
11/19/2014	MKTF-35	12/16/2014	2.00	6,951.90	6,951.65	6,951.25	North edge PVC Casing	-0.25	6,935.20	16.45	6 - 16	Chinle/Alluvium Interface
11/19/2014	MKTF-36	12/16/2014	2.00	6,950.67	6,950.12	6,949.87	North edge PVC Casing	-0.55	6,934.67	15.45	5 - 15	Chinle/Alluvium Interface
11/18/2014	MKTF-37	12/16/2014	2.00	6,959.07	6,958.87	6,958.62	North edge PVC Casing	-0.20	6,934.27	24.60	4 - 24	Chinle/Alluvium Interface
11/20/2014	MKTF-38	12/16/2014	2.00	6,955.17	6,954.89	6,954.54	North edge PVC Casing	-0.28	6,934.60	20.29	5 - 20	Chinle/Alluvium Interface
11/14/2014	MKTF-39	12/16/2014	2.00	6,953.97	6,953.75	6,953.12	North edge PVC Casing	-0.22	6,938.55	15.20	5 - 15	Chinle/Alluvium Interface
11/13/2014	MKTF-40	12/16/2014	2.00	6,891.35	6,894.73	6,890.48	North edge PVC Casing	3.38	6,871.09	23.64	5 - 20	Chinle/Alluvium Interface
11/14/2014	MKTF-41	12/16/2014	2.00	6,891.11	6,893.64	6,889.80	North edge PVC Casing	2.53	6,853.54	40.10	22 - 37	Chinle/Alluvium Interface
11/12/2014	MKTF-42	12/16/2014	2.00	6,890.42	6,892.95	6,888.75	North edge PVC Casing	2.53	6,859.80	33.15	10 - 30	Chinle/Alluvium Interface
11/11/2014	MKTF-43	12/16/2014	2.00	6,874.12	6,876.90	6,873.22	North edge PVC Casing	2.78	6,861.47	15.43	2 - 12	Chinle/Alluvium Interface
11/11/2014	MKTF-44	12/16/2014	2.00	6,867.41	6,869.95	6,866.06	North edge PVC Casing	2.54	6,818.80	51.15	38 - 48	Chinle/Alluvium Interface
Unknown [3]	MKTF-45	1/12/2015	4.00	6,948.63	6,949.59	6,948.27	North edge PVC Casing	0.96	6,919.35	30.24	20 - 30	Chinle/Alluvium Interface

DEFINITIONS:

NA = Not applicable

Stick up length is determined by subtracting 2011 Survey Ground Level Elevation from 2011 Survey Well Casing Rim Elevation.

2011 Survey Well Casing Bottom Elevation is determined by subtracting the 2011 Survey Well Casing Rim Elevation from the 2011 Survey Total Well Depth Measurement.

Total well depth was determined using a bottom sensing meter, Testwell Water level meter with bottom sensing indicator.

Screened interval for each well was verfied to the well boring logs. Settlement may have occurred since installation of well which is why total well depth is higher or equal to the screened interval levels.

NOTES:

1) 1/21/14 AND 4/30/14 - Survey conducted by DePauli Engineering. 12/16/14 and 1/2/15 - Survey conducted by HEI - Hammon Enterprises, Inc. Professional licensed surveyors.

2) Depth to bottom field verified 2/4/2015 using a bottom sensing meter, Testwell Water Level Meter with bottom sensing indicator.

3) Pre-existing well - Well logs, survey data unavailable for well identification. Re-labeled as MKTF-45.

Appendix C-3

2011 WELL ELEVATION SUMMARY TABLE FOR ARTESIAN WATER WELLS
Revision #2 - March 21, 2012

Date of Installation	Well ID Number	Submersible pump depth (feet)	Casing Diameter (Inch)	Well Head Elevation Mark* (North) (feet)	Well Head Elevation Mark* (West) (feet)	Well Head Elevation Mark* (Z) (feet)	Measuring Point Description	Total Well Depth (feet)	Well Casing Bottom Elevation[1] (feet)	Stratigraphic unit	Aquifer
9/24/1956	PW-2	800	16.0	3,300.40	4,694.28	162.78	1st Discharge tee or elbow	1,075.00	2,225.40	Chinle	San Andreas/Yeso Aquifer
April 1979	PW-3	900	14.0	2,932.83	1,387.79	248.00	1st Discharge tee or elbow	1,030.00	1,902.83	Chinle	San Andreas/Yeso Aquifer
11/12/1999	PW-4	750	12.0[2]	1,895.73	2,979.78	178.51	1st Discharge tee or elbow	1,020.00[3]	819.73	Chinle	San Andreas/Yeso Aquifer

NOTES:

** Basis of survey Refinery Control Point at 1000W, 2575N, plant elevation = 254.87 feet and MSL elevation = 6959.41 feet.*

1) Well casing bottom elevation using Well Head Elevation Mark (North) as reference point.
2) Actual well casing diameter is 12 inches. The 176 feet of 24 inch steel casing is the actual cemented support for development of the well.
3) The actual total well depth is 1020 feet with additional 56 feet x 7-7/8 inch diameter open exploratory hole which was accounted for as total well depth of 1076 feet.

At the time of the survey by DePauli Engineering the artesian wells were not included as these wells have never been listed on the summary table or had questionable elevations. These wells are sampled every three years and are not required to be gauged when sampling. A copy of an original survey dated February 13, 2003 conducted by DePauli Engineering is attached for reference.

APPENDIX D

APPENDIX D - TABLE 1 - Revised 9-21-2015

Table 1: Gallup Refinery - Ground Water Monitoring Schedule - Approved July 24-2015

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
NAPI Secondary Containment (3 units)	Q	NA	NA	BTEX+MTBE, GRO/DRO extended, WQCC Metals or check for fluids
RW-1	Q	X	NA	Measure DTW, DTP (Hydrocarbon recovery). Sample for BTEX, MTBE, GRO/DRO if no SPH is detected
RW-2	Q	X	NA	Same as RW-1
RW-5	Q	X	NA	Same as RW-1
RW-6	Q	X	NA	Same as RW-1
OW-1	Q	X	pH , EC, DO, ORP, Temp, TDS	Visual check for artesian flow conditions: Sample for major cations/anions, WQCC Metals, VOCs, GRO/DRO extended
OW-10	Q	X	pH , EC, DO, ORP, Temp, TDS	Visual check for artesian flow conditions: Sample for MTBE, uranium, arsenic, major cations/anions, VOCs, GRO/DRO extended
OW-13	Q	X	pH , EC, DO, ORP, Temp, TDS	VOCs, WQCC Metals, GRO/DRO extended
OW-14	Q	X	pH , EC, DO, ORP, Temp, TDS	Same as OW-13
OW-29	Q	X	pH , EC, DO, ORP, Temp, TDS	Same as OW-13
OW-30	Q	X	pH , EC, DO, ORP, Temp, TDS	Same as OW-13
GWM-1	Q	X	pH , EC, DO, ORP, Temp, TDS	Major cations/anions, VOC, GRO/DRO extended, WQCC Metals
GWM-2	Q	X	NA	Check for Water - if water is detected report to OCD & NMED within 24 hours. Sample for GRO/DRO extended, major cations/anions, VOCs
GWM-3	Q	X	NA	Check for Water - if water is detected report to OCD & NMED within 24 hours. Sample for GRO/DRO extended, major cations/anions, VOCs
NAPIS-1 [1]	Q	X	pH , EC, DO, ORP, Temp, TDS	Major cations/anions, BTEX+MTBE, SVOC, GRO/DRO EXTENDED. WQCC Metals
NAPIS-2 [1]	Q	X	pH , EC, DO, ORP, Temp, TDS	Same as Napis-1
NAPIS-3 [1]	Q	X	pH , EC, DO, ORP, Temp, TDS	Same as Napis-1
KA- 3 [1]	Q	X	pH , EC, DO, ORP, Temp, TDS	Same as Napis-1
OAPIS-1	Q	X	pH , EC, DO, ORP, Temp, TDS	VOCs, SVOC, GRO/DRO EXTENDED, WQCC Metals, Major cations/anions, Cyanide
STP1-NW	Q	X	NA	Major cations/anions, VOCS, GRO/DRO extended, WQCC Metals
STP1-SW	Q	X	NA	Major cations/anions, VOCS, GRO/DRO extended, WQCC Metals
Boiler Water & Cooling Tower Blow down inlet to EP-2	Semi Annual (SA)		pH , EC, DO, ORP, Temp, TDS	Major Cations/Anions

APPENDIX D - TABLE 1 - Revised 9-21-2015

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
Pond 1 [2]	SA		pH , EC, DO, ORP, Temp, TDS	No Longer in Service
Evaporation Pond 2 [2]	SA		pH , EC, DO, ORP, Temp, TDS	General Chemistry, VOC, SVOC, BOD, COD, E-Coli Bacteria, WQCC Metals
Evaporation Pond 3 [2]	SA		pH , EC, DO, ORP, Temp, TDS	Same as EP-2
Evaporation Pond 4 [2]	SA		pH , EC, DO, ORP, Temp, TDS	Same as EP-2
Evaporation Pond 5 [2]	SA		pH , EC, DO, ORP, Temp, TDS	Same as EP-2
Evaporation Pond 6 [2]	SA		pH , EC, DO, ORP, Temp, TDS	Same as EP-2
Evaporation Pond 7 [2]	SA		pH , EC, DO, ORP, Temp, TDS	Same as EP-2
Evaporation Pond 8 [2]	SA		pH , EC, DO, ORP, Temp, TDS	Same as EP-2
Evaporation Pond 9 [2]	SA		pH , EC, DO, ORP, Temp, TDS	Same as EP-2
Evaporation Pond 11 [2]	SA		pH , EC, DO, ORP, Temp, TDS	Same as EP-2
Evaporation Pond 12A [2]	SA		pH , EC, DO, ORP, Temp, TDS	Same as EP-2
Evaporation Pond 12B [2]	SA		pH , EC, DO, ORP, Temp, TDS	Same as EP-2
Any temporary Pond containing fluid	SA		pH , EC, DO, ORP, Temp, TDS	Same as EP-2
STP-1 TO EP-2 (EP-2 Inlet)	A		NA	VOC, GRO/DRO extended, BOD, COD, TDS
BW-1A	Annual (A)	X	pH , EC, DO, ORP, Temp, TDS	Major cations/anions, VOC,WQCC METALS, GRO/DRO extended
BW-1B	A	X	pH , EC, DO, ORP, Temp, TDS	Same as BW-1A
BW-1C	A	X	pH , EC, DO, ORP, Temp, TDS	Same as BW-1A
BW-2A	A	X	pH , EC, DO, ORP, Temp, TDS	Same as BW-1A
BW-2B	A	X	pH , EC, DO, ORP, Temp, TDS	Same as BW-1A
BW-2C	A	X	pH , EC, DO, ORP, Temp, TDS	Same as BW-1A
BW-3A	A	X	pH , EC, DO, ORP, Temp, TDS	Same as BW-1A
BW-3B	A	X	pH , EC, DO, ORP, Temp, TDS	Same as BW-1A
BW-3C	A	X	pH , EC, DO, ORP, Temp, TDS	Same as BW-1A
MW-1	A	X	pH , EC, DO, ORP, Temp, TDS	Major cations/anions, VOCs,GRO/DRO extended, WQCC Metals, Cyanide, SVOCs
MW-2	A	X	pH , EC, DO, ORP, Temp, TDS	Same as MW-1
MW-4	A	X	pH , EC, DO, ORP, Temp, TDS	Same as MW-1
MW-5	A	X	pH , EC, DO, ORP, Temp, TDS	Same as MW-1

APPENDIX D - TABLE 1 - Revised 9-21-2015

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
OW-11	A	X	pH , EC, DO, ORP, Temp, TDS	Major cations/anions, VOCS, WQCC Metals, GRO/DRO extended
OW-12	A	X	pH , EC, DO, ORP, Temp, TDS	VOCS, WQCC METALS, GRO/DRO extended
OW-50	A	X	pH , EC, DO, ORP, Temp, TDS	VOCS, GRO/DRO EXTENDED, WQCC METALS, GEN CHEM
OW-52	A	X	pH , EC, DO, ORP, Temp, TDS	VOCS, GRO/DRO EXTENDED, WQCC METALS, GEN CHEM
SMW-2	A	X	pH , EC, DO, ORP, Temp, TDS	Major cations/anions, VOCS, GRO/DRO extended, WQCC Metals, Cyanide
SMW-4	A	X	pH , EC, DO, ORP, Temp, TDS	Major cations/anions, VOCS, SVOCS, GRO/DRO extended, WQCC Metals, Cyanide
All wells including the recovery wells containing separate phase hydrocarbons.	Annual Event	X		Major Cations/Anions, VOCs, SVOCs, WQCC 20.6.2.3103 Constituents.
PW-3	A	X	pH , EC, DO, ORP, Temp, TDS	VOC, SVOC, WQCC Metals, Cyanide, Nitrates
PW-2	Every 3 years. Starting in 2008	X	pH , EC, DO, ORP, Temp, TDS	VOC, SVOC, WQCC Metals, Cyanide, Nitrates
PW-4	Every 3 years. Starting in 2007	X	pH , EC, DO, ORP, Temp, TDS	VOC, SVOC, WQCC Metals, Cyanide, Nitrates
MKTF-01	Q	X	NA	VOC, SVOC, WQCC Metals, GRO/DRO extended, Major cations/anions. Ground water samples will not be collected if SPH is present in any of these wells.
MKTF-02	Q	X	NA	Same as MKTF-01
MKTF-03	Q	X	NA	Same as MKTF-01
MKTF-04	Q	X	NA	Same as MKTF-01
MKTF-05	Q	X	NA	Same as MKTF-01
MKTF-06	Q	X	NA	Same as MKTF-01
MKTF-07	Q	X	NA	Same as MKTF-01
MKTF-08	Q	X	NA	Same as MKTF-01
MKTF-09	Q	X	NA	Same as MKTF-01
MKTF-10	Q	X	NA	Same as MKTF-01
MKTF-11	Q	X	NA	Same as MKTF-01

APPENDIX D - TABLE 1 - Revised 9-21-2015

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
MKTF-12	Q	X	NA	Same as MKTF-01
MKTF-13	Q	X	NA	Same as MKTF-01
MKTF-14	Q	X	NA	Same as MKTF-01
MKTF-15	Q	X	NA	Same as MKTF-01
MKTF-16	Q	X	NA	Same as MKTF-01
MKTF-17	Q	X	NA	Same as MKTF-01
MKTF-18	Q	X	NA	Same as MKTF-01
MKTF-19	Q	X	NA	Same as MKTF-01
MKTF-20	Q	X	NA	Same as MKTF-01
MKTF-21	Q	X	NA	Same as MKTF-01
MKTF-22	Q	X	NA	Same as MKTF-01
MKTF-23	Q	X	NA	Same as MKTF-01
MKTF-24	Q	X	NA	Same as MKTF-01
MKTF-25	Q	X	NA	Same as MKTF-01
MKTF-26	Q	X	NA	Same as MKTF-01
MKTF-27	Q	X	NA	Same as MKTF-01
MKTF-28	Q	X	NA	Same as MKTF-01
MKTF-29	Q	X	NA	Same as MKTF-01
MKTF-30	Q	X	NA	Same as MKTF-01
MKTF-31	Q	X	NA	Same as MKTF-01
MKTF-32	Q	X	NA	Same as MKTF-01
MKTF-33	Q	X	NA	Same as MKTF-01

APPENDIX D - TABLE 1 - Revised 9-21-2015

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite
MKTF-34	Q	X	NA	Same as MKTF-01
MKTF-35	Q	X	NA	Same as MKTF-01
MKTF-36	Q	X	NA	Same as MKTF-01
MKTF-37	Q	X	NA	Same as MKTF-01
MKTF-38	Q	X	NA	Same as MKTF-01
MKTF-39	Q	X	NA	Same as MKTF-01
MKTF-40	Q	X	NA	Same as MKTF-01
MKTF-41	Q	X	NA	Same as MKTF-01
MKTF-42	Q	X	NA	Same as MKTF-01
MKTF-43	Q	X	NA	Same as MKTF-01
MKTF-44	Q	X	NA	Same as MKTF-01
MKTF-45	Q	X	NA	Same as MKTF-01

DEFINITIONS:

STP-1 TO EP-2 - Sample collected at the inlet to Evaporation Pond 2 from STP-1

NAPIS 1 = (KA-1R); NAPIS-2 = (KA-2R), NAPIS-3 = KA-3R) - monitor wells positioned around NAPIS to detect leakage

DO- Dissolved Oxygen; ORP - Oxygen Reduction Potential; Temp - Temperature; EC - Electrical or Specific Conductivity

TDS - Total Dissolved Solids; VOC - Volatile Organic Compounds-EPA Method 8260, must include MTBE

SVOC - Semi-Volatile Organic Compounds - EPA Method 8270, must include phenol

DRO - Diesel Range Organics, GRO - Gasoline Range Organics, MRO - Motor oil range organics = EPA Method 8015D (or as modified)

BTEX - Benzene, Toluene, Ethylbenzene, Xylene, plus Methyl Tert-Butyl Ether (MTBE) - EPA Method 8021+MTBE

General Chemistry - pH, specific conductance, cations, Anions

DTW - Depth to Water; DTP - Depth to Product; EP - Evaporation Pond; BW - Boundary Wells

MW - Monitor Well; OW - Observation Well; RW - Recovery Well; PW - Raw Water Production Well

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved

NA - Not Applicable

NOTES:

1) NAPIS 1, NAPIS 2, NAPIS 3: Detection of product during quarterly monitoring must comply with Section II.F.2 (twenty-four hour reporting) of NMED Post-Closure Care Permit

APPENDIX D - TABLE 1 - Revised 9-21-2015

Sampling Location ID	Sampling Frequency	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Analytical Suite

2) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006 (use methods 9221-E and 9221-F, until EPA approves 40 CFR 136 methods. (Colilert, Colilert - 18, m-Coliblue24, membrane filter method)). Parameters are subject to change. Evaporation Pond samples must be collected at the inlet where waste water flows into the evaporation ponds.

APPENDIX D - Table 2

Table 2: Requested/Approved Changes to the Ground Water Monitoring Schedule

Sampling Location ID	Sampling Frequency (Q - Quarterly A - Annual SA - Semi-Annual)	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Approved Analytical Suite[1]	2014 Requested Changes	Rationale for Requested Changes
NAPI Secondary Containment (3 units)	Q	NA	NA	BTEX+MTBE, GRO/DRO extended, WQCC Metals or check for fluids	None	
RW-1	Q	X	NA	Measure DTW, DTP (Hydrocarbon recovery). Sample for BTEX, MTBE, GRO/DRO if no SPH is detected	None	
RW-2	Q	X	NA	Same as RW-1	None	
RW-5	Q	X	NA	Same as RW-1	None	
RW-6	Q	X	NA	Same as RW-1	None	
OW-1	Q	X	pH , EC, DO, ORP, Temp, TDS	Visual check for artesian flow conditions: Sample for major cations/anions, WQCC Metals, VOCs, GRO/DRO extended	None	
OW-10	Q	X	pH , EC, DO, ORP, Temp, TDS	Same as OW-1	None	
OW-13	Q	X	pH , EC, DO, ORP, Temp, TDS	VOCs, WQCC Metals, GRO/DRO extended	None	
OW-14	Q	X	pH , EC, DO, ORP, Temp, TDS	Same as OW-13	None	
OW-29	Q	X	pH , EC, DO, ORP, Temp, TDS	Same as OW-13	None	
OW-30	Q	X	pH , EC, DO, ORP, Temp, TDS	Same as OW-13	None	
GWM-1	Q	X	pH , EC, DO, ORP, Temp, TDS	Major cations/anions, VOC, GRO/DRO/MRO, WQCC Metals	None	
GWM-2	Q	X	NA	Check for Water - if water is detected report to OCD & NMED within 24 hours. Sample for GRO/DRO extended, major cations/anions, VOCs	None	
GWM-3	Q	X	NA	Same as GWM-2	None	
NAPIS-1 [2]	Q	X	pH , EC, DO, ORP, Temp, TDS	Major cations/anions, BTEX+MTBE, SVOC, GRO/DRO/MRO, WQCC Metals	None	
NAPIS-2 [2]	Q	X	pH , EC, DO, ORP, Temp, TDS	Same as Napis-1	None	
NAPIS-3 [2]	Q	X	pH , EC, DO, ORP, Temp, TDS	Same as Napis-1	None	
KA-3 [2]	Q	X	pH , EC, DO, ORP, Temp, TDS	Same as Napis-1	None	
OAPIS-1	Q	X	pH , EC, DO, ORP, Temp, TDS	Major Cations/anions, VOC, SVOC, GRO/DRO/MRO, WQCC Metals, Cyanide	None	
STP1-NW	Q	X	NA	Major cations/anions, VOCS, SVOCS, GRO/DRO/MRO, WQCC Metals	None	
STP1-SW	Q	X	NA	Same as STP1-NW	None	
Boiler Water & Cooling Tower Blow down inlet to EP-2	SA	NA	pH , EC, DO, ORP, Temp, TDS	Major Cations/Anions	None	
Pond 1 [3]	SA	NA	pH , EC, DO, ORP, Temp, TDS	NO LONGER IN SERVICE	None	

APPENDIX D - Table 2

Sampling Location ID	Sampling Frequency (Q - Quarterly A - Annual SA - Semi-Annual)	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Approved Analytical Suite[1]	2014 Requested Changes	Rationale for Requested Changes
Evaporation Pond 2 - 9 [3]	SA	NA	pH , EC, DO, ORP, Temp, TDS	General Chemistry, VOC, SVOC, BOD, COD, E-Coli Bacteria, WQCC Metals	None	
Evaporation Pond 11 [3]	SA	NA	pH , EC, DO, ORP, Temp, TDS	Same as EP-2	None	
Evaporation Pond 12a [3]	SA	NA	pH , EC, DO, ORP, Temp, TDS	Same as EP-2	None	
Evaporation Pond 12b [3]	SA	NA	pH , EC, DO, ORP, Temp, TDS	Same as EP-2	None	
Any temporary Pond containing fluid	SA	NA	pH , EC, DO, ORP, Temp, TDS	Same as EP-2	None	
STP-1 TO EP-2 (EP-2 Inlet)	A	NA	NA	VOC, GRO/DRO/MRO, BOD, COD, TDS	None	
BW-1A	A	X	pH , EC, DO, ORP, Temp, TDS	Major cations/anions, VOC, WQCC METALS, GRO/DRO extended	None	
BW-1B	A	X	pH , EC, DO, ORP, Temp, TDS	Same as BW-1A	None	
BW-1C	A	X	pH , EC, DO, ORP, Temp, TDS	Same as BW-1A	None	
BW-2A	A	X	pH , EC, DO, ORP, Temp, TDS	Same as BW-1A	None	
BW-2B	A	X	pH , EC, DO, ORP, Temp, TDS	Same as BW-1A	None	
BW-2C	A	X	pH , EC, DO, ORP, Temp, TDS	Same as BW-1A	None	
BW-3A	A	X	pH , EC, DO, ORP, Temp, TDS	Same as BW-1A	None	
BW-3B	A	X	pH , EC, DO, ORP, Temp, TDS	Same as BW-1A	None	
BW-3C	A	X	pH , EC, DO, ORP, Temp, TDS	Same as BW-1A	None	
MW-1	A	X	pH , EC, DO, ORP, Temp, TDS	Major cations/anions, VOCs,GRO/DRO extended, WQCC Metals, Cyanide, SVOCs	None	
MW-2	A	X	pH , EC, DO, ORP, Temp, TDS	Same as MW-1	None	
MW-4	A	X	pH , EC, DO, ORP, Temp, TDS	Same as MW-1	None	
MW-5	A	X	pH , EC, DO, ORP, Temp, TDS	Same as MW-1	None	
OW-11	A	X	pH , EC, DO, ORP, Temp, TDS	Major cations/anions, VOCS, WQCC Metals, GRO/DRO extended	None	
OW-12	A	X	pH , EC, DO, ORP, Temp, TDS	VOCS, WQCC METALS, GRO/DRO extended	None	
OW-50	A	X	pH , EC, DO, ORP, Temp, TDS	VOCS, GRO/DRO EXTENDED, WQCC METALS, GEN CHEM	None	
OW-52	A	X	pH , EC, DO, ORP, Temp, TDS	Same as OW-50	None	
SMW-2	A	X	pH , EC, DO, ORP, Temp, TDS	Major cations/anions, VOCS, GRO/DRO extended, WQCC Metals, Cyanide	None	

APPENDIX D - Table 2

Sampling Location ID	Sampling Frequency (Q - Quarterly A - Annual SA - Semi-Annual)	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Approved Analytical Suite[1]	2014 Requested Changes	Rationale for Requested Changes
SMW-4	A	X	pH , EC, DO, ORP, Temp, TDS	Major cations/anions, VOCS, SVOCS, GRO/DRO extended, WQCC Metals, Cyanide	None	
All wells including the recovery wells containing separate phase hydrocarbons.	Annual Event	X		Major Cations/Anions, VOC, SVOC, WQCC 20.6.2.3103 Constituents.	Remove this requirement from the monitoring schedule as all wells are already defined as to frequency and analytical suites.	Each of the site wells have been reviewed individually to determine what constituents should be analyzed and the appropriate frequency. This is reflected above where each well is listed. This requirement that refers to all wells is redundant and is not necessary.
PW-3	A	X	pH , EC, DO, ORP, Temp, TDS	VOC, SVOC, WQCC Metals, Cyanide, Nitrates	None	
PW-2	Every 3 years. Starting in 2008	X	pH , EC, DO, ORP, Temp, TDS	VOC, SVOC, WQCC Metals, Cyanide, Nitrates	None	
PW-4	Every 3 years. Starting in 2007	X	pH , EC, DO, ORP, Temp, TDS	VOC, SVOC, WQCC Metals, Cyanide, Nitrates	None	
MKTF-01	Q	X	NA	VOC, SVOC, WQCC Metals, GRO/DRO extended, Major cations/anions. Ground water samples will not be collected if SPH is present in any of these wells.	None	
MKTF-02	Q	X	NA	Same as MKTF-01	None	
MKTF-03	Q	X	NA	Same as MKTF-01	None	
MKTF-04	Q	X	NA	Same as MKTF-01	None	
MKTF-05	Q	X	NA	Same as MKTF-01	None	
MKTF-06	Q	X	NA	Same as MKTF-01	None	
MKTF-07	Q	X	NA	Same as MKTF-01	None	
MKTF-08	Q	X	NA	Same as MKTF-01	None	
MKTF-09	Q	X	NA	Same as MKTF-01	None	
MKTF-10	Q	X	NA	Same as MKTF-01	None	
MKTF-11	Q	X	NA	Same as MKTF-01	None	
MKTF-12	Q	X	NA	Same as MKTF-01	None	
MKTF-13	Q	X	NA	Same as MKTF-01	None	
MKTF-14	Q	X	NA	Same as MKTF-01	None	
MKTF-15	Q	X	NA	Same as MKTF-01	None	
MKTF-16	Q	X	NA	Same as MKTF-01	None	
MKTF-17	Q	X	NA	Same as MKTF-01	None	
MKTF-18	Q	X	NA	Same as MKTF-01	None	
MKTF-19	Q	X	NA	Same as MKTF-01	None	
MKTF-20	Q	X	NA	Same as MKTF-01	None	
MKTF-21	Q	X	NA	Same as MKTF-01	None	
MKTF-22	Q	X	NA	Same as MKTF-01	None	
MKTF-23	Q	X	NA	Same as MKTF-01	None	
MKTF-24	Q	X	NA	Same as MKTF-01	None	
MKTF-25	Q	X	NA	Same as MKTF-01	None	

APPENDIX D - Table 2

Sampling Location ID	Sampling Frequency (Q - Quarterly A - Annual SA - Semi-Annual)	Collect GW Elevation, DTW, DTP	Water Quality Parameters	Approved Analytical Suite[1]	2014 Requested Changes	Rationale for Requested Changes
MKTF-26	Q	X	NA	Same as MKTF-01	None	
MKTF-27	Q	X	NA	Same as MKTF-01	None	
MKTF-28	Q	X	NA	Same as MKTF-01	None	
MKTF-29	Q	X	NA	Same as MKTF-01	None	
MKTF-30	Q	X	NA	Same as MKTF-01	None	
MKTF-31	Q	X	NA	Same as MKTF-01	None	
MKTF-32	Q	X	NA	Same as MKTF-01	None	
MKTF-33	Q	X	NA	Same as MKTF-01	None	
MKTF-34	Q	X	NA	Same as MKTF-01	None	
MKTF-35	Q	X	NA	Same as MKTF-01	None	
MKTF-36	Q	X	NA	Same as MKTF-01	None	
MKTF-37	Q	X	NA	Same as MKTF-01	None	
MKTF-38	Q	X	NA	Same as MKTF-01	None	
MKTF-39	Q	X	NA	Same as MKTF-01	None	
MKTF-40	Q	X	NA	Same as MKTF-01	None	
MKTF-41	Q	X	NA	Same as MKTF-01	None	
MKTF-42	Q	X	NA	Same as MKTF-01	None	
MKTF-43	Q	X	NA	Same as MKTF-01	None	
MKTF-44	Q	X	NA	Same as MKTF-01	None	
MKTF-45	Q	X	NA	Same as MKTF-01	None	

DEFINITIONS:

STP-1 TO EP-2 - Sample collected at the inlet to Evaporation Pond 2 from STP-1

NAPIS 1 = (KA-1R); NAPIS-2 = (KA-2R), NAPIS-3 = KA-3R) - monitor wells positioned around NAPIS to detect leakage

DO- Dissolved Oxygen; ORP - Oxygen Reduction Potential; Temp - Temperature; EC - Electrical or Specific Conductivity

TDS - Total Dissolved Solids; VOC - Volatile Organic Compounds-EPA Method 8260, must include MTBE

SVOC - Semi-Volatile Organic Compounds - EPA Method 8270, must include phenol

DRO - Diesel Range Organics, GRO - Gasoline Range Organics, MRO - Motor oil range organics = EPA Method 8015D (or as modified)

BTEX - Benzene, Toluene, Ethylbenzene, Xylene, plus Methyl Tert-Butyl Ether (MTBE) - EPA Method 8021+MTBE

General Chemistry - pH, specific conductance, cations, Anions

DTW - Depth to Water; DTP - Depth to Product; EP - Evaporation Pond; BW - Boundary Wells

MW - Monitor Well; OW - Observation Well; RW - Recovery Well; PW - Raw Water Production Well

WQCC metals include the RCRA 8 metals, must be analyzed as totals and dissolved

NA - Not Applicable

NA - Not Applicable

NOTES:

1) Analytical suite include those listed in the approved sampling/monitoring schedule letter from NMED dated July 24, 2015; "Approval Approval with Modifications Facility-Wide Ground Water Monitoring Work Plan - 2012 Updates; 2013 Updates; 2014 Updates for 2015".

2) NAPIS 1, NAPIS 2, NAPIS 3: Detection of product during quarterly monitoring must comply with Section II.F.2 (twenty-four hour reporting) of NMED Post-Closure Care Permit

3) Sample using the State of New Mexico approved analytical methods as required by 20.6.4.14 NMAC, as amended through February 16, 2006 (use methods 9221-E and 9221-F, until EPA approves 40 CFR 136 methods. (Colilert, Colilert - 18, m-Coliblue24, membrane filter method)). Parameters are subject to change. Evaporation Pond samples must be collected at the inlet where waste water flows into the evaporation ponds.

APPENDIX E

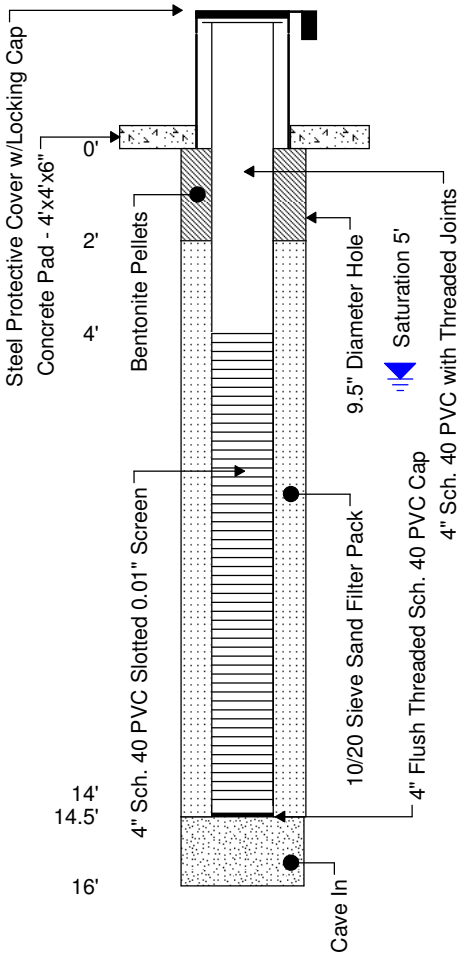
WELL INSTALLATION

Well No.: MKTF-01
Start Date: 11/14/2013
Finish Date: 11/14/2013

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon
Comments: N 35°29.346' W 108°25.782'; Boring ID - HA1

Total Depth: 16' bgl
Ground Water: Saturated @ 5' bgl
Elev., TOC (ft. msl): 6920.67
Elev., PAD (ft. msl): 6918.28
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,864.41 **E** 2,545,561.73

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
					Ground Surface
0 to 5				100	**Silty Clay (CL)** Low plasticity, soft, damp, reddish brown to brown, no odor
5 to 15		5'		100	**Silty Clay/Clayey Silt (CL/ML)** Low plasticity, very soft, moist to saturated, brown grading to black, gravelly, bio odor, no phase-separated hydrocarbon
					Total Depth = 16' BGL



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WELL INSTALLATION

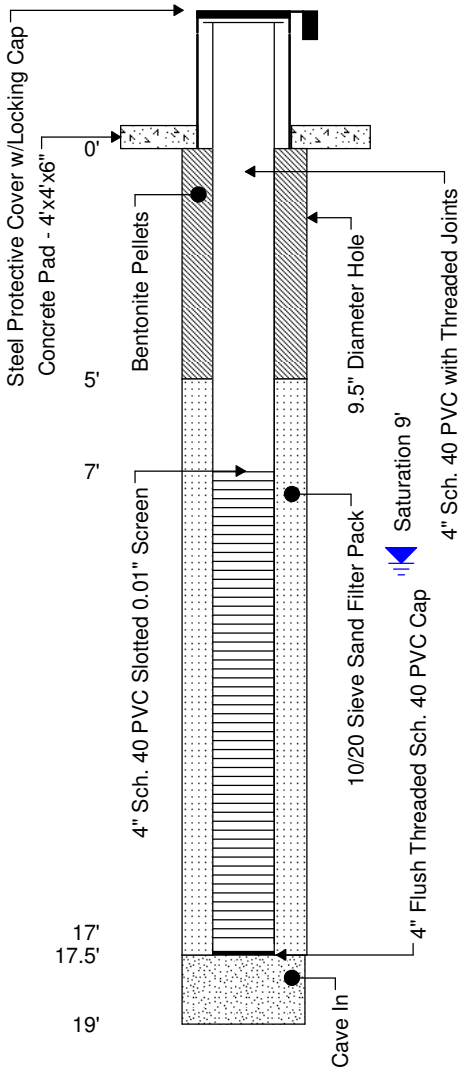
Well No.: MKTF-02
Start Date: 11/14/2013
Finish Date: 11/14/2013

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon
Comments: N 35°29.360' W 108°25.789'; Boring ID HA3

Total Depth: 19' bgl
Ground Water: Saturated @ 9' bgl
Elev., TOC (ft. msl): 6917.45
Elev., PAD (ft. msl): 6915.00
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,946.93 **E** 2,545,530.46

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
					Ground Surface
1				100	**Silty Clay (CL)** Low plasticity, firm, damp, brown-reddish brown, no odor
3	24.6				
5	20.1				
7	400			100	**Silty Clay (CL)** Similar to above, odor at 6' bgl with black discoloration
	933			100	**Sandy Clay (CL)** Low plasticity, soft, moist to saturated at 9' bgl, hydrocarbon odor, no phase-separated hydrocarbon
9	800	9'			
11					**Sandy Clay/Clayey Sand (SC/CL)** Fine grain, compact, saturated, dark brown, hydrocarbon odor, no phase-separated hydrocarbon
13				100	
15					
17					
19					Total Depth = 19' BGL

Completion Results



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512/347-8243

WELL INSTALLATION

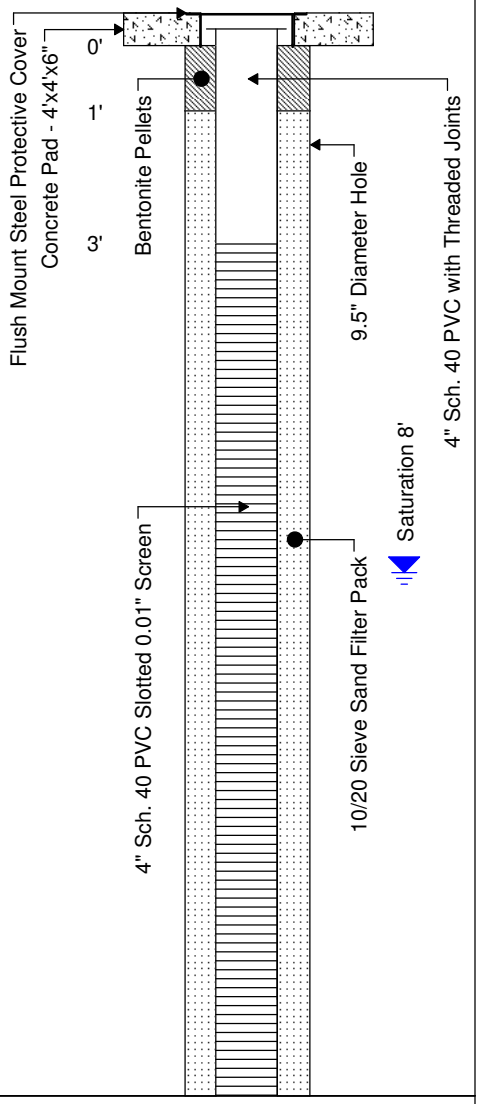
Well No.: MKTF-03
Start Date: 11/7/2013
Finish Date: 11/7/2013

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon
Comments: N 35°29.328' W108°25.743'; Boring ID - SB01

Total Depth: 19' bgl
Ground Water: Saturated @ 8' bgl
Elev., TOC (ft. msl): 6931.31
Elev., PAD (ft. msl): 6931.73
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,746.53 **E** 2,545,756.87

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
-1					Ground Surface
1	164			60	**Fill (Silt/Sand)** Fine grain, loose, dry to damp, brown, no odor
3	423			40	**Silty Clay (CL)** Low plasticity, firm, damp, brown/reddish brown, no odor
5	330			70	**Silty Clay (CL)** Similar to above, no odor
7	75			90	**Silty Clay (CL)** Similar to above, sandy at base from 7.75-8.0' bgl, no odor
9	326	8'		90	**Silty Clay (CL)** Fine grain sand seams throughout, saturated, phase-separated hydrocarbon, hydrocarbon odor, clear phase-separated hydrocarbon poured out of split spoon
11	312			90	**Silty Clay (CL)** Similar to above with sand seams, saturated with phase-separated hydrocarbon, hydrocarbon odor, dark brown
13	368			80	**Gravelly Sand (SW)** Fine to medium to coarse grain, loose, saturated with phase-separated hydrocarbon, black, hydrocarbon odor
15	700			60	**Gravelly Sand (SW)** Similar to above

Completion Results



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512/347-8243

WELL INSTALLATION

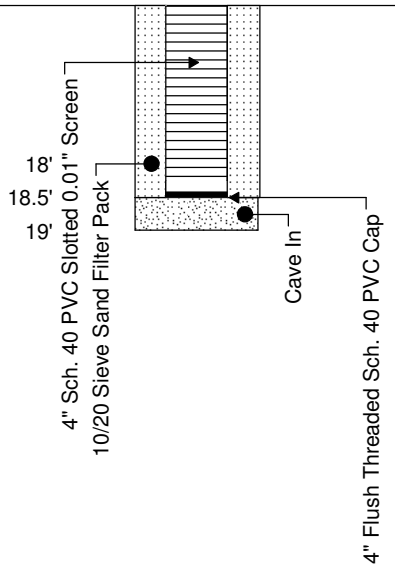
Well No.: MKTF-03
Start Date: 11/7/2013
Finish Date: 11/7/2013

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon
Comments: N 35°29.328' W108°25.743'; Boring ID - SB01

Total Depth: 19' bgl
Ground Water: Saturated @ 8' bgl
Elev., TOC (ft. msl): 6931.31
Elev., PAD (ft. msl): 6931.73
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,746.53 **E** 2,545,756.87

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
17				10	**Silty Sand/Silty Clay (SM/CL)** Low plasticity, firm, moist, brown, faint odor, no phase-separated hydrocarbon
					Silty Clay (CL) Poor recovery
19	225			80	**Clay (CH)** High plasticity, very dense, damp, light reddish brown, faint odor
					Total Depth = 19' BGL
21					
23					
25					
27					
29					
31					

Completion Results



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WELL INSTALLATION

Well No.: MKTF-04
Start Date: 11/12/2013
Finish Date: 11/12/2013

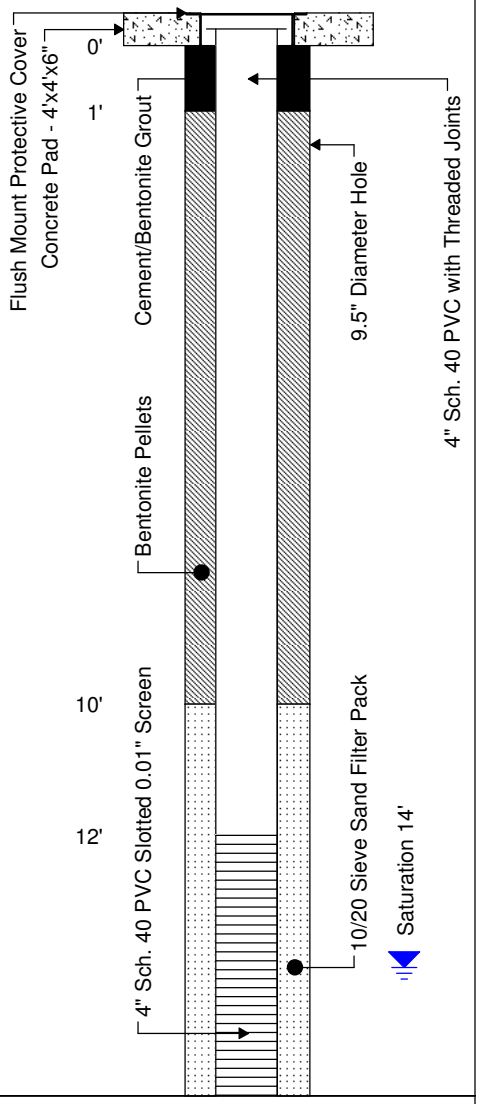
Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon

Total Depth: 24' bgl
Ground Water: Saturated @ 14' bgl
Elev., TOC (ft. msl): 6933.57
Elev., PAD (ft. msl): 6933.90
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,649.46 **E** 2,545,752.83

Comments: N 35°29.310' W 108°25.742'; Boring ID SB03

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
-1					Ground Surface
1	10.2			90	**Fill (Silt/Gravel)** Low plasticity, very dense, dry, light brown, no odor
3	11.7			80	**Fill (Silt/Gravel)** Similar to above, black, dense at base, no odor
5	16			90	**Silty Clay (CL)** Low plasticity, stiff, damp, reddish brown, no odor, calcareous
7	26			90	**Gravelly Sandy Clay (CL)** Low plasticity, loose to firm, damp, brown, no odor
9	708			70	**Silty Clay (CL)** Low plasticity, very soft, damp, reddish brown, hydrocarbon odor
11	369			80	**Clay (CH)** High plasticity, firm, damp, reddish brown, hydrocarbon odor
13	660	14'		90	**Sandy Clay/Clayey Sand (SC/CL)** Low plasticity, fine grain, soft, damp, reddish brown, hydrocarbon odor
15	85			90	**Sandy Clay (SC)** Similar to above, saturated sand seams, hydrocarbon odor, brown

Completion Results



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WELL INSTALLATION

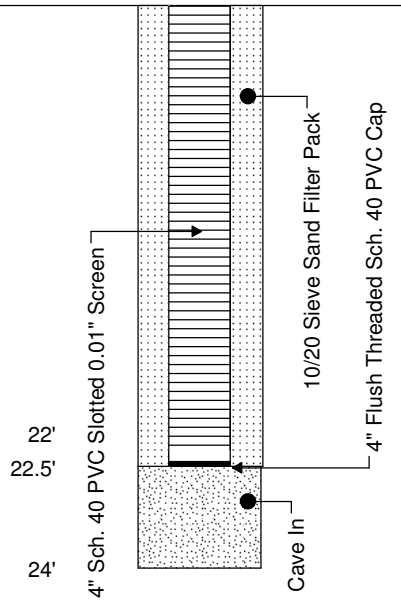
Well No.: MKTF-04
Start Date: 11/12/2013
Finish Date: 11/12/2013

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon
Comments: N 35°29.310' W 108°25.742'; Boring ID SB03

Total Depth: 24' bgl
Ground Water: Saturated @ 14' bgl
Elev., TOC (ft. msl): 6933.57
Elev., PAD (ft. msl): 6933.90
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,649.46 **E** 2,545,752.83

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
17	64			70	**Sandy Clay (SC)** Similar to above, moist to saturated, hydrocarbon odor, brown
	33				**Sandy Clay (SC)** Low plasticity, fine grain, soft, moist to saturated, light reddish brown, hydrocarbon odor, gravelly at base
19					**Silty Clay (CL)** Low plasticity, stiff, damp, light reddish brown grading to yellowish/greenish gray, becomes more silty at base
21				90	
23					Total Depth = 24' BGL
25					
27					
29					
31					

Completion Results



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WELL INSTALLATION

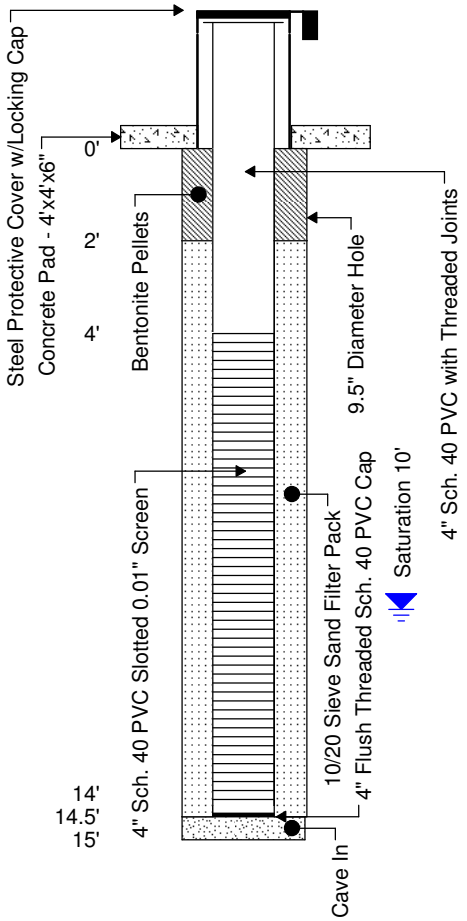
Well No.: MKTF-05
Start Date: 11/12/2013
Finish Date: 11/12/2013

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon
Comments: N 35°29.282' W 108°25.739'; Boring ID - SB06

Total Depth: 15' bgl
Ground Water: Saturated @ 10' bgl
Elev., TOC (ft. msl): 6942.22
Elev., PAD (ft. msl): 6939.49
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,472.30 **E** 2,545,769.95

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
					Ground Surface
1	52.6			60	**Fill (Silty Clay/Gravel)** Low plasticity, firm, damp, brown, faint odor
3	180			100	**Silty Clay (CL)** Low plasticity, firm, damp, reddish brown, odor, calcareous
5	224			90	**Sandy Clay/Clayey Sand (CL/SC)** Low plasticity, fine grain, damp, dark brown, hydrocarbon odor, sand seams present
7	1202			90	**Sandy Clay/Clayey Sand (CL)** Similar to above
9	1228	10'		90	**Sandy Silty Clay (CL)** Low plasticity, soft, damp, dark brown, hydrocarbon odor
11	1525			90	**Sandy Clay (CL)** Similar to above, with moist to saturated sand seams, hydrocarbon odor
13	377			90	**Clayey Sand (SC)** Fine grain, loose to compact, saturated, hydrocarbon odor, dark brown
15					**Sandy Clay (CL)** Low plasticity, soft to firm, moist, dark brown, hydrocarbon odor
					Total Depth = 15' BGL

Completion Results



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WELL INSTALLATION

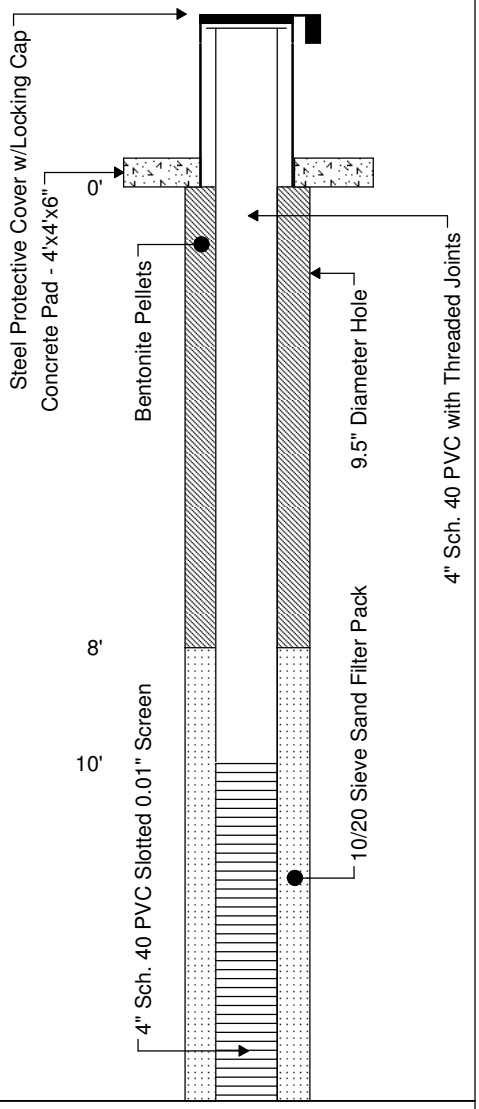
Well No.: MKTF-06
Start Date: 11/11/2013
Finish Date: 11/11/2013

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon

Total Depth: 21' bgl
Ground Water: Saturated @ 17.5' bgl
Elev., TOC (ft. msl): 6946.81
Elev., PAD (ft. msl): 6944.24
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,556.28 **E** 2,545,811.85

Comments: N 35°29.295' W 108°25.732'; Boring ID - SB08

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
					Ground Surface
1	15.9			70	**Fill (Silt/Silty Clay)** Low plasticity, stiff, dry, light brown, no odor
3	228			60	**Fill (Silty Clay/Gravel)** Similar to above, dry, no odor
5	177			60	**Fill (Silty Clay)** Similar to above, damp, no odor
7	264			40	**Fill (Silty Clay)** Low plasticity, soft, damp, brown, gravel and wood debris
9				--	No recovery
11	90			10	**Fill (Silty Clay/Gravel)** Similar to above
13	660			100	**Sandy Silty Clay (CL)** Low plasticity, soft, damp to moist at base, brown, hydrocarbon odor
15					



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512/347-8243

WELL INSTALLATION

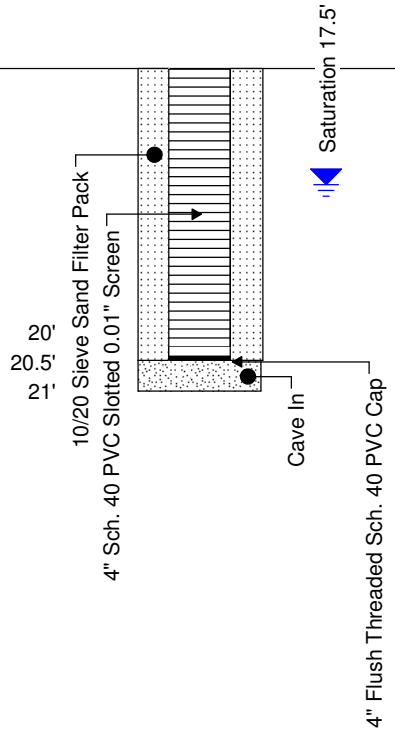
Well No.: MKTF-06
Start Date: 11/11/2013
Finish Date: 11/11/2013

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon
Comments: N 35°29.295' W 108°25.732'; Boring ID - SB08

Total Depth: 21' bgl
Ground Water: Saturated @ 17.5' bgl
Elev., TOC (ft. msl): 6946.81
Elev., PAD (ft. msl): 6944.24
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,556.28 **E** 2,545,811.85

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
17	1115	17.5'		100	**Sandy Silty Clay (CL)** Similar to above, moist, oily, hydrocarbon odor
				100	**Gravelly Sandy Clay (CL)** Low plasticity, firm, moist, oily, 1" gravel, strong hydrocarbon odor
19	225			100	**Clayey Gravel Sand (SC)** Fine to medium grain, loose, saturated, phase-separated hydrocarbon present, black, hydrocarbon odor
21					**Sandy Clay (CL)** Low plasticity, firm, moist, black hydrocarbon odor
					Total Depth = 21' BGL
23					
25					
27					
29					
31					
33					

Completion Results



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512/347-8243

WELL INSTALLATION

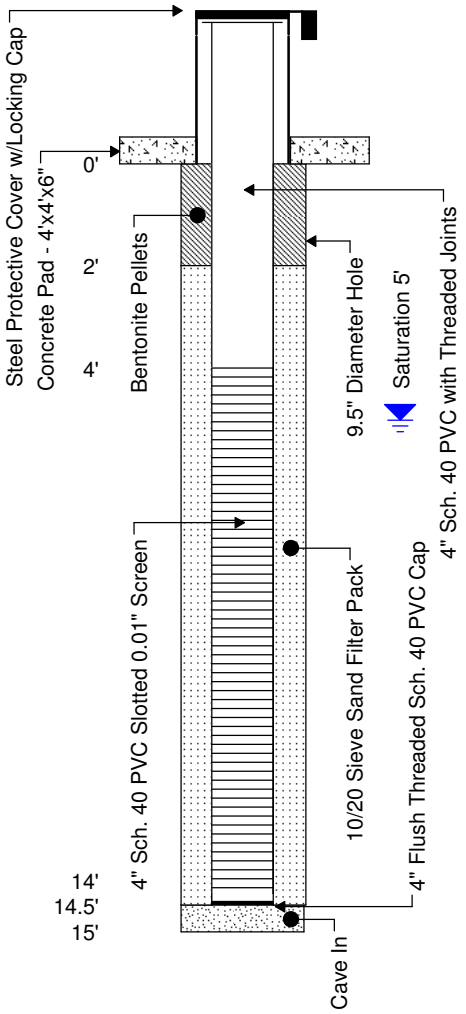
Well No.: MKTF-07
Start Date: 11/11/2013
Finish Date: 11/11/2013

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon

Total Depth: 15' bgl
Ground Water: Saturated @ 5' bgl
Elev., TOC (ft. msl): 6947.18
Elev., PAD (ft. msl): 6944.40
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,555.11 **E** 2,545,885.42

Comments: N 35°29.295' W 108°25.710'; Boring ID - SB10

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
					Ground Surface
1	132			90	**Fill (Silty Clay)** Low plasticity, firm, dry to damp, brown, faint odor
3	235			90	**Fill (Clay/Sand/Gravel)** Damp, hydrocarbon odor
5	1202	5'		50	**Fill (Clay/Caliche Rock)** Odor
7	372			90	**Silty Sand (SM)** Fine grain, loose, saturated, phase-separated hydrocarbon, oily, brown to dark brown, hydrocarbon odor
					Silty Sand (SM) Similar to above, saturated
11				--	**Silty Clay (CL)** Low plasticity, firm, damp, brown, hydrocarbon odor No recovery
15					Total Depth = 15' BGL



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512/347-7588
512/347-8243

WELL INSTALLATION

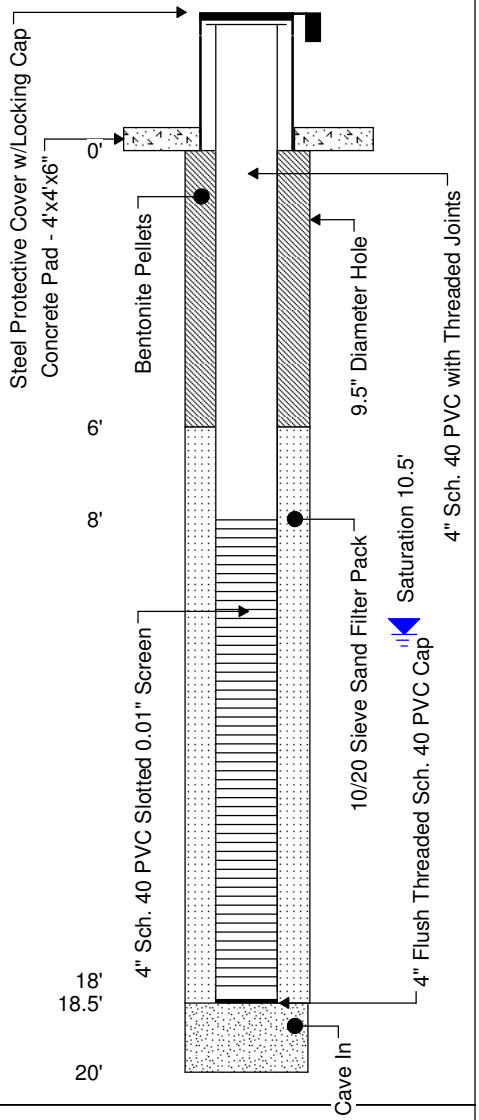
Well No.: MKTF-08
Start Date: 11/11/2013
Finish Date: 11/11/2013

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon
Comments: N 35°29.302' W 108°25.716'; Boring ID - SB11

Total Depth: 20' bgl
Ground Water: Saturated @ 10.5' bgl
Elev., TOC (ft. msl): 6947.09
Elev., PAD (ft. msl): 6944.02
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,598.94 **E** 2,545,885.02

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
0					Ground Surface
1	85			90	**Fill (Silty Clay/Gravel)** Low plasticity, firm, dry to damp, odor
3	273			80	**Fill (Silty Clay/Gravel)** Similar to above
5	86			90	**Clay (CH)** High plasticity, stiff, damp, brown with light brown pockets of silt, odor
7	308			90	**Silty Clay (CL)** Low plasticity, soft/crumbly, dry to damp, brown, hydrocarbon odor
9	1126			80	**Silty Clay (CL)** Low plasticity, soft, damp, brown, hydrocarbon odor
10.5		10.5'			
11	789			80	**Silty Clay (CL)** Similar to above, moist
13	558			90	**Silty Clay (CL)** Medium grain, loose, saturated, phase-separated hydrocarbon, hydrocarbon odor, brown
15					**Sandy Silty Clay (CL)** Low plasticity, soft to firm, moist, hydrocarbon odor
17					**Sandy Clay (CL)** Low plasticity, soft to compact, saturated, phase-separated hydrocarbon, hydrocarbon odor
19					
20					Total Depth = 20' BGL

Completion Results



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WELL INSTALLATION

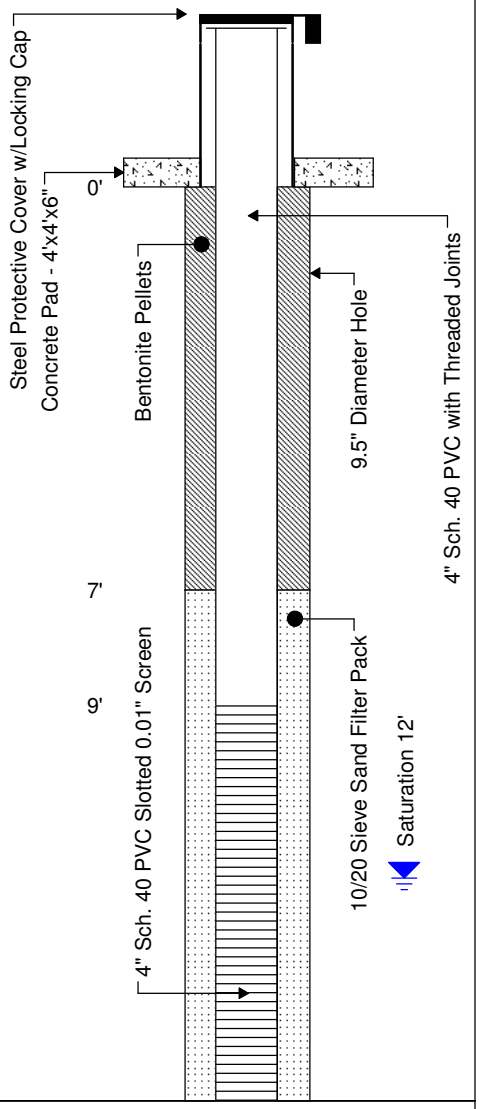
Well No.: MKTF-09
Start Date: 11/11/2013
Finish Date: 11/11/2013

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon
Comments: N 35°29.316' W 108°25.715'; Boring ID - SB13

Total Depth: 22' bgl
Ground Water: Saturated @ 12' bgl
Elev., TOC (ft. msl): 6946.50
Elev., PAD (ft. msl): 6943.57
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,681.33 **E** 2,545,895.93

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
					Ground Surface
1	21.9			90	**Fill (Silty Clay)** Low plasticity, stiff, dry to damp, no odor, brown
3	32.7			90	**Fill (Silty Clay)** Similar to above, gravel
5	36.1			90	**Silty Clay (CL)** Low plasticity, soft, damp, brown, faint odor
7	37			90	**Silty Clay (CL)** Similar to above
9	533			90	**Silty Clay (CL)** Similar to above
					Sandy Clay (CL) Similar to above, increase in sand and moisture
11	314	12'		90	**Sandy Clay (CL)** Similar to above, moist, hydrocarbon odor, dark brown
13	651			90	**Sandy Clay/Clayey Sand (CL/SC)** Fine to medium grain, compact, moist to saturated, hydrocarbon odor
15	587				**Sandy Clay/Clayey Sand (CL/SC)** Similar to above, saturated, sheen observed on split spoon, black, hydrocarbon odor

Completion Results



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WELL INSTALLATION

Well No.: MKTF-09
Start Date: 11/11/2013
Finish Date: 11/11/2013

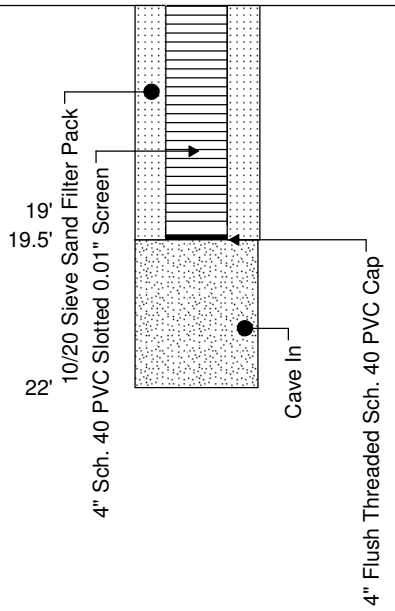
Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon

Total Depth: 22' bgl
Ground Water: Saturated @ 12' bgl
Elev., TOC (ft. msl): 6946.50
Elev., PAD (ft. msl): 6943.57
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,681.33 **E** 2,545,895.93

Comments: N 35°29.316' W 108°25.715'; Boring ID - SB13

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
17				90	**Sandy Clay/Clayey Sand (CL/SC)** Fine to medium grain, compact, saturated, sheen observed on split spoon, black, hydrocarbon odor
19					
21					
22					Total Depth = 22' BGL
23					
25					
27					
29					
31					
33					

Completion Results



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WELL INSTALLATION

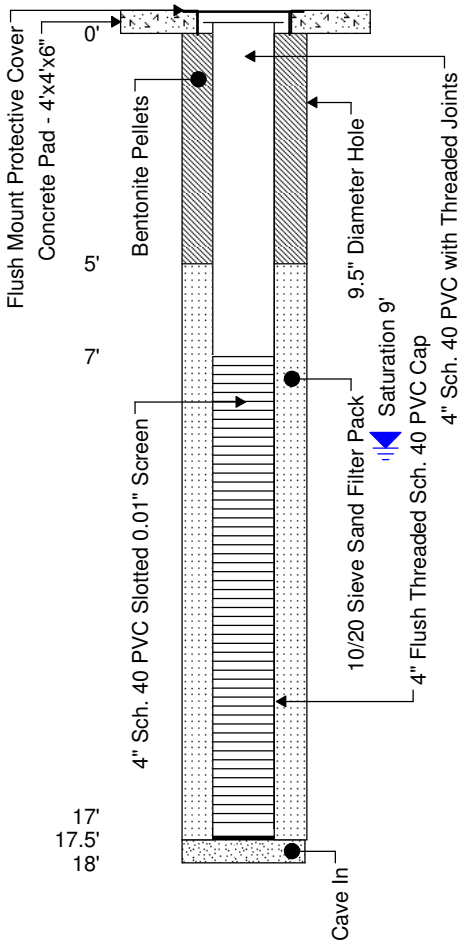
Well No.: MKTF-10
Start Date: 10/31/2013
Finish Date: 10/31/2013

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon
Comments: N 35°29.336' W 108°25.724'; Boring ID SB16

Total Depth: 18' bgl
Ground Water: Saturated @ 9' bgl
Elev., TOC (ft. msl): 6937.16
Elev., PAD (ft. msl): 6937.51
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,807.47 **E** 2,545,853.54

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
					Ground Surface
1	90			90	**Fill (Silt/Gravel)** Low plasticity, loose, dry, light brown
3	14			90	**Fill (Silty Clay/Gravel)** Similar to above
5	431			90	**Silty Clay (CL)** Low plasticity, stiff, dry, reddish brown, odor, calcareous
7	448			60	**Sand (SP)** Fine grain, loose, dry, reddish brown, odor
9	654	9'		60	**Sand (SP)** Similar to above, saturated at 9' bgl, phase-separated hydrocarbon, hydrocarbon odor
11	1559			90	**Clayey Sand (SC)** Fine grain, soft, saturated, phase-separated hydrocarbon, brown to black, hydrocarbon odor
13	713			90	**Clayey Sand/Sandy Clay (SC/CL)** Low plasticity, firm to stiff, moist to saturated, hydrocarbon odor, dark brown
17					Total Depth = 18' BGL

Completion Results



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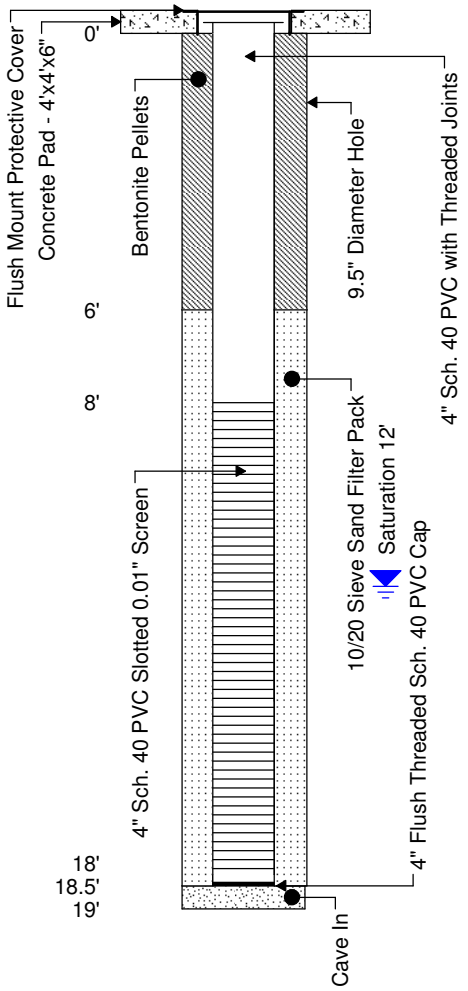
WELL INSTALLATION

Well No.: MKTF-11
Start Date: 10/31/2013
Finish Date: 10/31/2013

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon
Comments: N 35°29.336' W 108°25.739'; Boring ID - SB17

Total Depth: 19' bgl
Ground Water: Saturated @ 12' bgl
Elev., TOC (ft. msl): 6931.34
Elev., PAD (ft. msl): 6931.61
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,806.93 **E** 2,545,754.77

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
					Ground Surface
1	14			60	**Fill (Silty Clay/Gravel)** Low plasticity, stiff, dry, light brown
3	36			70	**Fill (Silty Clay)** Similar to above
5	80			90	**Silty Clay (CL)** Low plasticity, firm, damp, brown, calcareous
7	125			80	**Silty Clay (CL)** Similar to above
9	1259			80	**Silty Clay (CL)** Low plasticity, firm, damp, oily, hydrocarbon odor, dark brown
11	860	12'		70	**Silty Clay (CL)** Similar to above, moist, hydrocarbon odor, oily, phase-separated hydrocarbon
13	1716			60	**Sandy Clay (CL)** Low plasticity, soft, moist to saturated, hydrocarbon odor, dark brown
15	1050				**Silty Sand (SM)** Medium grain, loose, saturated, hydrocarbon odor, dark brown to black
17				70	**Sandy/Silty Clay (CL)** Low plasticity, firm, saturated, dark brown to black, hydrocarbon odor
19					Total Depth = 19' BGL



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WELL INSTALLATION

Well No.: MKTF-12
Start Date: 11/7/2013
Finish Date: 11/7/2013

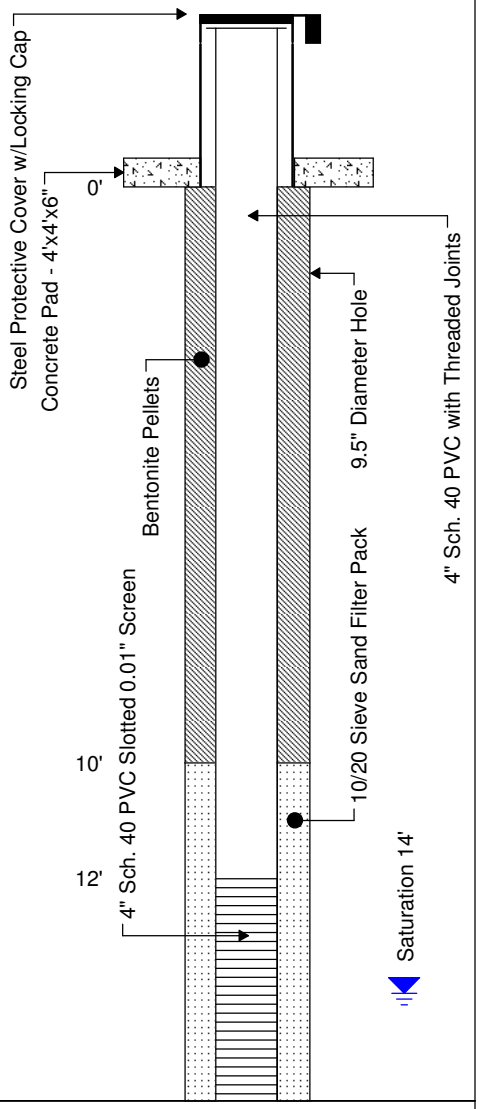
Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon

Total Depth: 23' bgl
Ground Water: Saturated @ 14' bgl
Elev., TOC (ft. msl): 6942.11
Elev., PAD (ft. msl): 6939.70
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,542.07 **E** 2,545,688.29

Comments: N 35°29.294' W 108°25.754'; Boring ID - SB19

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
-3					
-1					Ground Surface
1	8.7			90	**Silt/Gravel (ML)** Low plasticity, soft, dry/damp, no odor, brown
3	54			80	**Silt/Gravel (ML)** Similar to above
5	7			70	**Gravel/Silt (GW)** 1/2 to 1" gravel, loose, compact, dry, no odor
7	7.5			70	**Clayey Sandy Silt (ML)** Very fine grain, compact, dry to damp, brown, no odor
9	5.5			60	**Sandy Clay (CL)** Low plasticity, firm, damp, light brown, no odor
11	5.8			70	**Sandy Clay (CL)** Similar to above, brown, no odor
13	10	14'		70	**Sandy Clay (CL)** Similar to above
					Silty Sand (SM) Fine to medium grain, loose, damp, brown, no odor
15	225			50	**Sandy Clay (CL)** Low plasticity, firm, moist to saturated in sand seams, hydrocarbon odor, dark brown

Completion Results



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WELL INSTALLATION

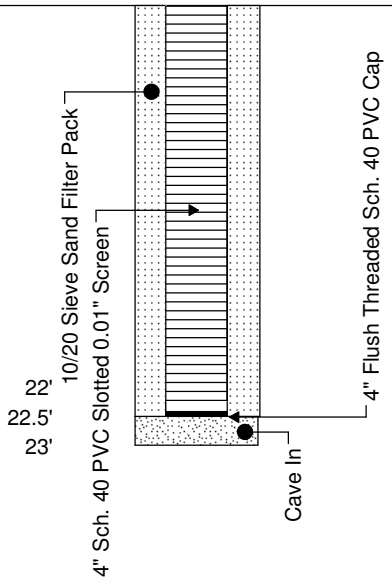
Well No.: MKTF-12
Start Date: 11/7/2013
Finish Date: 11/7/2013

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon
Comments: N 35°29.294' W 108°25.754'; Boring ID - SB19

Total Depth: 23' bgl
Ground Water: Saturated @ 14' bgl
Elev., TOC (ft. msl): 6942.11
Elev., PAD (ft. msl): 6939.70
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,542.07 **E** 2,545,688.29

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
17	319			70	**Sandy Clay (CL)** Similar to above, moist, hydrocarbon odor
19	400			--	**Sandy Clay (CL)** Similar to above, moist, hydrocarbon odor
21	532			--	**Sandy Clay/Clayey Sand (CL)** Very fine grain, compact, moist to saturated, sheen observed in split spoon, hydrocarbon odor
23					Total Depth = 23' BGL
25					
27					
29					
31					
33					

Completion Results



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WELL INSTALLATION

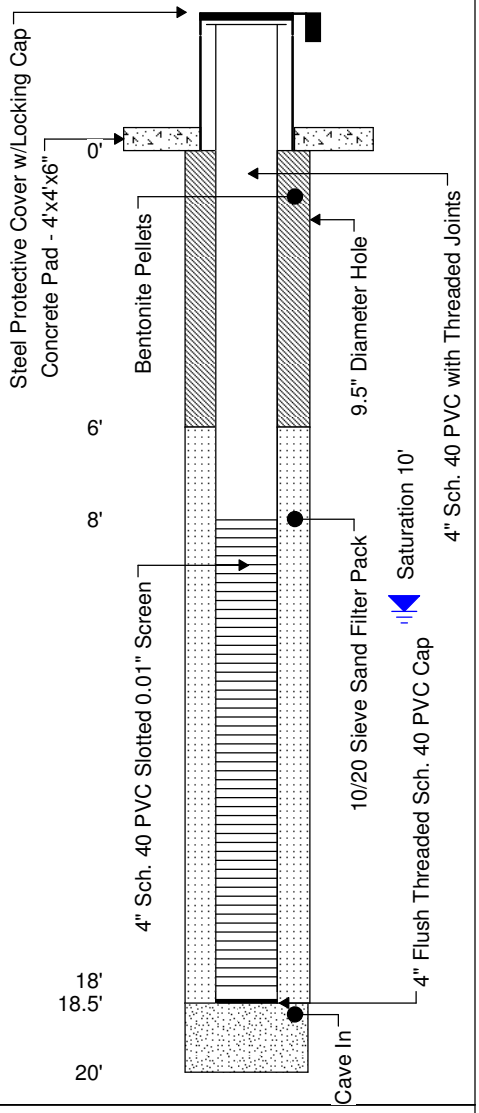
Well No.: MKTF-13
Start Date: 11/12/2013
Finish Date: 11/12/2013

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon
Comments: N 35°29.307' W 108°25.755'; Boring ID - SB20

Total Depth: 20' bgl
Ground Water: Saturated @ 10' bgl
Elev., TOC (ft. msl): 6935.18
Elev., PAD (ft. msl): 6933.67
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,625.25 **E** 2,545,697.39

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
					Ground Surface
1	8			90	**Silt (ML)** Low plasticity, soft, damp, brown, no odor
3	12.7			90	**Silt (ML)** Similar to above, trace gravel
5	13			80	**Sandy Clay (CL)** Low plasticity, stiff, dry, brown, calcareous
7	17			90	**Silty Sand/Sandy Silt (SM/ML)** Very fine grain, loose to compact, dry, calcareous, brown
9	59	10'		90	**Sandy Silt (ML)** Similar to above, no odor
11	1165			90	**Sandy Clay/Clayey Sand (SC/CL)** Medium grain, compact, moist to saturated, hydrocarbon odor, brown
13	1200			90	**Clayey Sand (SC)** Similar to above, saturated, hydrocarbon odor
15					
17					
19					Total Depth = 20' BGL

Completion Results



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WELL INSTALLATION

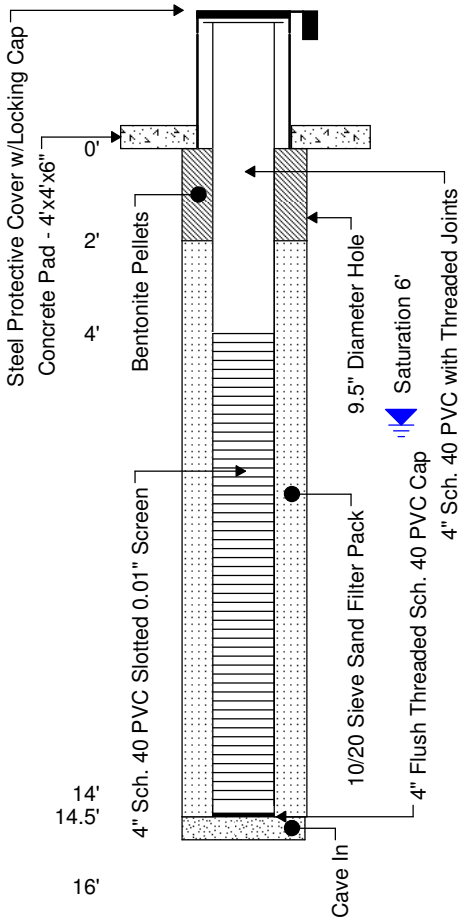
Well No.: MKTF-14
Start Date: 11/12/2013
Finish Date: 11/12/2013

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon
Comments: N 35°29.323' W 108°25.769'; Boring ID SB22

Total Depth: 15' bgl
Ground Water: Saturated @ 6' bgl
Elev., TOC (ft. msl): 6928.02
Elev., PAD (ft. msl): 6925.65
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,719.43 **E** 2,545,625.96

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
					Ground Surface
1	18			20	**Silty Clay (CL)** Low plasticity, soft, damp, brown
3	308			90	**Silty Clay (CL)** Similar to above, odor
5	793	6'		90	**Sandy Clay (CL)** Low plasticity, firm, moist, oily, brown, trace gravel
7	504			90	**Clayey Sand (SC)** Medium grain, loose to compact, saturated, phase-separated hydrocarbon, hydrocarbon odor, black
9	760			90	**Clayey Sand (SC)** Similar to above
15					Total Depth = 15' BGL

Completion Results



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512/347-8243

WELL INSTALLATION

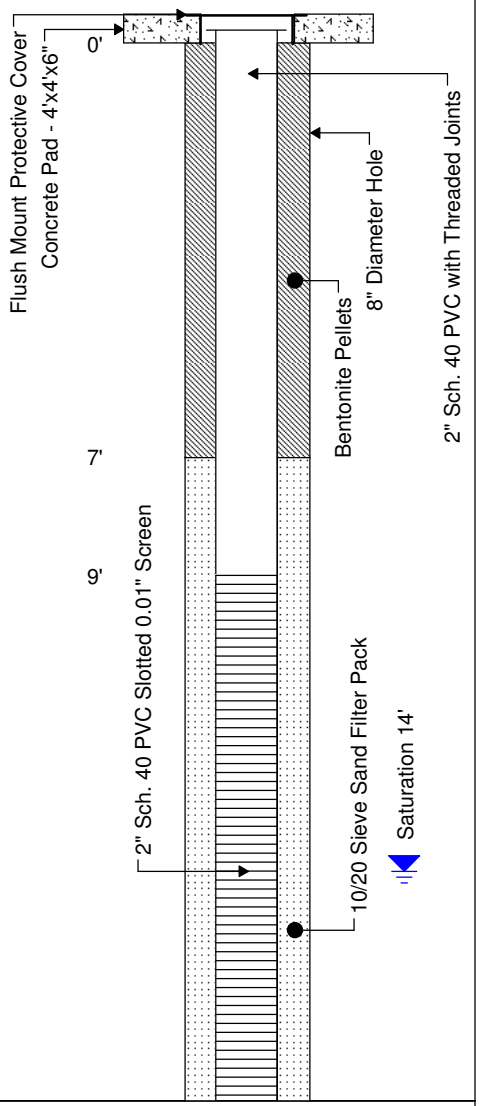
Well No.: MKTF-15
Start Date: 10/29/2013 09:30
Finish Date: 10/29/2013 12:15

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Five-Foot Core Barrel
Comments: N 35°29.343' W 108°25.708'; Boring ID - SB31

Total Depth: 22' bgl
Ground Water: Saturated @ 14' bgl
Elev., TOC (ft. msl): 6943.48
Elev., PAD (ft. msl): 6943.74
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,845.57 **E** 2,545,934.58

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
-1					Ground Surface
1	6.7			0	**Fill (Clay and Gravel)** No recovery
3	14.6			90	**Fill (Clay and Gravel)** Reddish brown
5				90	**Fill (Clay and Gravel)** Similar to above, no odor
7	823			90	**Fill (Silty Clay)** Reddish brown, hydrocarbon odor
9	1004			90	**Silty Sandy Clay (CL)** Low plasticity, firm to soft, damp, reddish brown, hydrocarbon odor
11	293			70	**Silty Sand (SM)** Fine grain, compact, damp, light reddish brown, no odor
13	221	14'		80	**Sand (SP)** Similar to above, odor, moist to very moist
15				80	**Sand (SP)** Fine to medium grain, loose, saturated, brown, hydrocarbon odor, phase-separated hydrocarbon present
17				60	**Sandy Silt (ML)** Low plasticity, very soft, damp to moist, brown, hydrocarbon odor

Completion Results



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WELL INSTALLATION

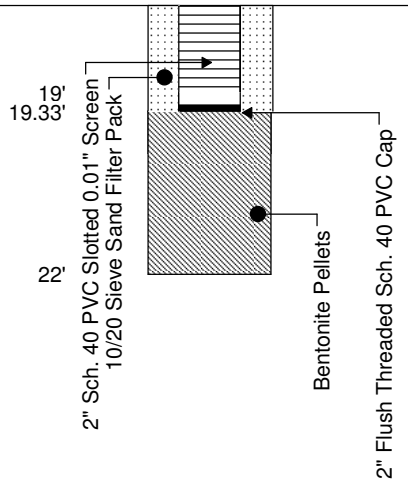
Well No.: MKTF-15
Start Date: 10/29/2013 09:30
Finish Date: 10/29/2013 12:15

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Five-Foot Core Barrel
Comments: N 35°29.343' W 108°25.708'; Boring ID - SB31

Total Depth: 22' bgl
Ground Water: Saturated @ 14' bgl
Elev., TOC (ft. msl): 6943.48
Elev., PAD (ft. msl): 6943.74
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,845.57 **E** 2,545,934.58

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
19				90	**Sandy Silt/Silty Sand (ML/SM)** Fine grain, loose to compact, moist to saturated, hydrocarbon odor, dark brown to black
					Sandy Silt/Silty Sand (ML/SM) Similar to above, saturated in silty sand lenses, hydrocarbon odor
21				90	**Silty Clay (CL)** Low plasticity, firm, damp, brown, faint odor
					Silty Clay (CL) Similar to above, odor
23					Total Depth = 22' BGL
25					
27					
29					
31					
33					
35					

Completion Results



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512/347-8243

WELL INSTALLATION

Well No.: MKTF-16
Start Date: 11/7/2013 08:40
Finish Date: 11/7/2013 11:00

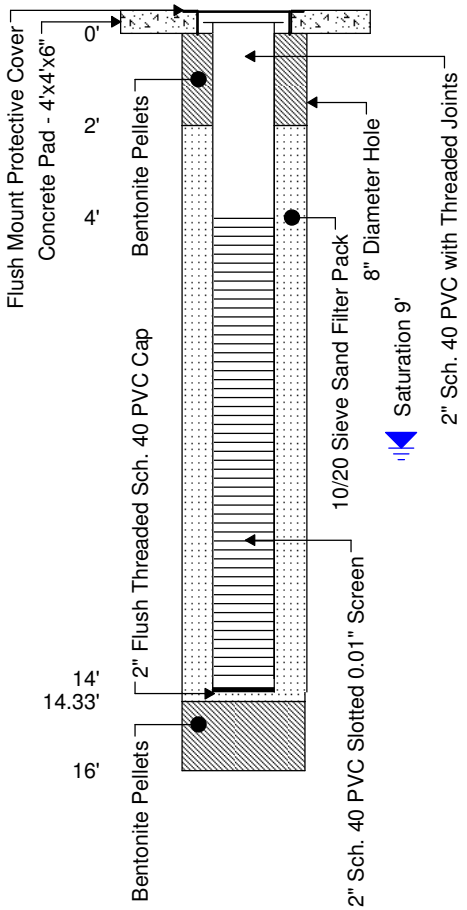
Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon

Total Depth: 16' bgl
Ground Water: Saturated @ 9' bgl
Elev., TOC (ft. msl): 6950.58
Elev., PAD (ft. msl): 6951.00
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,718.14 **E** 2,546,068.55

Comments: N 35°29.323' W 108°25.680'; Boring ID - SB32

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
					Ground Surface
0-1				0	**Fill (Clay/Gravel)** No recovery
1-3	469			10	**Fill (Clay/Gravel)** Similar to above
3-5				0	**Fill (Clay/Gravel)** Similar to baove
5-7				0	**Fill (Clay/Gravel)** Similar to above
7-9	1445	9'		90	**Fill (Clay/Gravel)** Saturated at 9' bgl, black discoloration, hydrocarbon odor
9-11	1255			90	**Gravelly Sand (SW)** High plasticity, firm, damp, dark brown, hydrocarbon odor
11-13	1412			40	**Clayey Sand (SC)** Similar to above, hydrocarbon odor
13-15	439			80	**Clayey Sand (SC)** Moderate plasticity, firm, damp, brown, hydrocarbon odor
15-17					Total Depth = 16' BGL
17-19					
19-21					

Completion Results



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512/347-8243

WELL INSTALLATION

Well No.: MKTF-17
Start Date: 11/14/2013 13:00
Finish Date: 11/14/2013 15:00

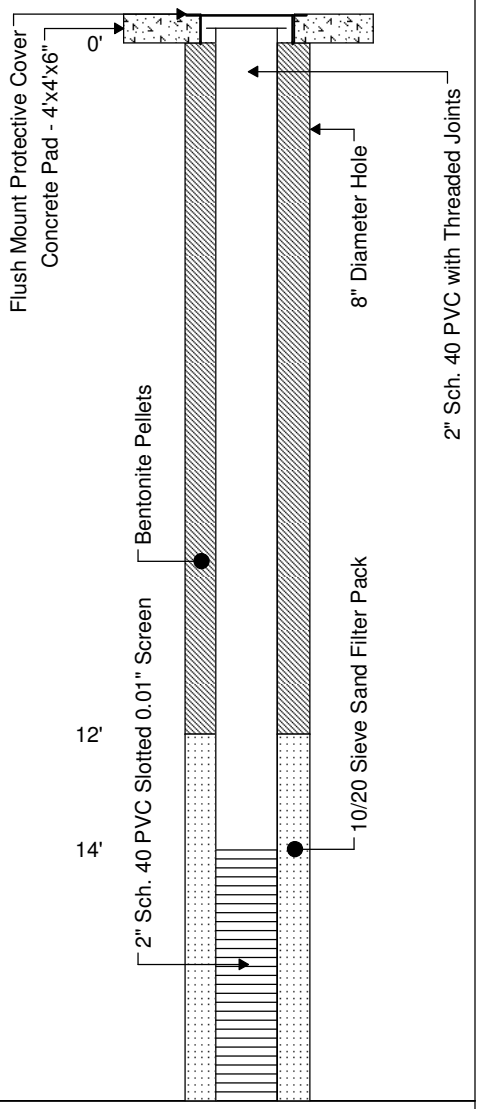
Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon

Total Depth: 25' bgl
Ground Water: Saturated @ 20' bgl
Elev., TOC (ft. msl): 6945.76
Elev., PAD (ft. msl): 6945.79
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,268.93 **E** 2,545,850.73

Comments: N 35°29.248' W 108°25.724'; Boring ID - SB33

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
-1					Ground Surface
1				10	**Fill (Asphalt/Base/Clay)** Low plasticity, soft, damp, brown
3	150			10	**Fill (Clay)** Similar to above
5	157			90	**Fill (Sand/Gravel/Clay)** Moist to very moist, reddish brown, no odor
7	92.1			20	**Fill (Sand/Gravel/Clay)** Similar to above, saturated, odor
9	65.9			90	**Clay (CH)** High plasticity, firm, damp, faint odor, brown
11	17			60	**Clay (CH)** Similar to above
13	55			70	**Clay (CH)** High plasticity, soft, damp, dark brown and black, odor
15	17.5			60	**Clay (CH)** Similar to above, faint odor
17	11.3			10	**Clay (CH)** Similar to above, trace fine grain sand

Completion Results



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Austin, Texas 78746

512/347-7588
512/347-8243

WELL INSTALLATION

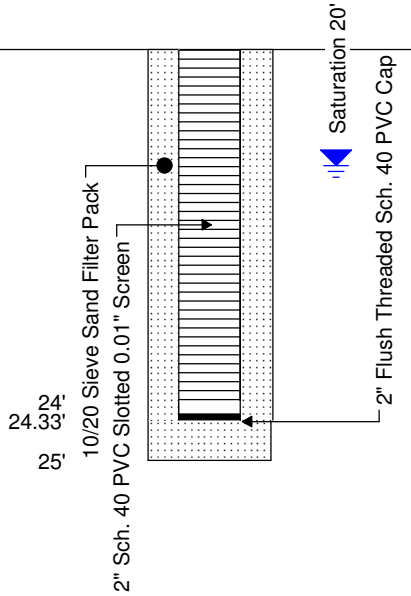
Well No.: MKTF-17
Start Date: 11/14/2013 13:00
Finish Date: 11/14/2013 15:00

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon
Comments: N 35°29.248' W 108°25.724'; Boring ID - SB33

Total Depth: 25' bgl
Ground Water: Saturated @ 20' bgl
Elev., TOC (ft. msl): 6945.76
Elev., PAD (ft. msl): 6945.79
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,268.93 **E** 2,545,850.73

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
20	17.2	20'		10	**Clay (CH)** High plasticity, soft, damp, brown
	17.5			70	**Sandy Clay (CH)** Moderate plasticity, soft, very moist to saturated in sand seams
22				80	**Silty Clayey Gravel (GM)** Compact to loose, medium grain sand to 1/4" gravel - angular, saturated, brown
24				90	**Clay (CH)** Moderate plasticity, firm to stiff, damp, greenish gray
					Total Depth = 25' BGL

Completion Results



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512/347-7588
512/347-8243

WELL INSTALLATION

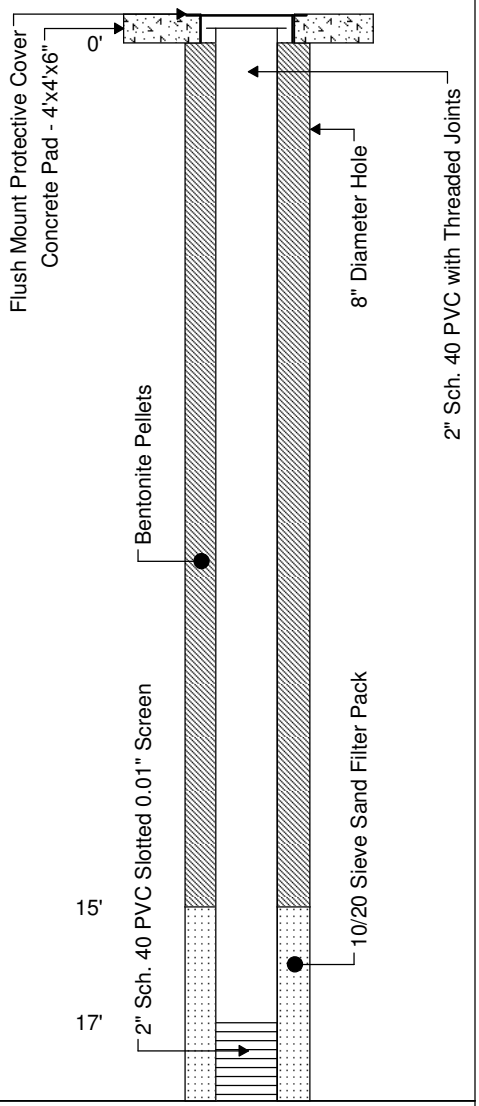
Well No.: MKTF-18
Start Date: 11/15/2013 10:00
Finish Date: 11/15/2013 15:00

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon

Total Depth: 27' bgl
Ground Water: Saturated @ 23' bgl
Elev., TOC (ft. msl): 6950.65
Elev., PAD (ft. msl): 6950.97
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,497.53 **E** 2,546,006.29

Comments: N 35°29.288' W 108°25.692'; Boring ID - SB34

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
					Ground Surface
1				--	**Fill (Gravel and Silty Clay)**
3	1009			20	**Fill (Gravel and Silty Clay)** Similar to above, strong hydrocarbon odor, damp
5	693			60	**Fill (Gravel and Silty Clay)** Similar to above
7	1108			70	**Fill (Silty Clay)** Low plasticity, firm, damp, brown, gravel present, strong hydrocarbon odor
9	901			90	**Fill (Clay/Sand/Gravel)** Similar to above, saturated, odor, sheen observed
11	803			60	**Clay (CH)** High plasticity, stiff, damp, brown, hydrocarbon odor
13	254			70	**Clay (CH)** Similar to above, very fine grain, sand in partings
15	200			30	**Clay (CH)** Similar to above
17				--	No recovery



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512/347-8243

WELL INSTALLATION

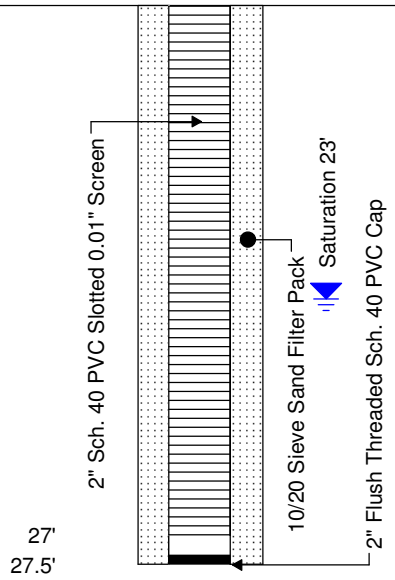
Well No.: MKTF-18
Start Date: 11/15/2013 10:00
Finish Date: 11/15/2013 15:00

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon
Comments: N 35°29.288' W 108°25.692'; Boring ID - SB34

Total Depth: 27' bgl
Ground Water: Saturated @ 23' bgl
Elev., TOC (ft. msl): 6950.65
Elev., PAD (ft. msl): 6950.97
Elev., GL (ft. msl): --
Site Coordinates:
N 1,633,497.53 **E** 2,546,006.29

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
20	112			30	**Clay (CH)** High plasticity, firm, damp, brown, faint odor
	55			20	**Clay (CH)** Similar to above
22		23'		80	**Clay (CH)** Similar to above
	323				**Sandy Clay/Clayey Sand (SC/CL)** Fine grain, compact, very moist to saturated, brown, hydrocarbon present
24				90	**Clayey Sand (SC)** Similar to above, saturated
26					**Sandy Clay (CL)** Low plasticity, firm, damp, hydrocarbon odor, greenish gray
28					Total Depth = 27' BGL
30					
32					
34					
36					

Completion Results



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WELL INSTALLATION

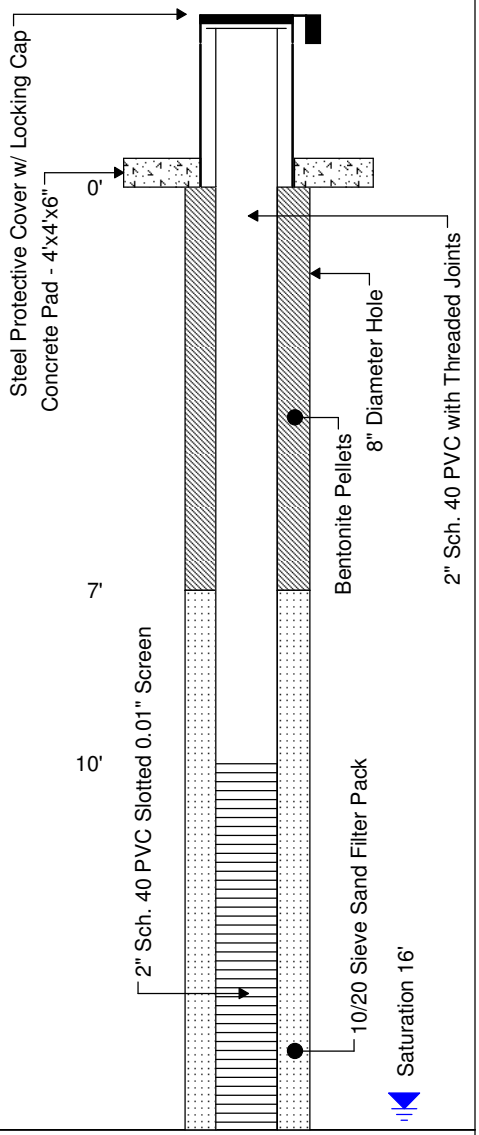
Well No.: MKTF-19
Start Date: 11/5/2013 08:50
Finish Date: 11/5/2013 11:20

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Five-Foot Core Barrel
Comments: N 35°29.268' W 108°25.726'; Boring ID - SB35

Total Depth: 20' bgl
Ground Water: Saturated @ 16' bgl
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): --
Site Coordinates:
N **W**

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
					Ground Surface
1				--	**Fill (Asphate/Base/Clay)** Odor
3	1178			50	**Fill (Silty Clay/Sandy Gravel)** Brown, strong hydrocarbon odor
5	1232			90	**Fill (Silty Clay/Sandy Gravel)** Similar to above, gray discoloration, strong hydrocarbon odor
7	120			80	**Clay (CH)** High plasticity, stiff, damp, brown, odor, calcareous, sampling tube is oily
9	375			70	**Clay (CH)** Similar to above, odor, oily
11	601			70	**Silty Sandy Clay (CL)** Moderate plasticity, firm, damp, brown, hydrocarbon odor, sampling tube is oily
13	1279			70	**Sandy Clay (CL)** Low plasticity, soft, damp to moist in sand seams, brown, strong hydrocarbon odor
15	249	16'		90	**Sandy Clay (CL)** Similar to above, hydrocarbon odor, tube is oily

Completion Results



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512/347-8243

WELL INSTALLATION

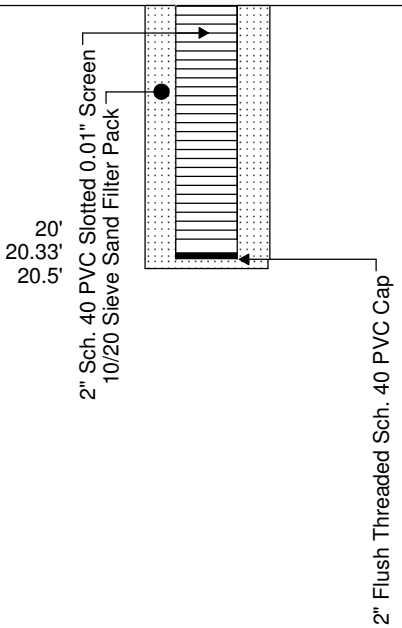
Well No.: MKTF-19
Start Date: 11/5/2013 08:50
Finish Date: 11/5/2013 11:20

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Five-Foot Core Barrel
Comments: N 35°29.268' W 108°25.726'; Boring ID - SB35

Total Depth: 20' bgl
Ground Water: Saturated @ 16' bgl
Elev., TOC (ft. msl): --
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): --
Site Coordinates:
N **W**

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
18				90	**Silty Sand (SM)** Fine grain, loose, saturated, oily/phase-separated hydrocarbon, hydrocarbon odor, clay at base
20				90	**Silty Sand (SM)** Similar to above
					Total Depth = 20' BGL

Completion Results



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512/347-8243

WELL INSTALLATION

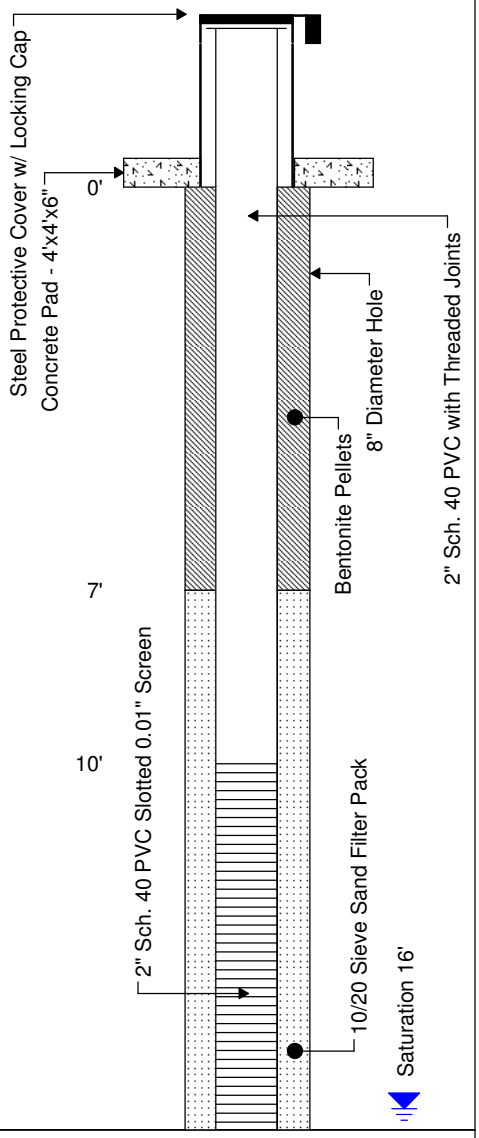
Well No.: MKTF-19
Start Date: 11/5/2013 08:50
Finish Date: 11/5/2013 11:20

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Five-Foot Core Barrel
Comments: N 35°29.268' W 108°25.726'; Boring ID - SB35

Total Depth: 20' bgl
Ground Water: Saturated @ 16' bgl
Elev., TOC (ft. msl): 6944.67
Elev., PAD (ft. msl): 6944.89
Elev., GL (ft. msl): 6944.34
Site Coordinates:
N 1633381.19 **E** 2545842.82

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
-3					
-1					Ground Surface
1				--	**Fill (Asphalt/Base/Clay)** Odor
3	1178			50	**Fill (Silty Clay/Sandy Gravel)** Brown, strong hydrocarbon odor
5	1232			90	**Fill (Silty Clay/Sandy Gravel)** Similar to above, gray discoloration, strong hydrocarbon odor
7	120			80	**Clay (CH)** High plasticity, stiff, damp, brown, odor, calcareous, sampling tube is oily
9	375			70	**Clay (CH)** Similar to above, odor, oily
11	601			70	**Silty Sandy Clay (CL)** Moderate plasticity, firm, damp, brown, hydrocarbon odor, sampling tube is oily
13	1279			70	**Sandy Clay (CL)** Low plasticity, soft, damp to moist in sand seams, brown, strong hydrocarbon odor
15	249	16'		90	**Sandy Clay (CL)** Similar to above, hydrocarbon odor, tube is oily

Completion Results



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512/347-7588
512/347-8243

WELL INSTALLATION

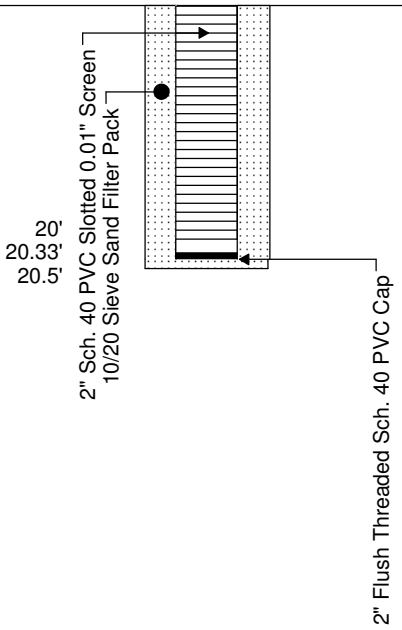
Well No.: MKTF-19
Start Date: 11/5/2013 08:50
Finish Date: 11/5/2013 11:20

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Five-Foot Core Barrel
Comments: N 35°29.268' W 108°25.726'; Boring ID - SB35

Total Depth: 20' bgl
Ground Water: Saturated @ 16' bgl
Elev., TOC (ft. msl): 6944.67
Elev., PAD (ft. msl): 6944.89
Elev., GL (ft. msl): 6944.34
Site Coordinates:
N 1633381.19 **E** 2545842.82

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
18				90	**Silty Sand (SM)** Fine grain, loose, saturated, oily/phase-separated hydrocarbon, hydrocarbon odor, clay at base
20				90	**Silty Sand (SM)** Similar to above
					Total Depth = 20' BGL

Completion Results



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512/347-8243

WELL INSTALLATION

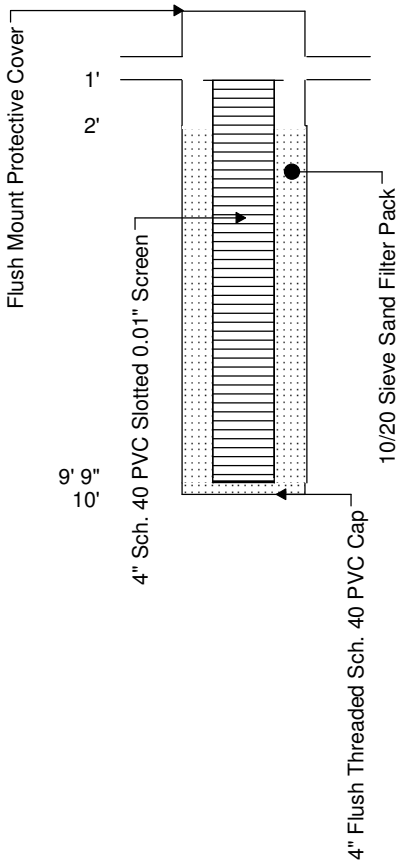
Well No.: MKTF-20
Start Date: 2/10/2014
Finish Date: 2/10/2014

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01867
Geologist: Not Applicable
Driller: Western Refining Southwest, Inc.
Drilling Rig: Not Applicable
Drilling Method: Not Applicable
Sampling Method: Not Applicable

Total Depth: 10' bgl
Ground Water: 7.86' ft. BTOC
Elev., TOC (ft. msl): 6951.78
Elev., PAD (ft. msl): 6951.89
Elev., GL (ft. msl): 6951.17
Site Coordinates:
N 1633698.28 **E** 2546111.23

Comments: N 35°29.319' W 108°25.674'; Boring ID: Sump-N

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
0					Ground Surface
0 - 10				--	**Fill Material**
10					Total Depth = 10' BGL



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512/347-8243

WELL INSTALLATION

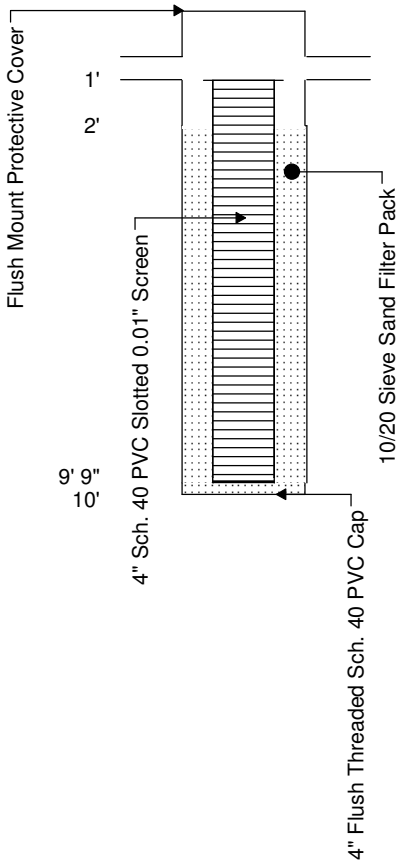
Well No.: MKTF-21
Start Date: 2/10/2014
Finish Date: 2/10/2014

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01867
Geologist: Not Applicable
Driller: Western Refining Southwest, Inc.
Drilling Rig: Not Applicable
Drilling Method: Not Applicable
Sampling Method: Not Applicable

Total Depth: 10' bgl
Ground Water: 7.60' ft. BTOC
Elev., TOC (ft. msl): 6952.57
Elev., PAD (ft. msl): 6952.68
Elev., GL (ft. msl): 6952.00
Site Coordinates:
N 1633570.30 **E** 2546110.00

Comments: N 35°29.295' W 108°25.675'; Boring ID: Sump-S

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
0					Ground Surface
0 – 10				--	**Fill Material**
10					Total Depth = 10' BGL



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512/347-7588
512/347-8243

WELL INSTALLATION

Well No.: MKTF-22
Start Date: 11/8/2013 12:15
Finish Date: 11/8/2013 15:30

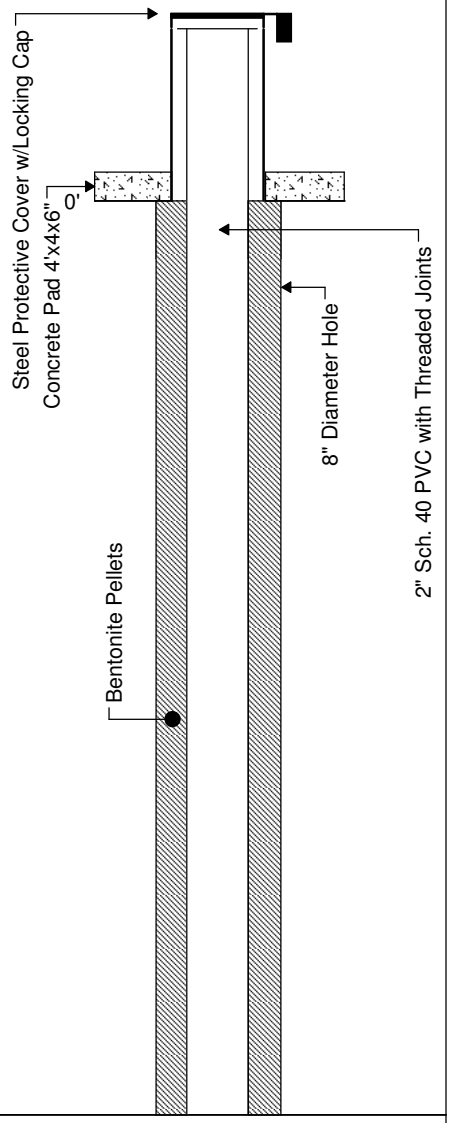
Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon

Total Depth: 32' bgl
Ground Water: Saturated @ 26' bgl
Elev., TOC (ft. msl): 6942.31
Elev., PAD (ft. msl): 6939.76
Elev., GL (ft. msl): 6938.57
Site Coordinates:
N 1633501.64 **E** 2545478.20

Comments: N 35°29.288' W 108°25.802'; Boring ID - SB23

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
-3					
-1					Ground Surface
1	3.4			10	**Clayey Silt (ML)** Low plasticity, very fine grain, compact to loose, damp, tan, no odor
3	8.9			20	**Clayey Silt (ML)** Similar to above
5	7.0			20	**Clayey Silt (ML)** Similar to above
7	7.9			50	**Clayey Silt (ML)** Similar to above, light brown, no odor
9	6.4			40	**Clayey Silt (ML)** Low plasticity, stiff, damp, light brown, no odor
11	13.7			50	**Clayey Silt (ML)** Similar to above
13	12.7			10	**Clayey Silt (ML)** Similar to above, very stiff
15	10.1			70	**Clayey Silt (ML)** Very fine grain, stiff, damp, brown, no odor, becomes sandy at base

Completion Results



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512/347-7588
512/347-8243

WELL INSTALLATION

Well No.: MKTF-22
Start Date: 11/8/2013 12:15
Finish Date: 11/8/2013 15:30

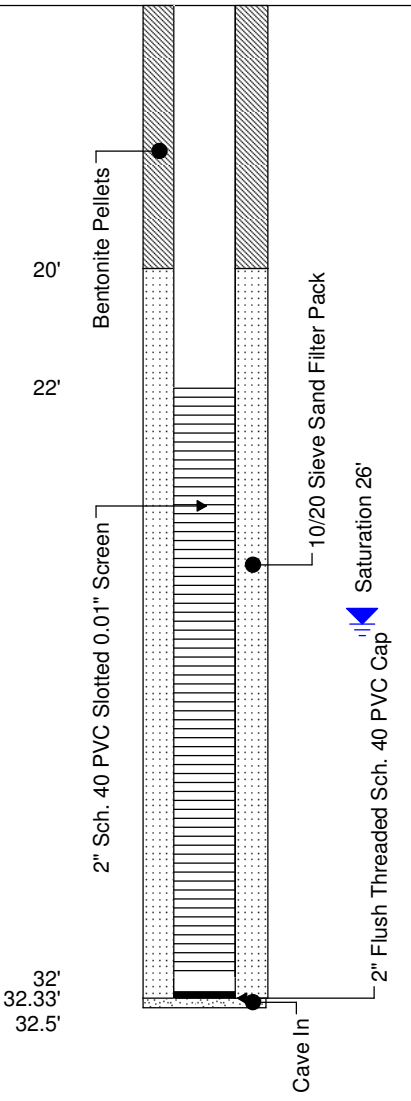
Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon
Comments: N 35°29.288' W 108°25.802'; Boring ID - SB23

Total Depth: 32' bgl
Ground Water: Saturated @ 26' bgl
Elev., TOC (ft. msl): 6942.31
Elev., PAD (ft. msl): 6939.76
Elev., GL (ft. msl): 6938.57
Site Coordinates:
N 1633501.64 **E** 2545478.20

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
17	13.2			10	**Silty Clay/Clayey Silt (CL)** Similar to above, increase in clay, damper, no odor
19	17.2			90	**Silty Clay (CL)** Low plasticity, firm, damp, brown, no odor
21	14.1			90	**Sandy Clay (CL)** Low plasticity, soft, damp, brown, no odor
23	43.1			90	**Sandy Clay (CL)** Similar to above, damp, faint odor
25	73.1			90	**Sandy Clay (CL)** Similar to above, very moist in sand seams, hydrocarbon odor
27		26'		90	**Silty Sand (SM)** Fine to medium grain, loose, saturated, brownish gray, hydrocarbon odor
29				90	**Clayey Silt (ML)** Very fine grain, soft, moist, dark brown, hydrocarbon odor
31				90	**Sand (SP)** Fine to medium grain, loose, saturated, brown, odor
33					**Silty Clay (CL)** Low plasticity, firm, damp, greenish gray, no odor

Total Depth = 32' BGL

Completion Results



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512/347-7588
512/347-8243

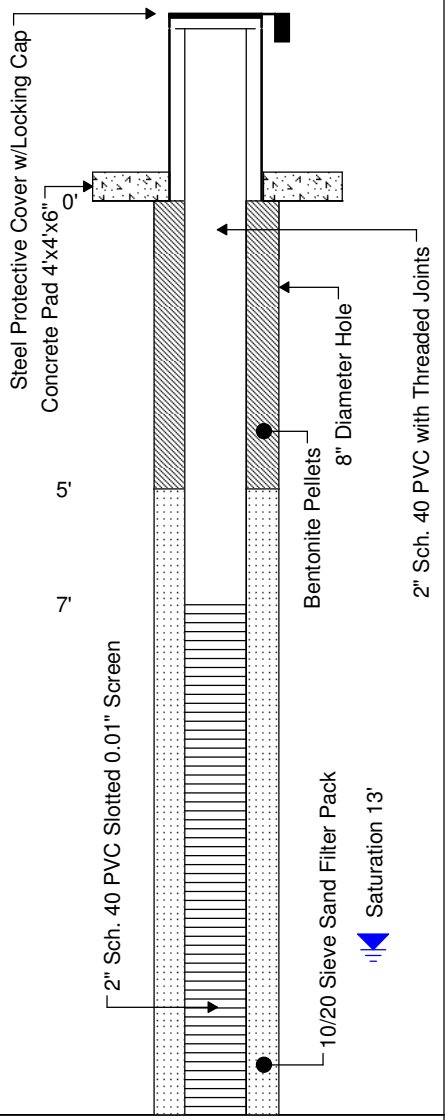
WELL INSTALLATION

Well No.: MKTF-23
Start Date: 11/4/2013 14:00
Finish Date: 11/4/2013 16:00

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Five-Foot Core Barrel
Comments: N 35°29.327' W 108°25.795'; Boring ID - SB25

Total Depth: 20' bgl
Ground Water: Saturated @ 13' bgl
Elev., TOC (ft. msl): 6929.98
Elev., PAD (ft. msl): 6927.23
Elev., GL (ft. msl): 6925.79
Site Coordinates:
N 1633750.93 **E** 2545503.70

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
-3					
-1					Ground Surface
1	10.3				**Silty Clay/Clayey Silt (ML/CL)** Low plasticity, firm, damp, brown, no odor
3	9.7			90	**Silty Clay/Clayey Silt (ML/CL)** Similar to above
5	13.4				**Silty Clay/Clayey Silt (ML/CL)** Similar to above
	21.9				**Clayey Silt (ML)** Low plasticity, soft, damp, brown, no odor
7	22				**Clayey Silt (ML)** Similar to above
9	29.1			90	**Clayey Sand (SC)** Very fine grain, compact, damp, brown, no odor
11	211				**Clayey Sand (SC)** Similar to above, odor, moist
13	1022	13'		80	**Clayey Sand (SC)** Fine grain, compact, moist to saturated in sand seam, hydrocarbon odor, phase-separated hydrocarbon present
15					



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512/347-8243

WELL INSTALLATION

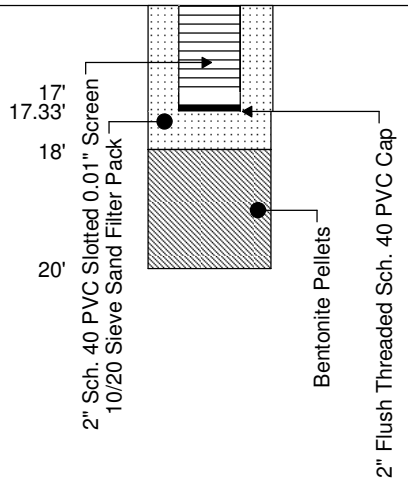
Well No.: MKTF-23
Start Date: 11/4/2013 14:00
Finish Date: 11/4/2013 16:00

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Five-Foot Core Barrel
Comments: N 35°29.327' W 108°25.795'; Boring ID - SB25

Total Depth: 20' bgl
Ground Water: Saturated @ 13' bgl
Elev., TOC (ft. msl): 6929.98
Elev., PAD (ft. msl): 6927.23
Elev., GL (ft. msl): 6925.79
Site Coordinates:
N 1633750.93 **E** 2545503.70

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
17	32.6			90	**Clay (CH)** High plasticity, stiff, damp, brown, no odor
19	28.9				
21	22.7				**Sandy Clay (CL)** Moderate plasticity, firm, damp, brown and gray, no odor
23					Total Depth = 20' BGL
25					
27					
29					
31					
33					

Completion Results



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512/347-7588
512/347-8243

WELL INSTALLATION

Well No.: MKTF-24
Start Date: 10/29/2013 13:15
Finish Date: 10/29/2013 16:15

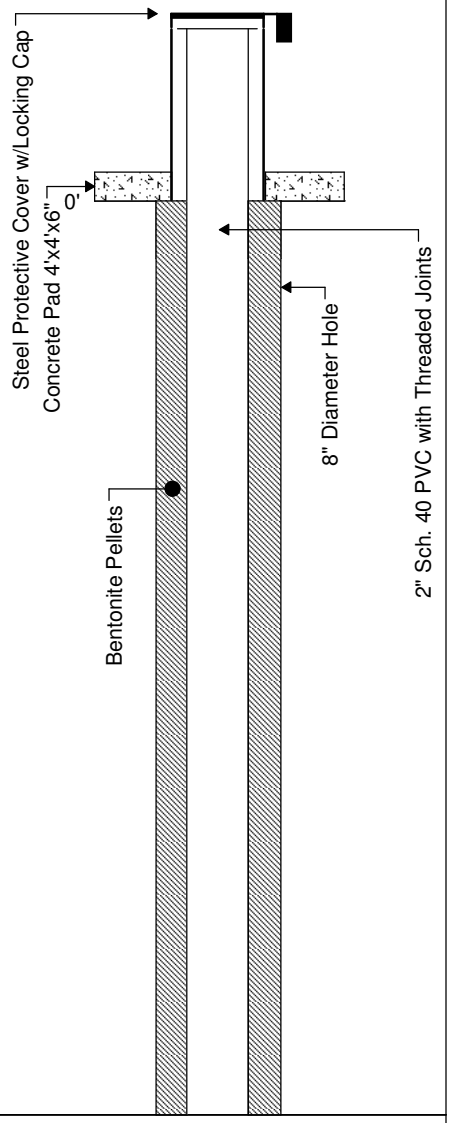
Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon

Total Depth: 30' bgl
Ground Water: Saturated @ 20' bgl
Elev., TOC (ft. msl): 6928.72
Elev., PAD (ft. msl): 6926.07
Elev., GL (ft. msl): 6924.62
Site Coordinates:
N 1633853.19 **E** 2545468.48

Comments: N 35°29.342' W 108°25.800'; Boring ID - SB26

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
-3					
-1					Ground Surface
1	14.1			90	**Silt/Silty Sand (ML/SM)** Very fine to fine grain, loose, dry, brown
3	11.2			10	**Silty Sand (SM)** Fine grain, compact/very dense, damp, brown
5	12.5			90	**Silty Sandy Clay (CL)** Low plasticity, very dense, damp, brown
7	11.8			90	**Silty Sandy Clay (CL)** Similar to above
9	14.8			60	**Silty Sandy Clay (CL)** Similar to above
11	12.5			90	**Silty Sandy Clay (CL)** Similar to above
13	12.8			90	**Silty Sandy Clay (CL)** Similar to above
15	13.4			90	**Clay (CH)** High plasticity, firm, damp, brown, trace silt, no odor

Completion Results



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512/347-8243

WELL INSTALLATION

Well No.: MKTF-24
Start Date: 10/29/2013 13:15
Finish Date: 10/29/2013 16:15

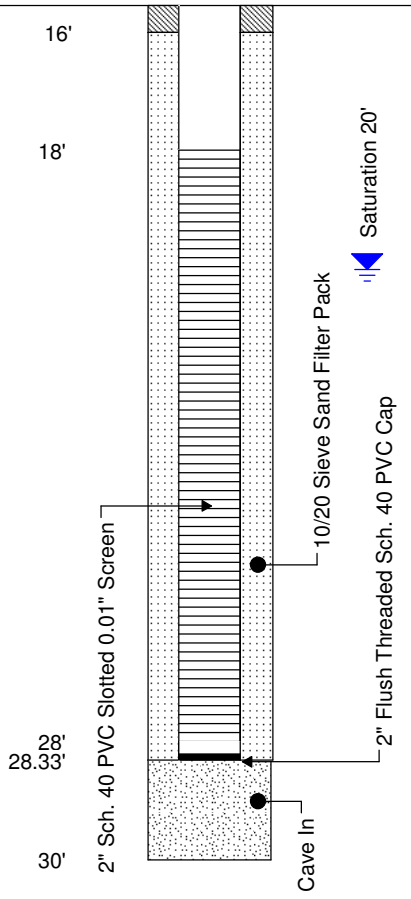
Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon

Total Depth: 30' bgl
Ground Water: Saturated @ 20' bgl
Elev., TOC (ft. msl): 6928.72
Elev., PAD (ft. msl): 6926.07
Elev., GL (ft. msl): 6924.62
Site Coordinates:
N 1633853.19 **E** 2545468.48

Comments: N 35°29.342' W 108°25.800'; Boring ID - SB26

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
17	16.8			70	**Silty Sandy Clay (CL)** Low plasticity, firm, damp, brown, no odor
19	33.7	20'		90	**Sandy Clay (CL)** Low plasticity, soft, damp, brown, no odor
21	40.8			90	**Sandy Clay/Clayey Sand (CL/SC)** Fine grain, compact to soft, moist to saturated, brown, no odor
23				90	**Sandy Clay/Clayey Sand (CL/SC)** Similar to above, moist to saturated, no odor
25				90	**Sandy Clay/Clayey Sand (CL/SC)** Similar to above, moist to saturated, no odor
27				90	**Sandy Clay/Clayey Sand (CL/SC)** Similar to above, moist to saturated, greenish gray sand at base
29				90	**Silt/Siltstone (ML)** Low plasticity, very dense, dry, crumbly, brown/reddish brown, no odor
31					Total Depth = 30' BGL
33					

Completion Results



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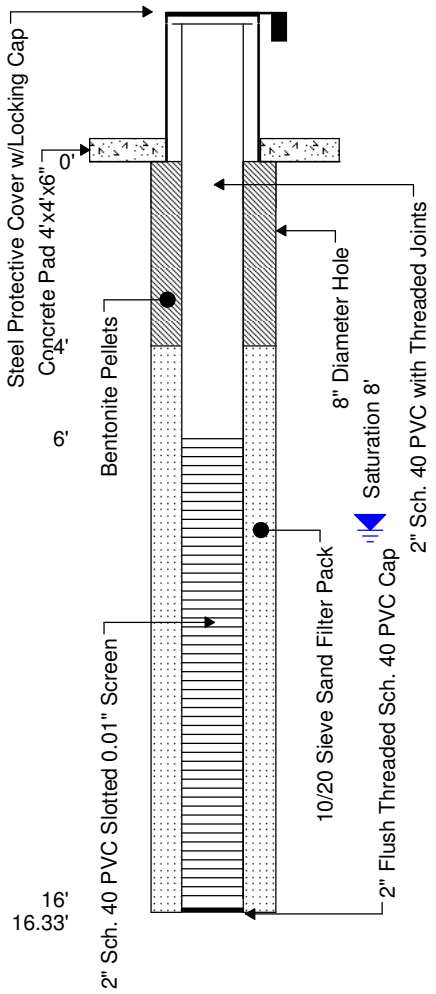
WELL INSTALLATION

Well No.: MKTF-25
Start Date: 10/30/2013 14:45
Finish Date: 10/30/2013 16:30

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon
Comments: N 35°29.372' W 108°25.840'; Boring ID - SB28

Total Depth: 16' bgl
Ground Water: Saturated @ 8' bgl
Elev., TOC (ft. msl): 6916.19
Elev., PAD (ft. msl): 6913.35
Elev., GL (ft. msl): 6911.79
Site Coordinates:
N 1634015.86 **E** 2545275.68

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
					Ground Surface
1	10.9			60	**Fill (Silty Clay/Gravel)** Low plasticity, stiff, damp, brown, no odor
3	14.5			70	**Fill (Silty Clay/Gravel)** Similar to above
5	12.9			20	**Silty Clay (CL)** Low plasticity, stiff, damp, brown
7	14.5			70	**Silty Clay (CL)** Similar to above
9	21.1	8'		60	**Gravelly Sand (SW)** Fine to medium grain, loose, brown, saturated, odor
11				80	**Gravelly Sand (SW)** Fine to medium grain, compact, brown, very moist to saturated, odor
13				70	**Clayey Sand (SC)** Fine grain, compact, brown, moist to saturated in sand seams, odor
15				80	**Clayey Sand (SC)** Similar to above, odor
					Total Depth = 16' BGL



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WELL INSTALLATION

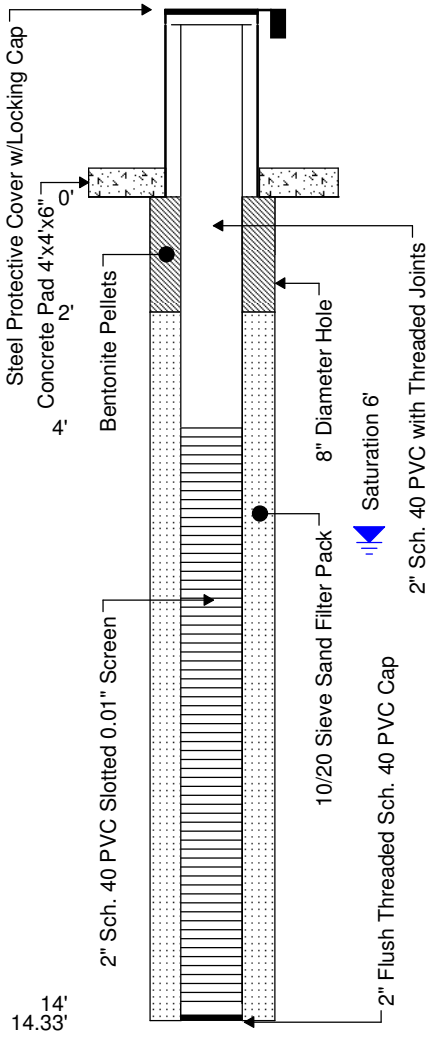
Well No.: MKTF-26
Start Date: 10/30/2013 10:40
Finish Date: 10/30/2013 12:00

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon
Comments: N 35°29.373' W 108°25.796'; Boring ID - SB29

Total Depth: 14' bgl
Ground Water: Saturated @ 6' bgl
Elev., TOC (ft. msl): 6915.31
Elev., PAD (ft. msl): 6912.55
Elev., GL (ft. msl): 6911.35
Site Coordinates:
N 1634033.63 **E** 2545492.39

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
					Ground Surface
1	17.5			80	**Silty Clay (CL)** Low plasticity, soft, damp, brown, no odor, trace small gravel
3	9.4			60	**Silty Clay (CL)** Similar to above
5	4.8	6'		60	**Silty Clay (CL)** Similar to above
7	34.8			90	**Sandy Clay/Clayey Sand (SC/CL)** Very fine grain, compact/soft, brown, moist, faint odor, saturated at base
9				70	**Sandy Clay (SC)** Low plasticity, stiff, damp, brown, no odor
11				60	**Silt/Siltstone (ML)** Low plasticity, very dense, dry, reddish brown, very fine grain sand in fissures, no odor
13				60	**Silt/Siltstone (ML)** Similar to above
15					Total Depth = 14' BGL

Completion Results



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WELL INSTALLATION

Well No.: MKTF-27
Start Date: 10/30/2013 09:00
Finish Date: 10/30/2013 10:20

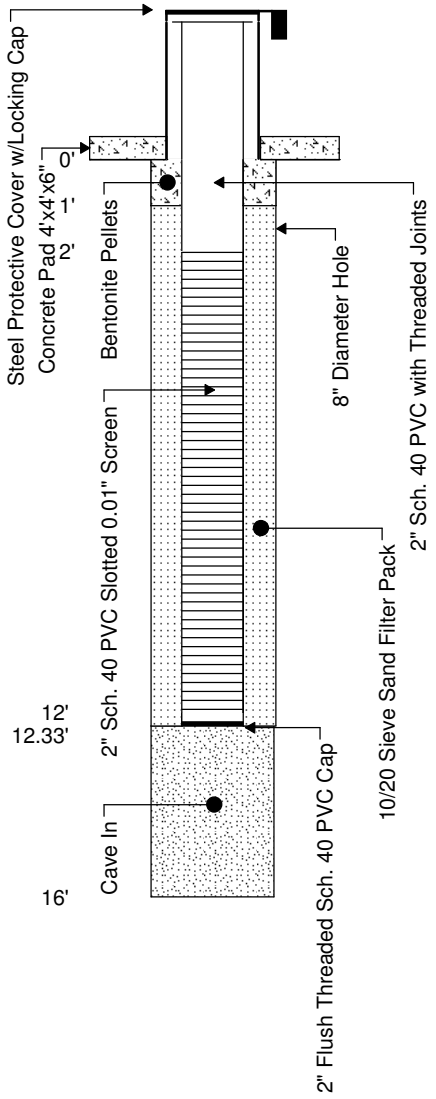
Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01809
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: Split Spoon

Total Depth: 16' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): 6917.90
Elev., PAD (ft. msl): 6915.36
Elev., GL (ft. msl): 6914.18
Site Coordinates:
N 1634115.56 **E** 2545620.98

Comments: N 35°29.387' W 108°25.771'; Boring ID - SB30

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
					Ground Surface
1	3.3			90	**Silty Clay (CL)** Low plasticity, firm, damp, brown, occasional gravel
3	4.1			80	**Silty Clay (CL)** Similar to above
5	2.4			90	**Silty Clay (CL)** Similar to above
7	4.1			90	**Silty Clay (CL)** Low to moderate plasticity, firm to soft, damp, brown, no odor, calcareous organics present
9	3.3			80	**Silt/Siltstone (ML)** Low plasticity, very dense, dry, reddish brown with greenish gray very fine grain sand in fissures, no odor
11	3.7			80	**Silt/Siltstone (ML)** Similar to above
13	4.5			80	**Silt/Siltstone (ML)** Similar to above
15	3.9			80	**Silt/Siltstone (ML)** Similar to above
					Total Depth = 16' BGL

Completion Results



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WELL INSTALLATION

Well No.: MKTF-28
Start Date: 4/2/2014 11:30
Finish Date: 4/2/2014 14:25

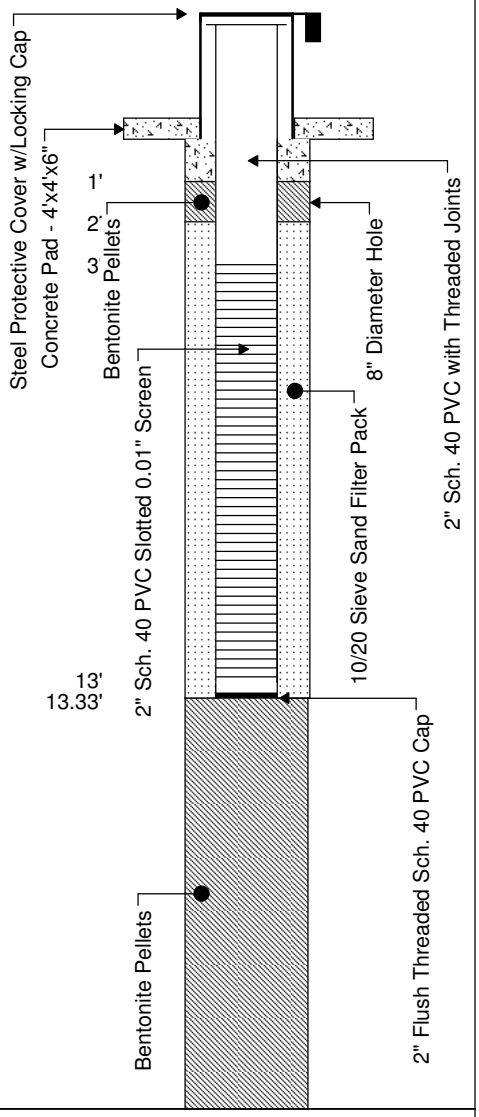
Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01867
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: 5-Foot Split Spoon

Total Depth: 30' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): 6921.52
Elev., PAD (ft. msl): 6918.67
Elev., GL (ft. msl): 6917.51
Site Coordinates:
N 1634263.44 **E** 2545650.04

Comments: N 35°29.412' W 108°25.763', Air Temp: 48°F

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
-3					
-1					Ground Surface
1	2.6			90	**Fill (Silty Clay)** Low plasticity, soft, damp, brown, no odor, sandy at base, moist
3	5.0				
5	3.6			60	**Silty Clay (CL)** Similar to above, damp to moist at 7.5' bgl
7	7.6				
9	8.2			60	**Silty Clay (CL)** Low plasticity, stiff, damp to dry, crumbly, brown, no odor
11	8.1				
13	7.5			60	**Silty Clay (CL)** Similar to above
15	9.1				
17	5.5			60	**Silty Clay (CL)** Similar to above
19	7.8				
21	3.5			60	

Completion Results



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512/347-8243

WELL INSTALLATION

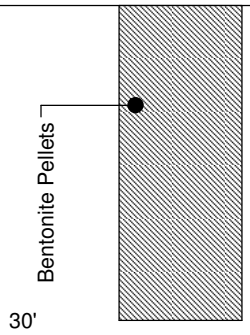
Well No.: MKTF-28
Start Date: 4/2/2014 11:30
Finish Date: 4/2/2014 14:25

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01867
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: 5-Foot Split Spoon
Comments: N 35°29.412' W 108°25.763', Air Temp: 48°F

Total Depth: 30' bgl
Ground Water: Not Encountered
Elev., TOC (ft. msl): 6921.52
Elev., PAD (ft. msl): 6918.67
Elev., GL (ft. msl): 6917.51
Site Coordinates:
N 1634263.44 **E** 2545650.04

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
24	4.3				**Clay (CH)** High plasticity, very stiff, reddish brown and gray, no odor, crumbly
26	4.1				**Clay (CH)** Similar to above
28	3.3			60	
30					Total Depth = 30' BGL
32					
34					
36					
38					
40					
42					
44					
46					
48					

Completion Results



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WELL INSTALLATION

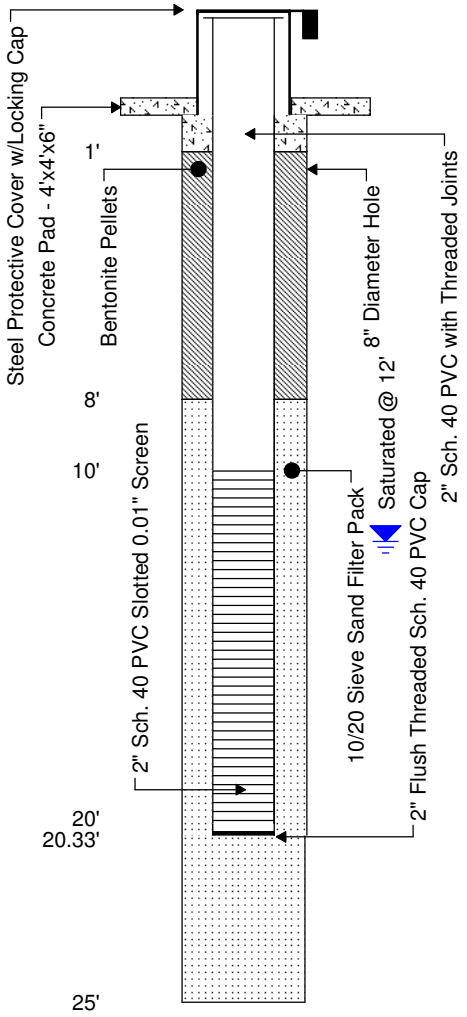
Well No.: MKTF-29
Start Date: 4/2/2014 08:30
Finish Date: 4/2/2014 11:15

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01867
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: 5-Foot Split Spoon
Comments: N 35°29.406' W 108°25.846', Air Temp: 41°F

Total Depth: 25' bgl
Ground Water: Saturated @ 12' bgl
Elev., TOC (ft. msl): 6901.62
Elev., PAD (ft. msl): 6898.83
Elev., GL (ft. msl): 6897.67
Site Coordinates:
N 1634249.76 **E** 2545258.34

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
0					Ground Surface
1	2.2			95	**Silty Clay (CL)** Low plasticity, firm, damp, brown, no odor
3	3.9				
5	3.1			95	**Silty Clay (CL)** Similar to above, no odor
7	1.3				
9	4.4				
11	2.4			60	**Silty Clay (CL)** Similar to above, no odor
13	2.9	12'			**Clayey Sand (SC)** Fine grain, compact, saturated, brown, no odor
15	2.8				**Clayey Sand (SC)** Similar to above, saturated
17	2.7			60	
19	1.0				**Clay (CH)** High plasticity, very stiff, dry, damp, reddish brown/gray, no odor
21	1.0			90	**Clay (CH)** Similar to above, no odor
23	1.2				
25					Total Depth = 25' BGL
27					

Completion Results



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WELL INSTALLATION

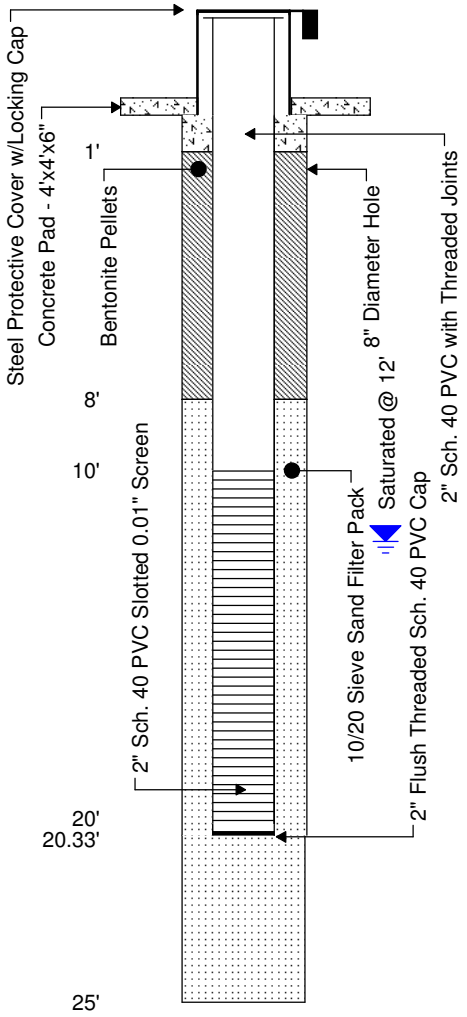
Well No.: MKTF-30
Start Date: 4/1/2014 13:00
Finish Date: 4/1/2014 15:00

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01867
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: 5-Foot Split Spoon

Total Depth: 25' bgl
Ground Water: Saturated @ 12' bgl
Elev., TOC (ft. msl): 6900.80
Elev., PAD (ft. msl): 6898.10
Elev., GL (ft. msl): 6896.68
Site Coordinates:
N 1634225.67 **E** 2544937.91

Comments: N 35°29.405' W 108°25.910', Air Temp: 58°F

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
0					Ground Surface
1	12.3			30	**Fill (Silty Clay)** Low plasticity, firm, dry, brown, no odor
5	12.3			90	**Fill (Silty Clay)** Similar to above, dry, crumbly, no odor, sand at base
7	13.2				
9	17.1				
11	18.5	12'		80	**Silty Sand (SM)** Fine grain, compact to loose, moist to saturated at 12' bgl, brown, no odor, clayey at 14' bgl
13	17.2				
15					**Sandy Clay (CL)** Low plasticity, firm, damp, brown, no odor
15	13.1			90	**Clayey Sand (SC)** Very fine grain, compact, saturated, brown, no odor
17					
19	13.8				**Sandy Clay (CL)** Low plasticity, firm, damp, brown, no odor
21	9.1			95	**Clay (CH)** Moderate to high plasticity, stiff, damp to dry, crumbly, brown/gray, no odor
23	6.2				
25					Total Depth = 25' BGL
27					



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WELL INSTALLATION

Well No.: MKTF-31
Start Date: 4/1/2014 08:20
Finish Date: 4/1/2014 12:00

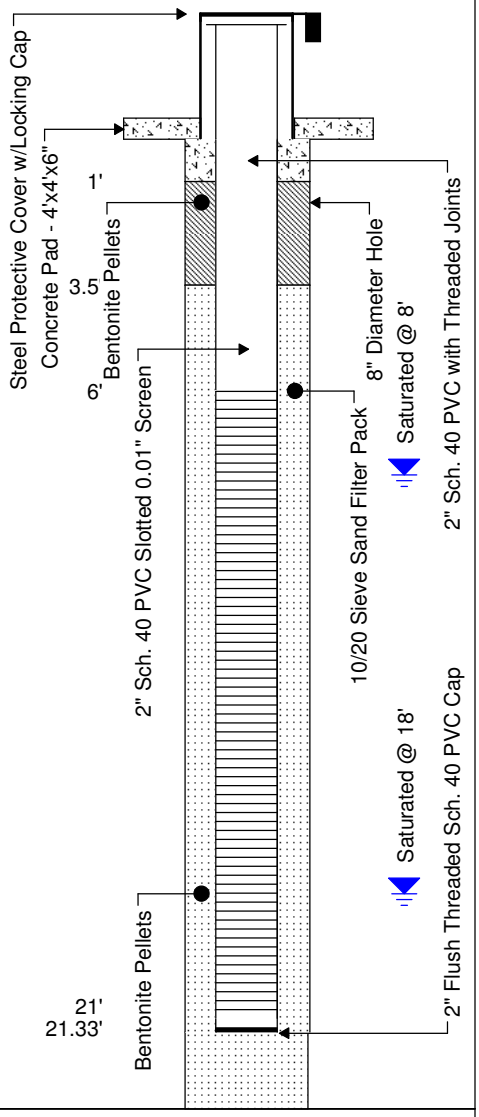
Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01867
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: 5-Foot Split Spoon

Total Depth: 30' bgl
Ground Water: Saturated @ 8' bgl
Elev., TOC (ft. msl): 6906.87
Elev., PAD (ft. msl): 6904.26
Elev., GL (ft. msl): 6903.11
Site Coordinates:
N 1633898.83 **E** 2544938.99

Comments: N 35°29.350' W 108°25.909', Air Temp: 48°F; Boring ID - SB20

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
-3					
-1					Ground Surface
1	2.0			90	**Fill (Silty Clay)** Low plasticity, firm, damp, brown, no odor, gravel throughout
3	2.7				
5	6.5				**Silty Clay (CL)** Low plasticity, firm, damp, brown, no odor
7	5.2	8'		70	**Clayey Sand (SC)** Very fine grain, compact, very moist at 6' bgl to saturated at 8' bgl, brown, no odor
9	4.8				
11				95	**Clayey Sand/Silty Sand (SC/SM)** Similar to above, saturated, brown, no odor
13	5.8				**Clay (CH)** High plasticity, stiff, damp, brown, no odor
15				95	**Sandy Clay (CL)** Low to moderate plasticity, firm, damp in sand seams, brown, no odor
17	3.3	18'			
19	4.6				**Clayey Sand (SC)** Very fine grain, compact, moist to saturated, brown, no odor
21	5.2			90	**Sandy Clay (CL)** Low to moderate plasticity, firm, damp in sand seams, brown, no odor

Completion Results



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512/347-8243

WELL INSTALLATION

Well No.: MKTF-31
Start Date: 4/1/2014 08:20
Finish Date: 4/1/2014 12:00

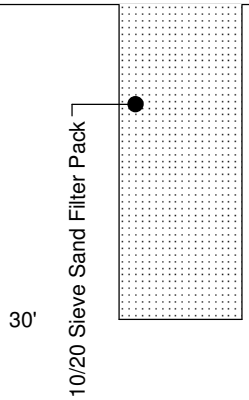
Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01867
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: 5-Foot Split Spoon

Total Depth: 30' bgl
Ground Water: Saturated @ 8' bgl
Elev., TOC (ft. msl): 6906.87
Elev., PAD (ft. msl): 6904.26
Elev., GL (ft. msl): 6903.11
Site Coordinates:
N 1633898.83 **E** 2544938.99

Comments: N 35°29.350' W 108°25.909', Air Temp: 48°F; Boring ID - SB20

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
24	7.2				
26	2.5			90	**Clay (CH)** Moderate plasticity, firm, dry to damp, crumbly, reddish brown, no odor
28	2.3				
30					Total Depth = 30' BGL
32					
34					
36					
38					
40					
42					
44					
46					
48					

Completion Results



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WELL INSTALLATION

Well No.: MKTF-32
Start Date: 3/31/2014 14:40
Finish Date: 3/31/2014 16:30

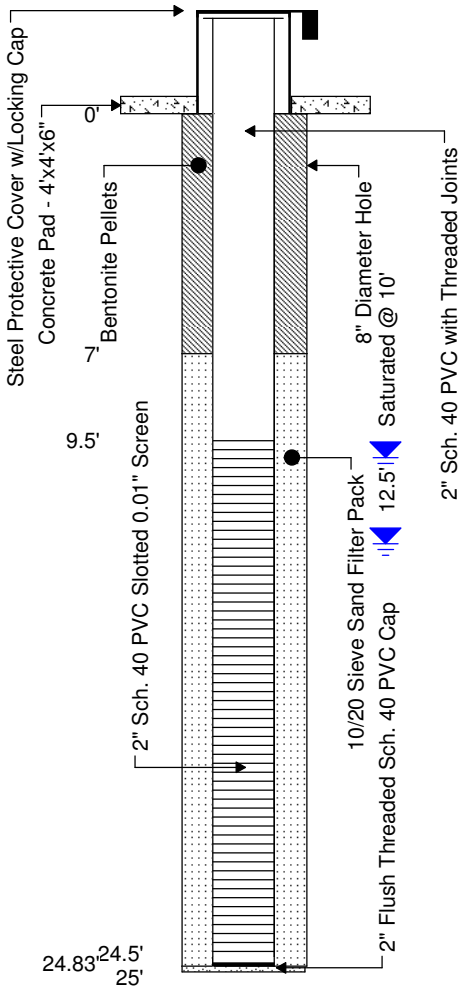
Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01867
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: 5-Foot Split Spoon

Total Depth: 25' bgl
Ground Water: Saturated @ 10' bgl
Elev., TOC (ft. msl): 6911.11
Elev., PAD (ft. msl): 6908.44
Elev., GL (ft. msl): 6907.16
Site Coordinates:
N 1633443.56 **E** 2544840.32

Comments: N 35°29.275' W 108°25.928', Air Temp: 58°F

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
-3					Ground Surface
-1					
1	16.3			95	**Clayey Silt (ML)** Low plasticity, firm, dry, brown, no odor
3	10.0				
5	8.7				
7	10.1			100	**Clayey Silt/Silty Clay (ML/CL)** Low plasticity, firm, dry, brown, no odor
9	9.1	10'			
11	13.6	12.5'			**Silty Clay (CL)** Similar to above, damp, no odor
13	9.3			90	**Sandy Clay/Clayey Sand (SC/CL)** Low plasticity, very fine grain, brown, moist, saturated at 10-11', bgl and 12.5-13.5' bgl, no odor
15	10.9				
17	10.6			80	**Silty Clay/Clay (CH)** Moderate to high plasticity, firm to stiff, damp, brown, no odor
19	14.1				
21	12.6			80	**Clay (CH)** Similar to above
23	10.4				**Sandy Clay (SC)** Moderate plasticity, firm, moist in sand seams, brown, no odor
25					**Silty Clay (CL)** Low plastiicty, stiff gray to greenish gray, gravelly at base, damp, no odor
27					Total Depth = 25' BGL

Completion Results



RPS
1250 S. Capital of Texas Hwy., Bldg. 3, Suite 200
Austin, Texas 78746

512/347-7588
512/347-8243

WELL INSTALLATION

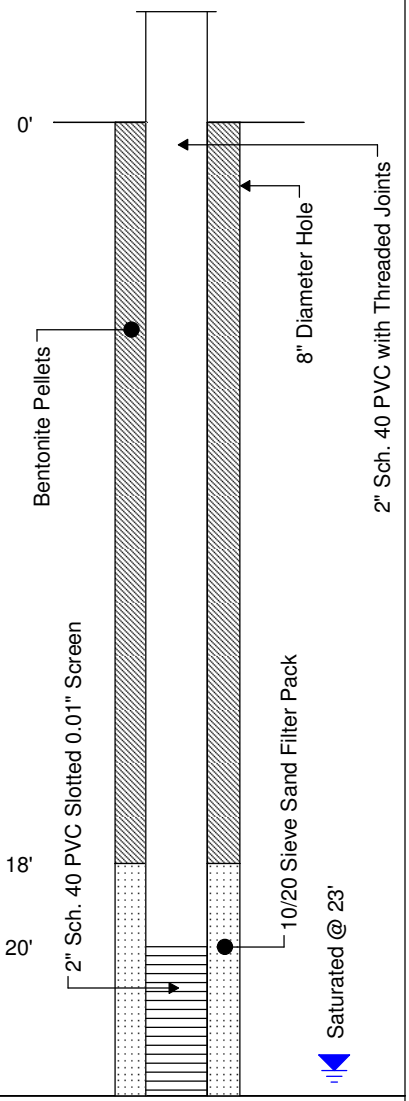
Well No.: MKTF-33
Start Date: 4/3/2014 08:40
Finish Date: 4/3/2014 12:00

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01867
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: 5-Foot Split Spoon

Total Depth: 35' bgl
Ground Water: Saturated @ 23' bgl
Elev., TOC (ft. msl): 6939.75
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 6936.59
Site Coordinates:
N 1633261.99 **E** 2545318.27

Comments: N 35°29.246' W 108°25.830', Air Temp: 30°F

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
0					Ground Surface
1	0.9				**Silty Clay (CL)** Low plasticity, firm, damp, brown, no odor
3	1.1			95	**Clayey Silt (ML)** Low plasticity, dense, dry, light brown, no odor, calcareous
5	2.1				
7	2.2			95	**Clayey Silt (ML)** Similar to above
9	2.8				
11	3.8			60	**Clayey Sand (SC)** Fine grain, loose to compact, dry, brown, no odor
13	3.7				
15	4.5				**Clay (CH)** High plasticity, very stiff, dry, brown, no odor
17	2.9			50	**Sand/Clayey Sand (SP/SC)** Fine grain, loose to compact, dry, brown, no odor
19					
21	2.5			90	**Sandy Clay/Clay (CL/CH)** High to moderate plasticity, stiff, damp, brown, no odor, sand seam at 21' bgl, saturated sand lense at 23' bgl
23	2.9	▼ 23'			



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Austin, Texas 78746

512/347-7588
512/347-8243

WELL INSTALLATION

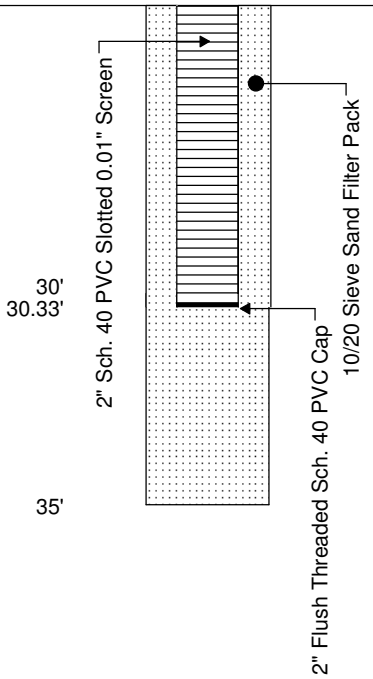
Well No.: MKTF-33
Start Date: 4/3/2014 08:40
Finish Date: 4/3/2014 12:00

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01867
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: 5-Foot Split Spoon
Comments: N 35°29.246' W 108°25.830', Air Temp: 30°F

Total Depth: 35' bgl
Ground Water: Saturated @ 23' bgl
Elev., TOC (ft. msl): 6939.75
Elev., PAD (ft. msl): --
Elev., GL (ft. msl): 6936.59
Site Coordinates:
N 1633261.99 **E** 2545318.27

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
25	3.4				
27	1.6			90	**Clayey Sand/Sandy Clay (SC/CL)** Moderate plasticity, firm, moist to saturated throughout interval, brown, interbedded sand/clay, no odor
29	2.5				
31				95	**Clay (CH)** High plasticity, very stiff, brown, damp, no odor
35					Total Depth = 35' BGL

Completion Results



RPS
1250 S. Capital of Texas Hwy., Bldg. 3, Suite 200
Austin, Texas 78746

512/347-7588
512/347-8243

WELL INSTALLATION

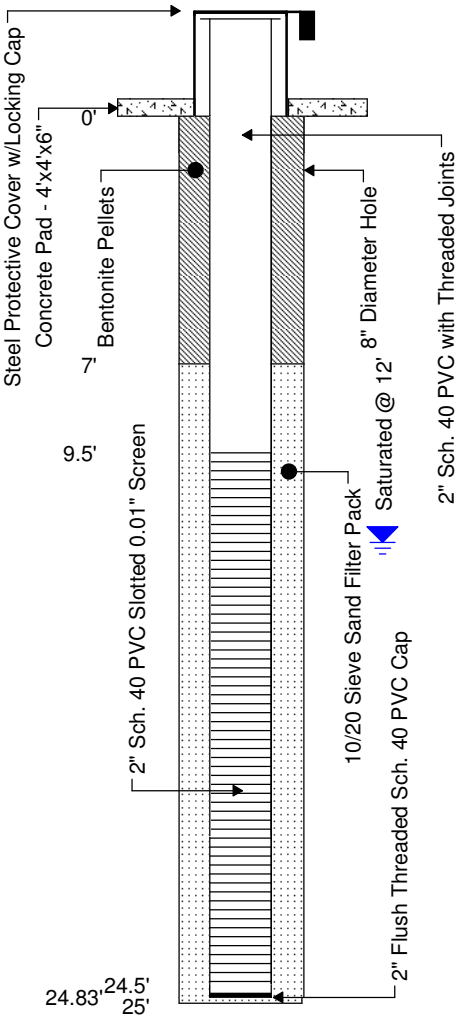
Well No.: MKTF-34
Start Date: 3/31/2014 11:00
Finish Date: 3/31/2014 13:45

Client: Western Refining Southwest, Inc.
Site: Gallup Refinery - Seep West of Tank 102
Job No.: UEC01867
Geologist: Tracy Payne
Driller: Enviro-Drill, Inc.
Drilling Rig: CME 75
Drilling Method: Hollow Stem Augers
Sampling Method: 5-Foot Split Spoon

Total Depth: 25' bgl
Ground Water: Saturated @ 12' bgl
Elev., TOC (ft. msl): 6945.35
Elev., PAD (ft. msl): 6942.42
Elev., GL (ft. msl): 6943.52
Site Coordinates:
N 1633118.42 **E** 2545681.30

Comments: N 35°29.224' W 108°25.757', Air Temp: 49-51°F

Depth (ft.)	PID (ppm)	Saturation	USCS Class	Recovery (%)	Sample Description
0					Ground Surface
1	13.6			95	**Silty Clay/Clayey Silt (CL/SM)** Low plasticity, soft, damp, brown, no odor, calcareous
3	7.8				
5	15.6				
7	12.1			60	**Clay (CH)** High plasticity, stiff, damp, brown, no odor
9	10.7				
11	12.3			60	**Sandy Clay (CL)** Moderate plasticity, firm, moist, brown, no odor
13	11.9	12'			**Clayey Sand (SC)** Similar to above, saturated, no odor
15	9.0				**Sandy Clay (CL)** Moderate plasticity, firm, moist, brown, no odor
17	8.1			90	**Silty Sandy Clay (CL)** Low to moderate plasticity, firm, damp, no odor
19	16.3				
21	13.4			95	**Silty Clay (CL)** Similar to above, damp, no odor
23	13.6				
25	15.8				**Gravelly Clay (CL)** Low plasticity, firm, crumbly, damp, no odor, greenish gray
27	11.5				Total Depth = 25' BGL
	11.7				



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512/347-7588
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Client: WESTERN REFINING SW, INC.	Project Number: WEST14003	Boring No. \ Well No.: MKTF-35
Project Name: GALLUP REFINERY - HYDROCARBON SEEP		Sheet: 1 of 1
Saturation Depth: 10' / Total Depth: 18'	GPS Coordinates: N35°29.240'N W108°25.692'	Logged By: TRACY PAYNE
Drilling Methods \ Auger Size \ Bit Size: HOLLOW STEM AUGER 7.5" / Drilling Rig: CME 75 / Driller: C. ORTIZ		Drilling Company: ENVIRO-DRILL, INC.
Sampling Method \ Size of Sampler: SPLIT SPOON 2" DIA, 2' LONG		Start Date: 11.19.14 Finish Date: 11.19.14
Comments		Start Time: 0815 Finish Time: 1045

Field Screening: Depth (feet bgl)	PID (ppm)	Air Temp. (°F)	Lithologic Interval (feet bgl)	Symbol	% Recovery	Description of Lithology
			0-6"	—	100	ASPHALT / BASE
6"-2'	4.5	28°	6"-2'	CL	100	SILTY CLAY - LOW, V. STIFF, DAMP, BROWN
2-4'	46.6	28	2-4'	CL	20	SILTY CLAY - STA, ODOR, GRAVEL PRESENT
4-6'	95	28	4-6'	CL/SP/GP	90	SILTY CLAY / SAND / GRAVEL - LOW, DAMP, REDDISH BROWN
						ODOR - V. COARSE GRAIN SAND - 1/4" → 1"
						GRAVEL, ODOR
6-8'	64	28	6-8'	CL	80	SILTY CLAY - LOW, FIRM, DAMP, REDDISH BROWN,
						ODOR, OCCASIONAL GRAVEL
8-10	78	28	8-10	CL/SP/GP	90	SILTY CLAY / SAND / GRAVEL - ST 4-6'
						DAMP ⇒ MOIST, ODOR
10-12	1790	28	10-11.5	CL/SP/GP	80	SILTY CLAY / SAND / GRAVEL - STA, SAT., HC
						ODOR
			11.5-12	CL	90	SILTY CLAY - LOW, STIFF, DAMP, REDDISH
						BROWN, LT GRAY CLAY AT BASE, HC ODOR
12-14	2400	28	12-14	CL	90	SILTY CLAY / SANDY CLAY - LOW, FIRM TO
						STIFF, DAMP, GRAY, HC
						ODOR SAND / SILT VARIES ACROSS
					50	INTERVAL - GRAVELLY
14-16	745	28	14-16	CL	90	SILTY SANDY CLAY - STA, DAMP, GRAY,
						BROWN AT BASE, HC ODOR
16-18	37	28	16-18	CL	90	CLAY - MOD, V. STIFF, DAMP, BROWN AND
						GRAY, FAINT ODOR

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WELL CONSTRUCTION DATA

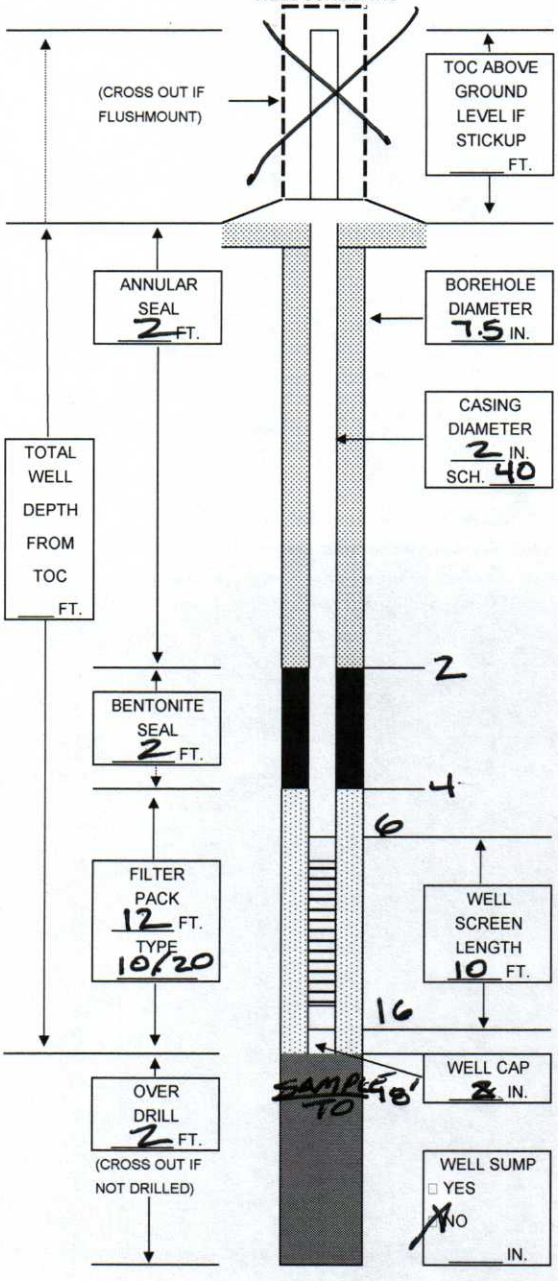
Well Number: MKTF-35
Prepared by: TRACY PAYNE
Start Date: 11.19.14
Finish Date: 11.19.14

WELL LOCATION:

Client Name: WESTERN REFINING SW, INC.
Project No. WEST14003
Project Name: GALLUP REFINERY - HYDROCARBON SEEP
Address of Site: 92 GIANT CROSSING RD GALLUP, NM 87301
Drilling Contractor: ENVIRO-DRILL, INC.
Driller: C. ORTIZ
GPS Coordinates: N35°29.240' N W108°25.692'

WELL TYPE: X MONITOR ☐ RECOVERY ☐ OBSERVATION
☐ TEMPORARY ☐ PERMANENT ☐ REPLACEMENT ☐ SINGLE CASED
☐ SHALLOW ☐ INTERMEDIATE ☐ DEEP ☐ DOUBLE CASED ☐ OTHER

WELL SCHEMATIC



INSTALLATION DATA

DECONTAMINATION: ☐ STEAM CLEAN ☐ SOAP WASH ☐ HIGH PRESSURE WASH
CASING TYPE: ☐ PVC ☐ STAINLESS ☐ TEFLON ☐ OTHER
JOINTS: ☐ THREADED ☐ WELDED ☐ COUPLED ☐ SCREWED
SURFACE CASING: ☐ NO ☐ YES ☐ DESCRIBE ____
WELL SCREEN: ☐ PVC ☐ STAINLESS ☐ TEFLON ☐ OTHER
DIAMETER: ☐ 2" ☐ 4" ☐ 6" ☐ OTHER ____ IN
SLOT SIZE: ☐ 0.010 ☐ 0.020 ☐ OTHER ____ IN
SAND: SIZE 10-20 LBS/SACK ____ # 5
BENTONITE: SIZE 3/8" LBS/SACK ____ LBS/BUCKET ____ # 1
DRILLING METHOD: X HOLLOW STEM ☐ SOLID STEM ☐ MUD ROTARY ☐ HAND AUGER
☐ AIR ROTARY ☐ DIRECT PUSH ☐ OTHER ____
BIT SIZE: ☐ 6" ☐ 8" ☐ 10" ☐ 12" ☐ 14" X OTHER 7.5 IN
DRILLING MUD: X NONE ☐ BENTONITE ☐ WATER ☐ OTHER ____
CENTRALIZER: X NO ☐ YES INTERVAL ____
COMPLETION: X FLUSH MOUNT ☐ STICKUP ☐ VAULT
PAD: ☐ 4' X 4' ☐ 5' X 5' ☐ OTHER ____
CUTTINGS: X DRUMMED NUMBER OF DRUMS 1
☐ ROLLOFF BOX ID NUMBER OF BOX ____
☐ SPREAD ☐ OTHER ____

COMMENTS: ____

WELL DEVELOPMENT DATA

DATE: ____ TIME: ____

PRE-DEVELOPMENT MEASUREMENTS/OBSERVATIONS:
DEPTH TO HC: ____ ☐ BTOC ☐ BGL
DEPTH TO GW: ____ ☐ BTOC ☐ BGL
TOTAL DEPTH: ____ ☐ BTOC ☐ BGL
APPEARANCE: ☐ PSH ☐ SILTY ☐ TURBID ☐ OPAQUE ☐ CLEAR
ODOR: ☐ YES ☐ NO TYPE ____

DEVELOPMENT METHOD: ☐ NONE ☐ BAILING ☐ PUMPING ☐ AIR LIFT
☐ SURGE & BLOCK ☐ OTHER ____
TIME: ☐ 10 MIN ☐ 20 MIN ☐ OTHER ____
AMOUNT: ☐ 5 GAL ☐ 10 GAL ☐ OTHER ____ GAL

POST-DEVELOPMENT MEASUREMENTS/OBSERVATIONS:
DEPTH TO HC: ____ ☐ BTOC ☐ BGL
DEPTH TO GW: ____ ☐ BTOC ☐ BGL
TOTAL DEPTH: ____ ☐ BTOC ☐ BGL
APPEARANCE: ☐ PSH ☐ SILTY ☐ TURBID ☐ OPAQUE ☐ CLEAR
ODOR: ☐ YES ☐ NO TYPE ____

DISPOSITION OF FLUIDS: ☐ DRUMMED ☐ WWTS ☐ TREATED ☐ POTW ☐ OTHER
☐ OTHER ____

COMMENTS: ____

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Client: WESTERN REFINING SW INC.	Project Number: WEST14003	Boring No. \ Well No.: MKTF-36
Project Name: GALLUP REFINERY - HYDROCARBON SEEP		Sheet: 1 of 1
Saturation Depth: 10' / Total Depth: 16 / GPS Coordinates: N35°29.266' W108°25.708'		Logged By: TRACY PAYNE
Drilling Methods \ Auger Size \ Bit Size: HOLLOW STEM AUGER 7.5" / Drilling Rig: CME 75 / Driller: C. ORTIZ		Drilling Company: ENVIRO-DRILL, INC.
Sampling Method \ Size of Sampler: SPLIT SPOON 2"DIA 2' LONG		Start Date: 11.19.14 Finish Date: 11.19.14
Comments		Start Time: 1242 Finish Time: 1445

Field Screening: Depth (feet bgl)	PID (ppm)	Air Temp. (°F)	Lithologic Interval (feet bgl)	Symbol	% Recovery	Description of Lithology
			0-6"	-	100	ASPHALT / BASE
6"-2'	812	54	6"-2	CL	90	SANDY CLAY - LOW, STIFF, DRY, TAN, NO ODOR GRAVEL THROUGHOUT
2-4'	276	54	2-4	CL	60	SILTY CLAY - LOW, V. STIFF, DRY, BROWN, HC ODOR
4-6'	1700	54	4-6	CL	60	SILTY CLAY - STA, TRACE SAND/GRAVEL, HC ODOR
6-8'	2411	54	6-8	CL	90	SILTY CLAY / SAND / GRAVEL - LOW, FIRM, DAMP TAN, ~~COARSE~~ V. COARSE SAND, 1/4" -> 1" GRAVEL, HC ODOR, MOIST -> V. MOIST IN SEAMS
8-10'	2278	54	8-10	CL / SP / GP	90	SILTY CLAY / SAND / GRAVEL - STA, MOIST, FLUID IN TOP OF SAMPLING ~~TUBE~~ SPOON STRONG HC ODOR TRACE PSH
10-12'	1879	54	10-12	CL / SP / GP	90	SILTY CLAY / SAND / GRAVEL - STA, ~~SAT.~~, PSH
12-13'	405	54	12-13	CL / SP / GP	90	SILTY CLAY / SAND / GRAVEL - STA, SAT., PSH
~~13~~			13-14	CL	90	SILTY CLAY - LOW, STIFF, DAMP, BROWN, HC ODOR
14-16'	450	54	14-16	CL	90	SILTY CLAY - STA, DAMP, HC ODOR

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WELL CONSTRUCTION DATA

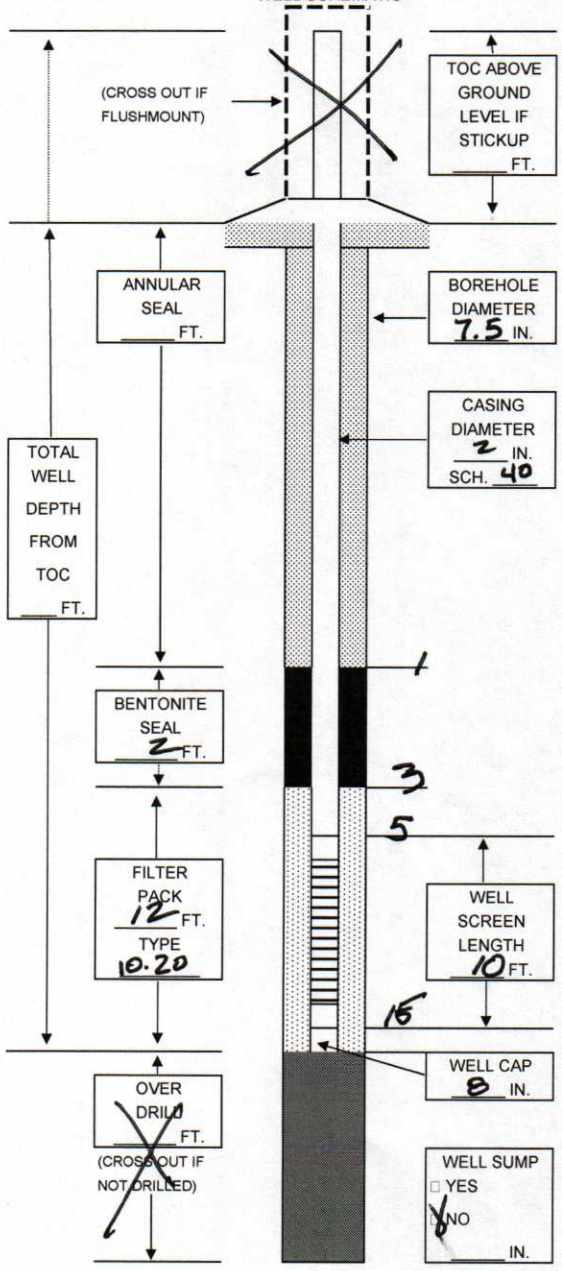
Well Number: MKTF-36
Prepared by: TRACY PAYNE
Start Date: 11.19.14
Finish Date: 11.19.14

WELL LOCATION:

Client Name: WESTERN REFINING SW INC. Project No. WNEST14003
Project Name: GALLUP REFINERY- HYDROCARBON SEEP
Address of Site: 92 GIANT CROSSING RD GALLUP NM 87301
Drilling Contractor: ENVIRO-DRILL, INC Driller: C. ORTIZ
GPS Coordinates: N35°29.266' W108°25.708

WELL TYPE: X MONITOR ☐ RECOVERY ☐ OBSERVATION
☐ TEMPORARY ☐ PERMANENT ☐ REPLACEMENT ☐ SINGLE CASED
☐ SHALLOW ☐ INTERMEDIATE ☐ DEEP ☐ DOUBLE CASED ☐ OTHER

WELL SCHEMATIC



INSTALLATION DATA

DECONTAMINATION: ☐ STEAM CLEAN ☐ SOAP WASH X HIGH PRESSURE WASH
CASING TYPE: X PVC ☐ STAINLESS ☐ TEFLON ☐ OTHER
JOINTS: X THREADED ☐ WELDED ☐ COUPLED ☐ SCREWED
SURFACE CASING: X NO ☐ YES ☐ DESCRIBE ____
WELL SCREEN: X PVC ☐ STAINLESS ☐ TEFLON ☐ OTHER
DIAMETER: X 2" ☐ 4" ☐ 6" ☐ OTHER ____ IN
SLOT SIZE: X 0.010 ☐ 0.020 ☐ OTHER ____ IN
SAND: SIZE 10.20 LBS/SACK ____ # 9
BENTONITE: SIZE 3/8" LBS/SACK ____ LBS/BUCKET ____ # 1
DRILLING METHOD: X HOLLOW STEM ☐ SOLID STEM ☐ MUD ROTARY ☐ HAND AUGER
☐ AIR ROTARY ☐ DIRECT PUSH ☐ OTHER ____
BIT SIZE: ☐6" ☐8" ☐10" ☐12" ☐14" X OTHER 7.5 IN
DRILLING MUD: ☐ NONE ☐ BENTONITE ☐ WATER ☐ OTHER ____
CENTRALIZER: ☐ NO ☐ YES INTERVAL ____
COMPLETION: X FLUSH MOUNT ☐ STICKUP ☐ VAULT
PAD: ☐ 4' X 4' ☐ 5' X 5' ☐ OTHER ____
CUTTINGS: X DRUMMED NUMBER OF DRUMS 2
☐ ROLLOFF BOX ID NUMBER OF BOX ____
☐ SPREAD ☐ OTHER ____

COMMENTS:

WELL DEVELOPMENT DATA

DATE: ____ TIME: ____

PRE-DEVELOPMENT MEASUREMENTS/OBSERVATIONS:
DEPTH TO HC: ____ ☐ BTOC ☐ BGL
DEPTH TO GW: ____ ☐ BTOC ☐ BGL
TOTAL DEPTH: ____ ☐ BTOC ☐ BGL
APPEARANCE: ☐ PSH ☐ SILTY ☐ TURBID ☐ OPAQUE ☐ CLEAR
ODOR: ☐ YES ☐ NO TYPE ____

DEVELOPMENT METHOD: ☐ NONE ☐ BAILING ☐ PUMPING ☐ AIR LIFT
☐ SURGE & BLOCK ☐ OTHER ____
TIME: ☐ 10 MIN ☐ 20 MIN ☐ OTHER ____
AMOUNT: ☐ 5 GAL ☐ 10 GAL ☐ OTHER ____ GAL

POST-DEVELOPMENT MEASUREMENTS/OBSERVATIONS:
DEPTH TO HC: ____ ☐ BTOC ☐ BGL
DEPTH TO GW: ____ ☐ BTOC ☐ BGL
TOTAL DEPTH: ____ ☐ BTOC ☐ BGL
APPEARANCE: ☐ PSH ☐ SILTY ☐ TURBID ☐ OPAQUE ☐ CLEAR
ODOR: ☐ YES ☐ NO TYPE ____

DISPOSITION OF FLUIDS: ☐ DRUMMED ☐ WWTS ☐ TREATED ☐ POTW ☐ OTHER
☐ OTHER ____

COMMENTS:

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Client: WESTERN REFINING SW INC.	Project Number: WEST14003	Boring No. \ Well No.: MKTF-37
Project Name: GALLUP REFINERY – HYDROCARBON SEEP		Sheet: 1 of 1
Saturation Depth: 8'?	Total Depth: 30	GPS Coordinates: N35°29.253' W108°25.649'
Logged By: TRACY PAYNE		
Drilling Methods \ Auger Size \ Bit Size: HOLLOW STEM AUGER	Drilling Rig: CME 75	Driller: C. ORTIZ
Drilling Company: ENVIRO-DRILL, INC.		
Sampling Method \ Size of Sampler: SPLIT SPOON SAMPLER 2" DIA 2' LONG	Start Date: 11.18.14	Finish Date: 11.18.14
Comments	Start Time: 1351	Finish Time: 1645

Field Screening: Depth (feet bgl)	PID (ppm)	Air Temp. (°F)	Lithologic Interval (feet bgl)	Symbol	% Recovery	Description of Lithology
0-2	69	48	0-2	–	40	ASPHALT / GRAVEL BASE – CLAY – V. STIFF, BROWN, DAMP, ~~NO~~ ODOR – FAINT
2-4	367	48	2-4	CL	50	SILTY CLAY – LOW, V. STIFF, BROWN, DAMP, ODOR, GRAVEL PRESENT
4-6	355	48	4-6	CL/SP/GP	60	SILTY CLAY / SANDY / GRAVELLY LOW, TO FIRM, DAMP, BROWN WITH SAND/GRAVEL ODOR
6-8	1790	48	6-8	CL/SP/GP	80	SILTY CLAY / SANDY / GRAVELLY STA, ODOR
8-10	2140	48	8-9	CL	90	SILTY CLAY – LOW, SOFT, MOIST TO V. MOIST, BROWN, STRONG ODOR
			9-10	SW/GW	90	SANDY GRAVEL / GRAVELLY SAND – COARSE TO COARSE GRAIN, COMPACT, V. MOIST, ODOR, TAN
10-12	404	48	10-12	CL/SP/GP	90	SILTY CLAY / SAND / GRAVEL – LOW → FIRM DAMP, BROWN WITH COARSE SAND & GRAVEL, ODOR
12-14	454	48	12-14	CL	90	SANDY CLAY – LOW, SOFT, DAMP, ODOR, LIGHT GRAY, GRAVEL AT BASE
14-16	660	48	14-16	CL	50	SANDY CLAY – LOW, V. STIFF, DAMP, ODOR LIGHT GRAY
16-18	340	48	16-18	CL	30	SANDY CLAY – STA
18-20	344	48	18-20	CL	30	SANDY CLAY – STA
20-22	421	48	20-21	CL	60	SANDY CLAY – STA
			21-22	–	60	SHALE – CLAYEY – LT. PURPLE, DAMP, V. STIFF, ODOR
22-24	375	48	22-24	–	30	SHALE – STA

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WELL CONSTRUCTION DATA

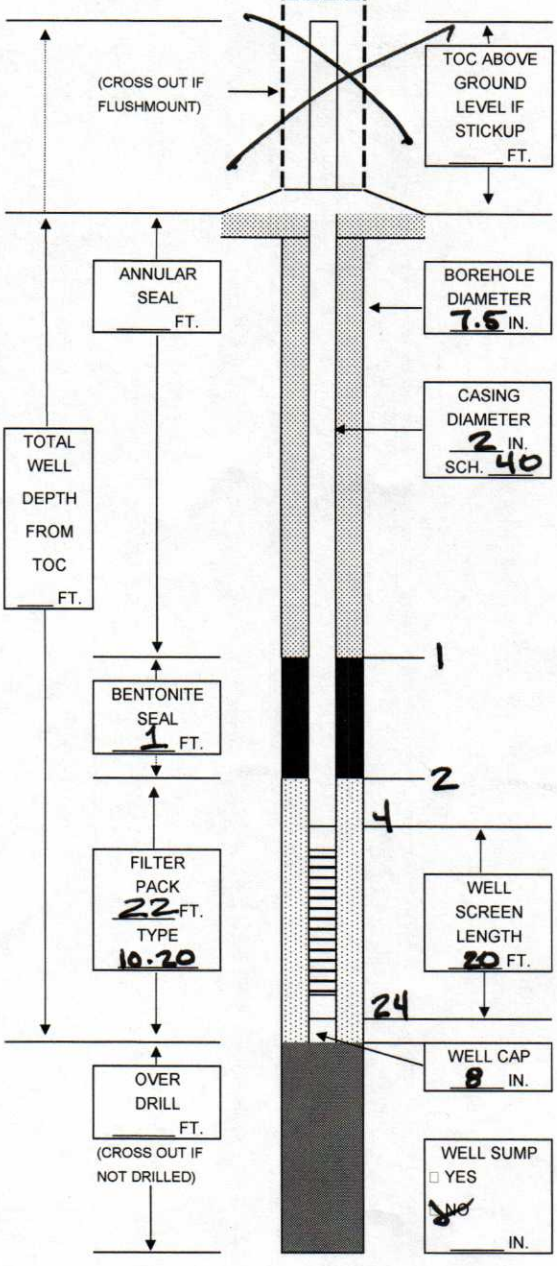
Well Number: MKTF-37
Prepared by: TRACY PAYNE
Start Date: 11.18.14
Finish Date: 11.18.14

WELL LOCATION:

Client Name: WESTERN REFINING SW, INC.
Project No. WEST14003
Project Name: GALLUP REFINERY - HYDROCARBON SEEP
Address of Site: 92 GIANT CROSSING ROAD GALLUP, NM 87301
Drilling Contractor: ENVIRO-DRILL, INC.
Driller: C. ORTIZ
GPS Coordinates: N35°29.253' W108° 25.649

WELL TYPE: [X] MONITOR [ ] RECOVERY [ ] OBSERVATION
[ ] TEMPORARY [ ] PERMANENT [ ] REPLACEMENT [ ] SINGLE CASED
[ ] SHALLOW [ ] INTERMEDIATE [ ] DEEP [ ] DOUBLE CASED [ ] OTHER

WELL SCHEMATIC



INSTALLATION DATA

DECONTAMINATION: [ ] STEAM CLEAN [ ] SOAP WASH [X] HIGH PRESSURE WASH
CASING TYPE: [X] PVC [ ] STAINLESS [ ] TEFLON [ ] OTHER
JOINTS: [X] THREADED [ ] WELDED [ ] COUPLED [ ] SCREWED
SURFACE CASING: [X] NO [ ] YES [ ] DESCRIBE ____
WELL SCREEN: [X] PVC [ ] STAINLESS [ ] TEFLON [ ] OTHER
DIAMETER: [X] 2" [ ] 4" [ ] 6" [ ] OTHER ____ IN
SLOT SIZE: [X] 0.010 [ ] 0.020 [ ] OTHER ____ IN
SAND: SIZE 10.20 LBS/SACK ____ # 13
BENTONITE: SIZE 3/8" LBS/SACK ____ LBS/BUCKET ____ # 1
DRILLING METHOD: [X] HOLLOW STEM [ ] SOLID STEM [ ] MUD ROTARY [ ] HAND AUGER
[ ] AIR ROTARY [ ] DIRECT PUSH [ ] OTHER ____
BIT SIZE: [ ] 6" [ ] 8" [ ] 10" [ ] 12" [ ] 14" [X] OTHER 7.5" IN
DRILLING MUD: [X] NONE [ ] BENTONITE [ ] WATER [ ] OTHER ____
CENTRALIZER: [X] NO [ ] YES INTERVAL ____
COMPLETION: [X] FLUSH MOUNT [ ] STICKUP [ ] VAULT
PAD: [ ] 4' X 4' [ ] 5' X 5' [ ] OTHER ____
CUTTINGS: [X] DRUMMED NUMBER OF DRUMS 2
[ ] ROLLOFF BOX ID NUMBER OF BOX ____
[ ] SPREAD [ ] OTHER ____

COMMENTS: ____

WELL DEVELOPMENT DATA

DATE: ____ TIME: ____

PRE-DEVELOPMENT MEASUREMENTS/OBSERVATIONS:
DEPTH TO HC: ____ [ ] BTOC [ ] BGL
DEPTH TO GW: ____ [ ] BTOC [ ] BGL
TOTAL DEPTH: ____ [ ] BTOC [ ] BGL
APPEARANCE: [ ] PSH [ ] SILTY [ ] TURBID [ ] OPAQUE [ ] CLEAR
ODOR: [ ] YES [ ] NO TYPE ____

DEVELOPMENT METHOD: [ ] NONE [ ] BAILING [ ] PUMPING [ ] AIR LIFT
[ ] SURGE & BLOCK [ ] OTHER ____
TIME: [ ] 10 MIN [ ] 20 MIN [ ] OTHER ____
AMOUNT: [ ] 5 GAL [ ] 10 GAL [ ] OTHER ____ GAL

POST-DEVELOPMENT MEASUREMENTS/OBSERVATIONS:
DEPTH TO HC: ____ [ ] BTOC [ ] BGL
DEPTH TO GW: ____ [ ] BTOC [ ] BGL
TOTAL DEPTH: ____ [ ] BTOC [ ] BGL
APPEARANCE: [ ] PSH [ ] SILTY [ ] TURBID [ ] OPAQUE [ ] CLEAR
ODOR: [ ] YES [ ] NO TYPE ____

DISPOSITION OF FLUIDS: [ ] DRUMMED [ ] WWTS [ ] TREATED [ ] POTW [ ] OTHER
[ ] OTHER ____
COMMENTS: ____

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Client: WESTERN REFINING SW, INC.	Project Number: WEST 14003	Boring No. \ Well No.: MKTF-~~38~~ 38	
Project Name: GALLUP REFINERY - HYDROCARBON SEEP		Sheet: 1 of 1	
Saturation Depth: 8'	Total Depth: 20' BGL	GPS Coordinates: N35°29.277' W108°25.647'	Logged By: TRACY PAYNE
Drilling Methods \ Auger Size \ Bit Size: HOLLOW STEM AUGER 7.5'	Drilling Rig: CME 75	Driller: C. ORTIZ	Drilling Company: ENVIRO-DRILL INC
Sampling Method \ Size of Sampler: SPLIT SPOON 2" DIA, 2' LONG			Start Date: 11.20.14 Finish Date: 11.20.14
Comments			Start Time: 0845 Finish Time: 1100

Field Screening: Depth (feet bgl)	PID (ppm)	Air Temp. (°F)	Lithologic Interval (feet bgl)	Symbol	% Recovery	5-20' Description of Lithology
			0-6"	-	100	ASPHALT / BASE
6"-2'	217	37	6"-2'	CL/SP/GP	90	SILTY CLAY / SAND / GRAVEL - LOW, FIRM DAMP, BROWN, COARSE GRAIN SAND, ¼" → 1" GRAVEL, ODOR
2-4	70	37	2-4	CL/SP/GP	90	SILTY CLAY / SAND / GRAVEL - STA, ODOR
4-6	42	37	4-6	↓	90	SILTY CLAY / SAND / GRAVEL - STA, ODOR
6-8	20	37	6-8	↓	90	SILTY CLAY / SAND / GRAVEL - STA, ODOR
8-10	9	37	8-10	↓	90	SILTY CLAY / SAND / GRAVEL - STA DECREASE IN CLAY CONTENT - V. MOIST TO SAT. ODOR
10-12	7	37	10-11	GW	90	SANDY GRAVEL - COMPACT, BROWN, SAT. FAINT ODOR V. COARSE SAND ¼" → 1.5" GRAVEL
			11-11.5	CL	90	~~SILTY~~ SANDY CLAY - LOW, FIRM → SOFT, MOIST, BROWN
			11.5-12	GW	90	SANDY GRAVEL - STA (10-11) SAT.
12-14	8	37	12-14	GW	10	SANDY GRAVEL - STA, SAT.
14-16	6	37	14-16	GW	10	SANDY GRAVEL - STA, SAT. → MOIST
16-18	4	37	16-18	CL	50	SANDY CLAY - LOW, FIRM, DAMP, GRAYISH BROWN, FAINT, ODOR
18-20	5	37	18-20	CL	60	SANDY CLAY - STA

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WELL CONSTRUCTION DATA

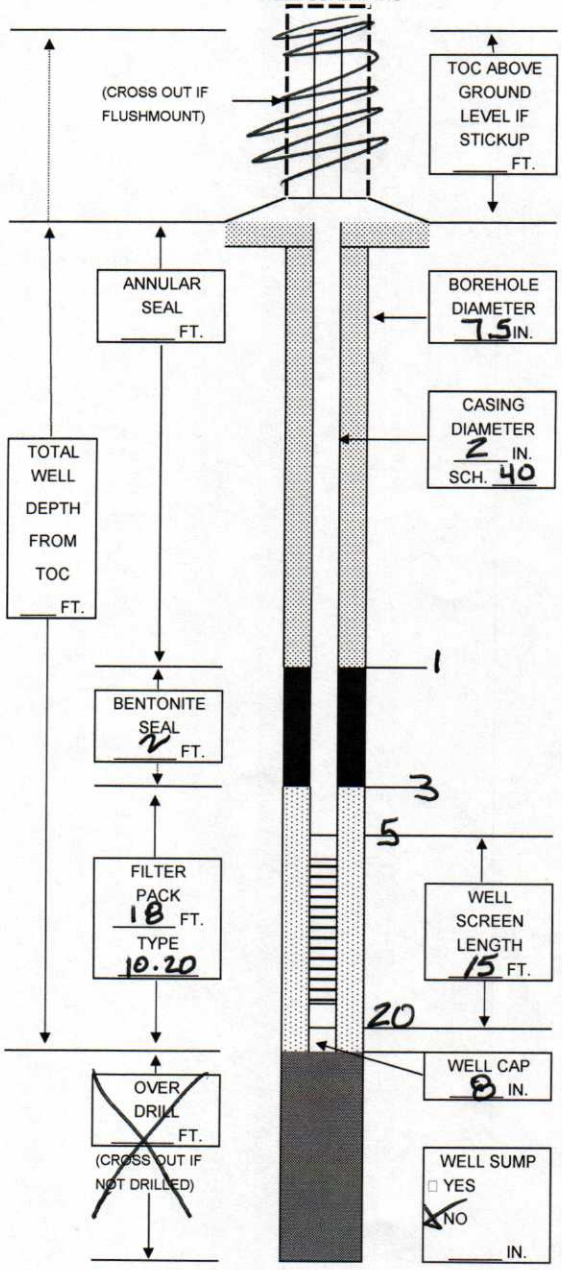
Well Number: MKTF-38
Prepared by: TRACY PAYNE
Start Date: 11.20.14
Finish Date: 11.20.14

WELL LOCATION:

Client Name: WESTERN REFINING SW INC.
Project No. WEST14003
Project Name: GALLUP REFINERY – HYDROCARBON SEEP
Address of Site: 92 GIANT CROSSING RD, GALLUP NM 87301
Drilling Contractor: ENVIRO-DRILL, INC.
Driller: C. ORTIZ
GPS Coordinates: N35°29.277' W108°25.647'

WELL TYPE: ☒ MONITOR ☐ RECOVERY ☐ OBSERVATION
☐ TEMPORARY ☐ PERMANENT ☐ REPLACEMENT ☐ SINGLE CASED
☐ SHALLOW ☐ INTERMEDIATE ☐ DEEP ☐ DOUBLE CASED ☐ OTHER

WELL SCHEMATIC



INSTALLATION DATA

DECONTAMINATION: ☐ STEAM CLEAN ☐ SOAP WASH ☒ HIGH PRESSURE WASH
CASING TYPE: ☒ PVC ☐ STAINLESS ☐ TEFLON ☐ OTHER
JOINTS: ☒ THREADED ☐ WELDED ☐ COUPLED ☐ SCREWED
SURFACE CASING: ☒ NO ☐ YES ☐ DESCRIBE _____
WELL SCREEN: ☒ PVC ☐ STAINLESS ☐ TEFLON ☐ OTHER
DIAMETER: ☒ 2" ☐ 4" ☐ 6" ☐ OTHER _____ IN
SLOT SIZE: ☒ 0.010 ☐ 0.020 ☐ OTHER _____ IN
SAND: SIZE 10.20 LBS/SACK _____ #_____
BENTONITE: SIZE 3/8" LBS/SACK _____ LBS/BUCKET _____ #_____
DRILLING METHOD: ☒ HOLLOW STEM ☐ SOLID STEM ☐ MUD ROTARY ☐ HAND AUGER
☐ AIR ROTARY ☐ DIRECT PUSH ☐ OTHER _____
BIT SIZE: ☐ 6" ☐ 8" ☐ 10" ☐ 12" ☐ 14" ☒ OTHER 7.5 IN
DRILLING MUD: ☒ NONE ☐ BENTONITE ☐ WATER ☐ OTHER _____
CENTRALIZER: ☒ NO ☐ YES INTERVAL _____
COMPLETION: ☒ FLUSH MOUNT ☐ STICKUP ☐ VAULT
PAD: ☐ 4' X 4' ☐ 5' X 5' ☒ OTHER _____
CUTTINGS: ☒ DRUMMED NUMBER OF DRUMS 2
☐ ROLLOFF BOX ID NUMBER OF BOX _____
☐ SPREAD ☐ OTHER _____

COMMENTS: _____

WELL DEVELOPMENT DATA

DATE: _____ TIME: _____

PRE-DEVELOPMENT MEASUREMENTS/OBSERVATIONS:
DEPTH TO HC: _____ ☐ BTOC ☐ BGL
DEPTH TO GW: _____ ☐ BTOC ☐ BGL
TOTAL DEPTH: _____ ☐ BTOC ☐ BGL
APPEARANCE: ☐ PSH ☐ SILTY ☐ TURBID ☐ OPAQUE ☐ CLEAR
ODOR: ☐ YES ☐ NO TYPE _____

DEVELOPMENT METHOD: ☐ NONE ☐ BAILING ☐ PUMPING ☐ AIR LIFT
☐ SURGE & BLOCK ☐ OTHER _____
TIME: ☐ 10 MIN ☐ 20 MIN ☐ OTHER _____
AMOUNT: ☐ 5 GAL ☐ 10 GAL ☐ OTHER _____ GAL

POST-DEVELOPMENT MEASUREMENTS/OBSERVATIONS:
DEPTH TO HC: _____ ☐ BTOC ☐ BGL
DEPTH TO GW: _____ ☐ BTOC ☐ BGL
TOTAL DEPTH: _____ ☐ BTOC ☐ BGL
APPEARANCE: ☐ PSH ☐ SILTY ☐ TURBID ☐ OPAQUE ☐ CLEAR
ODOR: ☐ YES ☐ NO TYPE _____

DISPOSITION OF FLUIDS: ☐ DRUMMED ☐ WWTS ☐ TREATED ☐ POTW ☐ OTHER
☐ OTHER _____

COMMENTS: _____

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Client: WESTERN REFINING SOUTHWEST, INC.	Project Number: WEST14003		Boring No. \ Well No.: MKTF-39
Project Name: GALLUP REFINERY - HYDROCARBON SEEP			Sheet: 1 of 1
Saturation Depth	Total Depth: 16' BGL	GPS Coordinates: N 35° 29.321' W 108° 25.641'	Logged By: TRACY PAYNE
Drilling Methods \ Auger Size \ Bit Size: HOLLOW STEM AUGER 7.5"	Drilling Rig: CME 75	Driller: C. ORTIZ	Drilling Company: ENVIRO-DRILL, INC
Sampling Method \ Size of Sampler: SPLIT SPOON 2" DIA 2' ~~LONG~~ LONG			Start Date: 11.14.14 Finish Date: 11.14.14
Comments			Start Time: 1340 Finish Time: 1530

Field Screening: Depth (feet bgl)	PID (ppm)	Air Temp. (°F)	Lithologic Interval (feet bgl)	Symbol	% Recovery	Description of Lithology
0-2	2.1	53	0-2	ML	100	GRAVEL / CLAY SILT - FILL - BROWN, DAMP FAINT ODOR
2-4	29.4	53	2-4	CL	100	GRAVEL / SILTY CLAY - FILL - MOD STIFF, DAMP, BROWN, NO ODOR
4-6	6.5	53	4-6	CL	90	SANDY SILTY CLAY - FILL LOW, SOFT, DAMP, BROWN PEA SIZE GRAVEL, NO ODOR
6-8	4.5	53	6-8	SW	90	SILTY GRAVELLY SAND - FILL - LOOSE, MEDIUM SAND TO 1.5" GRAVEL, BROWN, NO ODOR, DAMP
8-10	400	53	8-10	CL/SC	90	SANDY CLAY / CLAYEY SAND - COARSE, COMPACT, DAMP TO MOIST, BROWN, HYDROCARBON ODOR - GRAVELLY
10-12	569	53	10-12	CL/SC	90	SANDY CLAY / CLAYEY SAND - STA, MOIST/OILY HC ODOR - GRAVELLY
12-13	-	-	12-13	GP	90	SANDY GRAVEL - LOOSE, BROWN, SAT., HC ODOR V. COARSE SAND TO 3/4" GRAVEL
13-14	51	53	13-14	CL	90	SILTY CLAY - LOW, V. STIFF, DRY → DAMP, GRAY, FAINT ODOR @ BASE
14-16	18	53	14-16	CL	90	SILTY CLAY - STA

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WELL CONSTRUCTION DATA

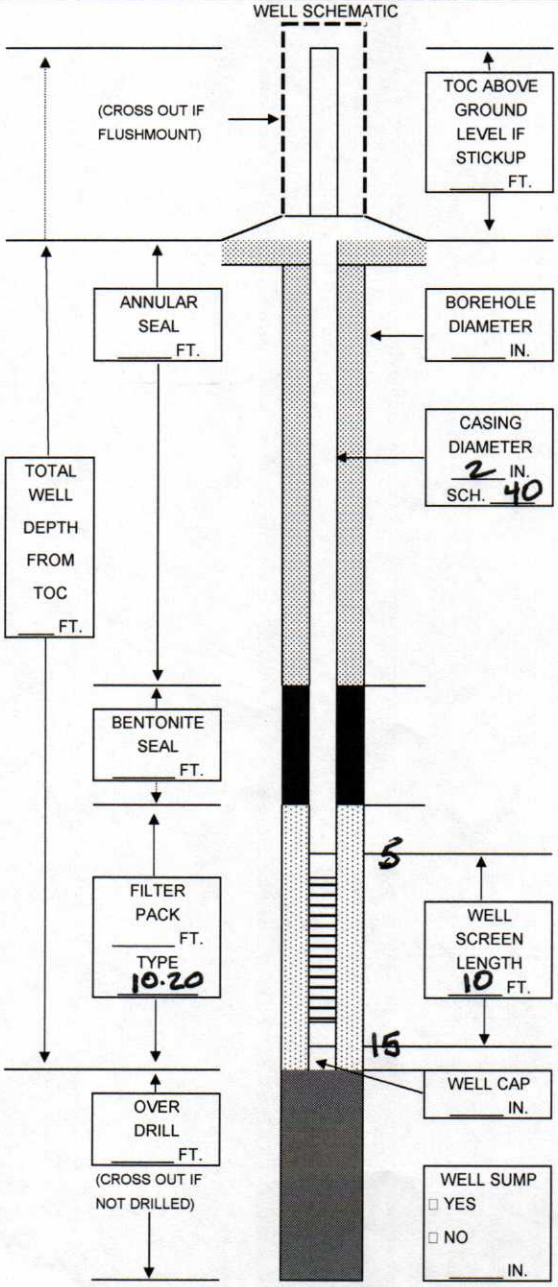
Well Number: MKTF-39
Prepared by: TRACY PAYNE
Start Date: 11.14.14
Finish Date:

WELL LOCATION:

Client Name: WESTERN REFINING SW, INC. Project No. WEST14003
Project Name: GALLUP REFINERY-HYDROCARBON SEEP
Address of Site: 92 GIANT CROSSING RD GALLUP NM 87301
Drilling Contractor: ENVIRO-DRILL INC. Driller: C. ORTIZ
GPS Coordinates: N 35°29.321' W108° 25.641

WELL TYPE: ☒ MONITOR ☐ RECOVERY ☐ OBSERVATION
☐ TEMPORARY ☐ PERMANENT ☐ REPLACEMENT ☐ SINGLE CASED
☐ SHALLOW ☐ INTERMEDIATE ☐ DEEP ☐ DOUBLE CASED ☐ OTHER

WELL SCHEMATIC



INSTALLATION DATA

DECONTAMINATION: ☐ STEAM CLEAN ☐ SOAP WASH ☒ HIGH PRESSURE WASH
CASING TYPE: ☒ PVC ☐ STAINLESS ☐ TEFLON ☐ OTHER
JOINTS: ☒ THREADED ☐ WELDED ☐ COUPLED ☐ SCREWED
SURFACE CASING: ☒ NO ☐ YES ☐ DESCRIBE ____
WELL SCREEN: ☒ PVC ☐ STAINLESS ☐ TEFLON ☐ OTHER
DIAMETER: ☒ 2" ☐ 4" ☐ 6" ☐ OTHER ____ IN
SLOT SIZE: ☒ 0.010 ☐ 0.020 ☐ OTHER ____ IN
SAND: SIZE 10-20 LBS/SACK ____ #____
BENTONITE: SIZE 3/8" LBS/SACK ____ LBS/BUCKET ____ #____
DRILLING METHOD: ☒ HOLLOW STEM ☐ SOLID STEM ☐ MUD ROTARY ☐ HAND AUGER
☐ AIR ROTARY ☐ DIRECT PUSH ☐ OTHER ____
BIT SIZE: ☐ 6" ☐ 8" ☐ 10" ☐ 12" ☐ 14" ☐ OTHER ____ IN
DRILLING MUD: ☐ NONE ☐ BENTONITE ☐ WATER ☐ OTHER ____
CENTRALIZER: ☐ NO ☐ YES INTERVAL ____
COMPLETION: ☒ FLUSH MOUNT ☐ STICKUP ☐ VAULT
PAD: ☒ 4' X 4' ☐ 5' X 5' ☐ OTHER ____
CUTTINGS: ☒ DRUMMED NUMBER OF DRUMS 1
☐ ROLLOFF BOX ID NUMBER OF BOX ____
☐ SPREAD ☐ OTHER ____

COMMENTS:

WELL DEVELOPMENT DATA

DATE: ____ TIME: ____

PRE-DEVELOPMENT MEASUREMENTS/OBSERVATIONS:
DEPTH TO HC: ____ ☐ BTOC ☐ BGL
DEPTH TO GW: ____ ☐ BTOC ☐ BGL
TOTAL DEPTH: ____ ☐ BTOC ☐ BGL
APPEARANCE: ☐ PSH ☐ SILTY ☐ TURBID ☐ OPAQUE ☐ CLEAR
ODOR: ☐ YES ☐ NO TYPE ____

DEVELOPMENT METHOD: ☐ NONE ☐ BAILING ☐ PUMPING ☐ AIR LIFT
☐ SURGE & BLOCK ☐ OTHER ____
TIME: ☐ 10 MIN ☐ 20 MIN ☐ OTHER ____
AMOUNT: ☐ 5 GAL ☐ 10 GAL ☐ OTHER ____ GAL

POST-DEVELOPMENT MEASUREMENTS/OBSERVATIONS:
DEPTH TO HC: ____ ☐ BTOC ☐ BGL
DEPTH TO GW: ____ ☐ BTOC ☐ BGL
TOTAL DEPTH: ____ ☐ BTOC ☐ BGL
APPEARANCE: ☐ PSH ☐ SILTY ☐ TURBID ☐ OPAQUE ☐ CLEAR
ODOR: ☐ YES ☐ NO TYPE ____

DISPOSITION OF FLUIDS: ☐ DRUMMED ☐ WWTS ☐ TREATED ☐ POTW ☐ OTHER
☐ OTHER ____

COMMENTS:

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Client: WESTERN REFINING SOUTHWEST, INC.	Project Number: WEST14003		Boring No. \ Well No.: MKTF-40
Project Name: GALLUP REFINERY-HYDROCARBON SEEP			Sheet: 1 of 1
Saturation Depth: 10'	Total Depth: 22'	GPS Coordinates: N35° 29.383' W108° 25.971'	Logged By: TRACY PAYNE
Drilling Methods \ Auger Size \ Bit Size: HOLLOW STEM AUGER 7.5"	Drilling Rig: CME 75	Driller: C.ORTIZ	Drilling Company: ENVIRO-DRILL, INC.
Sampling Method \ Size of Sampler: SPLIT SPOON 2" DIA, 2' LONG			Start Date: 11.13.14 Finish Date: 11.13.14
Comments:			Start Time: 1440 Finish Time: 1600

Field Screening: Depth (feet bgl)	PID (ppm)	Air Temp. (°F)	Lithologic Interval (feet bgl)	Symbol	% Recovery	Description of Lithology
0-2	0.8	54	0-2	CL	100	CLAY - MOD, STIFF, DAMP, BROWN, NO ODOR, ↑ GRAVEL
2-4	0.1	54	2-4	CL	90	CLAY - STA - GRAVEL
4-6	0.7	54	4-6	CL	80	CLAY - STA
6-8	1.8	54	6-8	CL	90	SANDY CLAY - LOW, FIRM → SOFT, DAMP, BROWN, NO ODOR, MOIST 7-8'
8-10	2.0	54	8-10	CL	70	SANDY CLAY - STA, DAMP → MOIST
10-12	0.6	54	10-12	CL/SC	90	SANDY CLAY / CLAYEY SAND - STA, MOIST TO SATURATED IN CLAYEY SAND SEAMS, NO ODOR
12-14	1.5	54	12-14	CL	20	SANDY SILTY CLAY - LOW, STIFF, DAMP, BROWN NO ODOR - MOIST TO SAT. IN SAND SEAMS
14-16	2.2	54	14-16	CL/SC	80	SANDY CLAY / CLAYEY SAND - LOW, FIRM → SOFT, MOIST TO SAT. IN CLAYEY SAND SEAMS
16-18	2.2	54	16-17.5	CL/SC	80	SANDY CLAY / CLAYEY SAND - STA, MOIST TO SAT.
			17.5-18	CL	90	SILTY CLAY - LOW, V. STIFF, DAMP, REDDISH BROWN AND GRAY, NO ODOR
18-20	2.5	54	18-20	CL	80	SILTY CLAY - ~~FRESH~~ STA
20-22	2.6	54	20-22	CL	50	SILTY CLAY - STA

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WELL CONSTRUCTION DATA

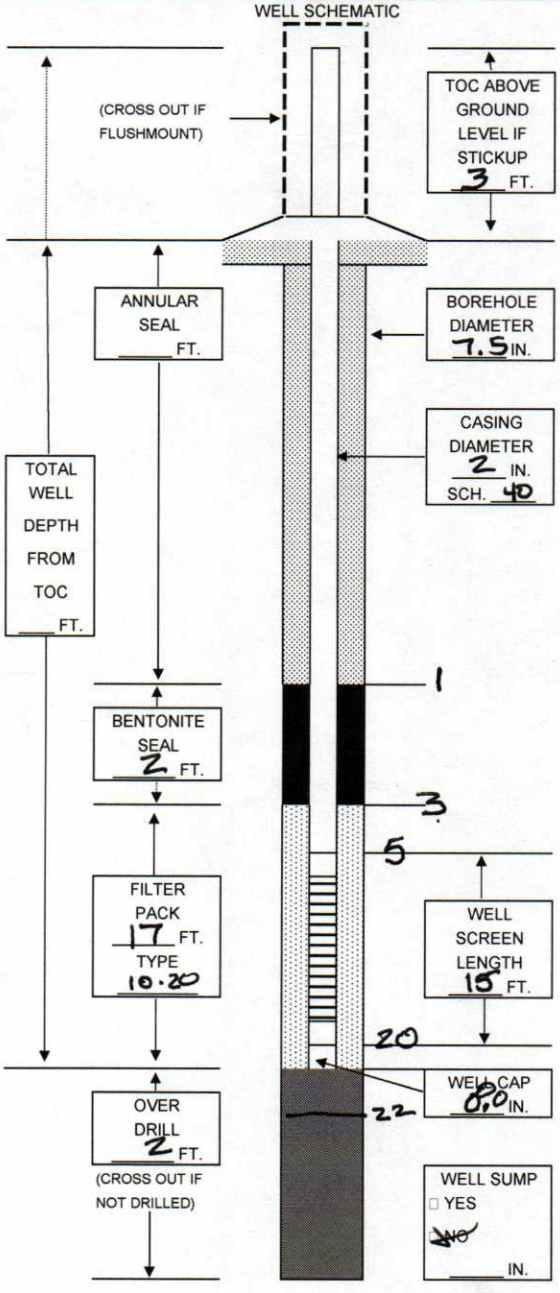
Well Number: MKTF-40
Prepared by: TRACY PAYNE
Start Date: 11.13.14
Finish Date: 11.13.14

WELL LOCATION:

Client Name: WESTERN REFINING SW, INC.
Project No. WEST14003
Project Name: GALLUP REFINERY - HYDROCARBON SEEP
Address of Site: 92 GIANT CROSSING RD., GALLUP NM 87301
Drilling Contractor: ENVIRO-DRILL, INC.
Driller: C. ORTIZ
GPS Coordinates: N35°29.383' W108°25.971'

WELL TYPE: X MONITOR ☐ RECOVERY ☐ OBSERVATION
☐ TEMPORARY ☐ PERMANENT ☐ REPLACEMENT ☐ SINGLE CASED
☐ SHALLOW ☐ INTERMEDIATE ☐ DEEP ☐ DOUBLE CASED ☐ OTHER

WELL SCHEMATIC



INSTALLATION DATA

DECONTAMINATION:	☐ STEAM CLEAN	☐ SOAP WASH	X HIGH PRESSURE WASH	
CASING TYPE:	X PVC	☐ STAINLESS	☐ TEFLON	☐ OTHER
JOINTS:	X THREADED	☐ WELDED	☐ COUPLED	☐ SCREWED
SURFACE CASING:	X NO	☐ YES	☐ DESCRIBE ___	
WELL SCREEN:	X PVC	☐ STAINLESS	☐ TEFLON	☐ OTHER
DIAMETER:	X 2"	☐ 4"	☐ 6"	☐ OTHER ___ IN
SLOT SIZE:	X 0.010	☐ 0.020	☐ OTHER ___ IN	
SAND:	SIZE 10-20	LBS/SACK ___		# ___
BENTONITE:	SIZE 3/8"	LBS/SACK ___	LBS/BUCKET ___	# ___
DRILLING METHOD:	X HOLLOW STEM	☐ SOLID STEM	☐ MUD ROTARY	☐ HAND AUGER
	☐ AIR ROTARY	☐ DIRECT PUSH	☐ OTHER ___	
BIT SIZE:	☐ 6" ☐ 8"	☐ 10" ☐ 12"	☐ 14"	X OTHER 7.5 IN
DRILLING MUD:	X NONE	☐ BENTONITE	☐ WATER	☐ OTHER ___
CENTRALIZER:	X NO	☐ YES	INTERVAL ___	
COMPLETION:	☐ FLUSH MOUNT	X STICKUP	☐ VAULT	
PAD:	X 4' X 4'	☐ 5' X 5'	☐ OTHER ___	
CUTTINGS:	X DRUMMED	NUMBER OF DRUMS 1		
	☐ ROLLOFF BOX	ID NUMBER OF BOX ___		
	☐ SPREAD	☐ OTHER ___		

COMMENTS:

WELL DEVELOPMENT DATA

DATE: ___ TIME: ___

PRE-DEVELOPMENT MEASUREMENTS/OBSERVATIONS:

DEPTH TO HC:	___	☐ BTOC	☐ BGL		
DEPTH TO GW:	___	☐ BTOC	☐ BGL		
TOTAL DEPTH:	___	☐ BTOC	☐ BGL		
APPEARANCE:	☐ PSH	☐ SILTY	☐ TURBID	☐ OPAQUE	☐ CLEAR
ODOR:	☐ YES	☐ NO	TYPE ___		

DEVELOPMENT METHOD:	☐ NONE	☐ BAILING	☐ PUMPING	☐ AIR LIFT
	☐ SURGE & BLOCK	☐ OTHER ___		
TIME:	☐ 10 MIN	☐ 20 MIN	☐ OTHER ___	
AMOUNT:	☐ 5 GAL	☐ 10 GAL	☐ OTHER ___ GAL	

POST-DEVELOPMENT MEASUREMENTS/OBSERVATIONS:

DEPTH TO HC:	___	☐ BTOC	☐ BGL		
DEPTH TO GW:	___	☐ BTOC	☐ BGL		
TOTAL DEPTH:	___	☐ BTOC	☐ BGL		
APPEARANCE:	☐ PSH	☐ SILTY	☐ TURBID	☐ OPAQUE	☐ CLEAR
ODOR:	☐ YES	☐ NO	TYPE ___		

DISPOSITION OF FLUIDS	☐ DRUMMED	☐ WWTS	☐ TREATED	☐ POTW	☐ OTHER
	☐ OTHER ___				

COMMENTS:

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Client: WESTERN REFINING SOUTHWEST, INC.	Project Number: WEST14003	Boring No. \ Well No.: MKTF-41
Project Name: GALLUP REFINERY- HYDROCARBON SEEP		Sheet: 1 of 1
Saturation Depth: 34' BGL / Total Depth: 37'	GPS Coordinates: N 35° 29.287' W 108° 25.983'	Logged By: TRACY PAYNE
Drilling Methods \ Auger Size \ Bit Size: HOLLOW STEM AUGER 7.5"	Drilling Rig: CME 75 / Driller: C. ORTIZ	Drilling Company: ENVIRO-DRILL, INC
Sampling Method \ Size of Sampler: SPLIT SPOON 2"DIA, 2' LONG		Start Date: 11.13.14 / Finish Date: 11.14.14
Comments		Start Time: 1015 / Finish Time: 1130

Field Screening: Depth (feet bgl)	PID (ppm)	Air Temp. (°F)	Lithologic Interval (feet bgl)	Symbol	% Recovery	Description of Lithology
0-2	2.6	54	0-2	CL	80	SANDY SILTY CLAY- LOW, STIFF, DRY, BROWN, NO ODOR FINE GRAINED SAND, OCCASIONAL GRAVEL
2-4	2.3	54	2-4	CL	70	SANDY SILTY CLAY- STA, NO ODOR
4-6	1.2	54	4-6	CL	40	SANDY SILTY CLAY- STA, NO ODOR
6-8	2.4	54	6-8	CL/ML	50	SILTY CLAY / CLAYEY SILT- LOW FIRM, DRY, BROWN NO ODOR
8-10	3.9	54	8-10	CL	60	SANDY CLAY- LOW, V. STIFF, DRY, BROWN, NO ODOR
10-12	4.8	54	10-12	CL	30	SANDY CLAY - STA, DAMP
12-14	3.5	54	12-14	CL	40	SANDY CLAY - STA
14-16	1.2	54	14-16	CL	10	SANDY CLAY - STA
16-18	3.9	54	16-18	CL	50	SILTY CLAY - LOW, V. ~~SOFT~~ STIFF, ~~DRY~~ DRY/DAMP LT REDDISH BROWN WITH GRAY AT BASE, NO ODOR
~~18-20~~	4.0	54	18-20	CL	80	SILTY CLAY - STA, REDDISH BROWN AND LT GRAY
20-22	3.9	54	20-22	CL	50	SILTY CLAY - STA, LT REDDISH BROWN
22-24	3.6	54	22-24	CL	40	SILTY CLAY - STA, LT REDDISH BROWN & TRACE GRAY
24-26	3.3	54	24-26	CL	50	SILTY CLAY - STA, LT REDDISH BROWN
26-28	2.1	54	26-28	CL	10	SILTY CLAY - STA
28-30	2.8	54	28-30	CL	20	SILTY CLAY - STA
						RESUMED SAMPLING ON 11.14.14
30-32	2.6	46	30-32	CL	40	SILTY CLAY - STA, MOIST AT TOP OF SAMPLE
32-34	3.1	46	32-34	CL	50	SILTY CLAY - STA, CALCAREOUS
34-36	2.9	46	34-36	CL	50	SILTY CLAY - STA, GRAVELLY, MOIST TO SAT., NO ODOR, SHALE AT BASE
	-	-	36-37	-	10	SHALE - DARK GRAY, DENSE TO V. DENSE
						TD @ 37'

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WELL CONSTRUCTION DATA

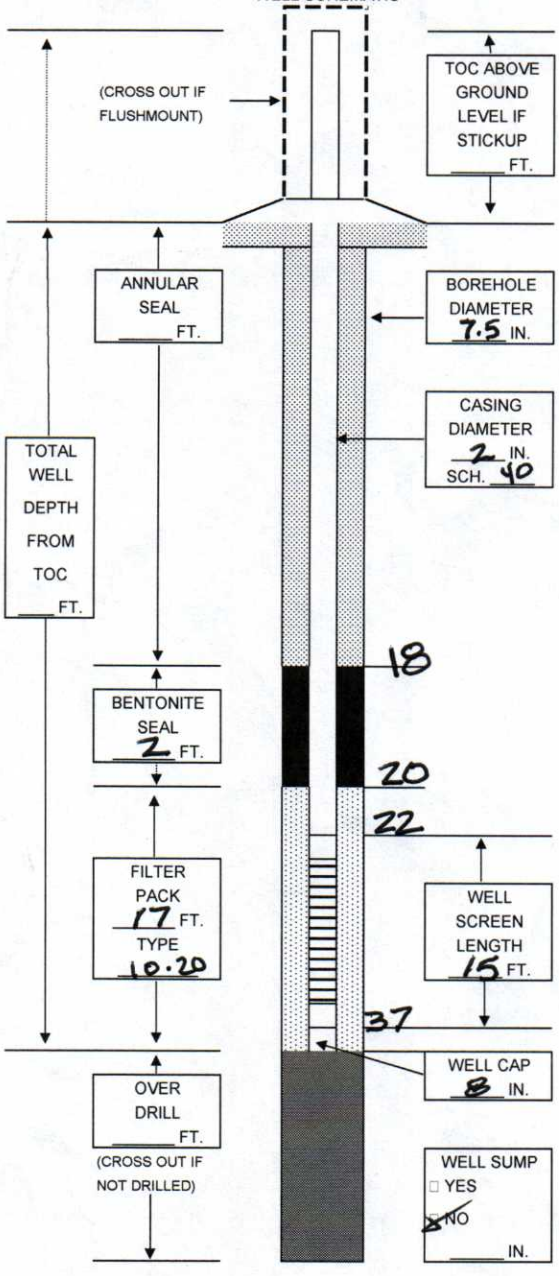
Well Number: MKTF-41
Prepared by: TRACY PAYNE
Start Date: 11.14.14
Finish Date: 11.14.14

WELL LOCATION:

Client Name: WESTERN REFINING SW, INC
Project No.: WEST14003
Project Name: GALLUP REFINERY - HYDROCARBON SEEP
Address of Site: 92 GIANT CROSSING ROAD - GALLUP, NM 87301
Drilling Contractor: ENVIRO-DRILL, INC.
Driller: C. ORTIZ
GPS Coordinates: N35°29.287' W108° 25.983'

WELL TYPE: X MONITOR ☐ RECOVERY ☐ OBSERVATION
☐ TEMPORARY ☐ PERMANENT ☐ REPLACEMENT ☐ SINGLE CASED
☐ SHALLOW ☐ INTERMEDIATE ☐ DEEP ☐ DOUBLE CASED ☐ OTHER

WELL SCHEMATIC



INSTALLATION DATA

DECONTAMINATION:	☐ STEAM CLEAN	☐ SOAP WASH	X HIGH PRESSURE WASH	
CASING TYPE:	X PVC	☐ STAINLESS	☐ TEFLON	☐ OTHER
JOINTS:	X THREADED	☐ WELDED	☐ COUPLED	☐ SCREWED
SURFACE CASING:	X NO	☐ YES	☐ DESCRIBE	
WELL SCREEN:	X PVC	☐ STAINLESS	☐ TEFLON	☐ OTHER
DIAMETER:	X 2"	☐ 4"	☐ 6"	☐ OTHER ____ IN
SLOT SIZE:	X 0.010	☐ 0.020	☐ OTHER ____ IN	
SAND:	SIZE 10-20	LBS/SACK ____		# 8
BENTONITE:	SIZE 3/8"	LBS/SACK ____	LBS/BUCKET ____	# 1
DRILLING METHOD:	X HOLLOW STEM	☐ SOLID STEM	☐ MUD ROTARY	☐ HAND AUGER
	☐ AIR ROTARY	☐ DIRECT PUSH	☐ OTHER	
BIT SIZE:	☐ 6" ☐ 8"	☐ 10" ☐ 12"	☐ 14"	X OTHER 7.5 IN
DRILLING MUD:	X NONE	☐ BENTONITE	☐ WATER	☐ OTHER
CENTRALIZER:	X NO	☐ YES	INTERVAL ____	
COMPLETION:	☐ FLUSH MOUNT	X STICKUP	☐ VAULT	
PAD:	X 4' X 4'	☐ 5' X 5'	☐ OTHER	
CUTTINGS:	X DRUMMED	NUMBER OF DRUMS 3		
	☐ ROLLOFF BOX	ID NUMBER OF BOX ____		
	☐ SPREAD	☐ OTHER ____		

COMMENTS:

WELL DEVELOPMENT DATA

DATE: ____ TIME: ____

PRE-DEVELOPMENT MEASUREMENTS/OBSERVATIONS:

DEPTH TO HC:	____	☐ BTOC	☐ BGL		
DEPTH TO GW:	____	☐ BTOC	☐ BGL		
TOTAL DEPTH:	____	☐ BTOC	☐ BGL		
APPEARANCE:	☐ PSH	☐ SILTY	☐ TURBID	☐ OPAQUE	☐ CLEAR
ODOR:	☐ YES	☐ NO	TYPE ____		

DEVELOPMENT METHOD:	☐ NONE	☐ BAILING	☐ PUMPING	☐ AIR LIFT
	☐ SURGE & BLOCK	☐ OTHER ____		
TIME:	☐ 10 MIN	☐ 20 MIN	☐ OTHER ____	
AMOUNT:	☐ 5 GAL	☐ 10 GAL	☐ OTHER ____	GAL

POST-DEVELOPMENT MEASUREMENTS/OBSERVATIONS:

DEPTH TO HC:	____	☐ BTOC	☐ BGL		
DEPTH TO GW:	____	☐ BTOC	☐ BGL		
TOTAL DEPTH:	____	☐ BTOC	☐ BGL		
APPEARANCE:	☐ PSH	☐ SILTY	☐ TURBID	☐ OPAQUE	☐ CLEAR
ODOR:	☐ YES	☐ NO	TYPE ____		

DISPOSITION OF FLUIDS	☐ DRUMMED	☐ WWTS	☐ TREATED	☐ POTW	☐ OTHER
	☐ OTHER ____				

COMMENTS:

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Client: WESTERN REFINING SOUTHWEST, INC.	Project Number: WEST14003		Boring No. \ Well No.: MKTF-42
Project Name: GALLUP REFINERY - HYDROCARBON SEEP			Sheet: 1 of 1
Saturation Depth: UNK	Total Depth: 30' BGL	GPS Coordinates: N35°29.216' W108°25.957	Logged By: TRACY PAYNE
Drilling Methods \ Auger Size \ Bit Size: HOLLOW-STEM AUGER 7.5"	Drilling Rig: CME 75	Driller: C. ORTIZ	Drilling Company: ENVIRO-DRILL, INC.
Sampling Method \ Size of Sampler: SPLIT SPOON - 2"DIA, 2' LONG			Start Date: 11.12.14 Finish Date: 11.12.14
Comments			Start Time: 1505 Finish Time: 1700

Field Screening			Lithologic Interval (feet bgl)	Symbol	% Recovery	Description of Lithology
Depth (feet bgl)	PID (ppm)	Air Temp. (°F)				
0-2	1.7	50	0-2	CL	100	SILTY CLAY - LOW, FIRM, DRY, LT BROWN, NO ODOR
2-4	2.8	50	2-4	CL	90	SILTY CLAY - LOW, V. STIFF, DRY, LT BROWN, CALCAREOUS, NO ODOR, CRUMBLY
4-6	3.8	50	4-6	CL	60	SILTY CLAY - STA
6-8	2.4	50	6-8	CL	60	SILTY CLAY - STA
8-10	4.1	50	8-10	CL	30	SILTY CLAY - STA
10-12	2.8	50	10-12	CL	50	SANDY CLAY - LOW, STIFF, DRY, LT REDDISH BROWN WITH MEDIUM GRAINED SAND & INTERBEDDED SANDSTONE - LESS THAN 1/2" THICK
12-13	3.9	50	12-13	CL	80	SANDY CLAY - STA
13-14	3.8	50	13-14	CL	80	SILTY CLAY - LOW, V. STIFF, DAMP/DRY, LT REDDISH BROWN, NO ODOR, CALCAREOUS
14-16	2.5	50	14-16	CL	60	SILTY CLAY - STA, INCREASE IN MOISTURE
16-18	2.3	50	16-18	CL	50	SILTY CLAY - STA, TRACE SAND, SANDSTONE SEAM AT 17.5' V. DENSE
18-20	2.4	50	18-20	CL	80	SILTY CLAY - STA, ODOR, EXTREMELY CALCAREOUS (50%)
20-22	1.5	50	20-22	CL	80	SILTY CLAY - STA, CALCAROUS
22-24	2.5	50	22-24	CL	10	SILTY CLAY - LOW, STIFF, DAMP, REDDISH BROWN, NO ODOR
24-26	1.4	48	24-26	CL	60	SILTY CLAY - STA
26-28	1.5	48	26-28	CL	60	SILTY CLAY - STA, TRACE GRAY
28-30	1.2	48	28-30	CL	50	SILTY CLAY - STA, GRAY & REDDISH BROWN

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WELL CONSTRUCTION DATA

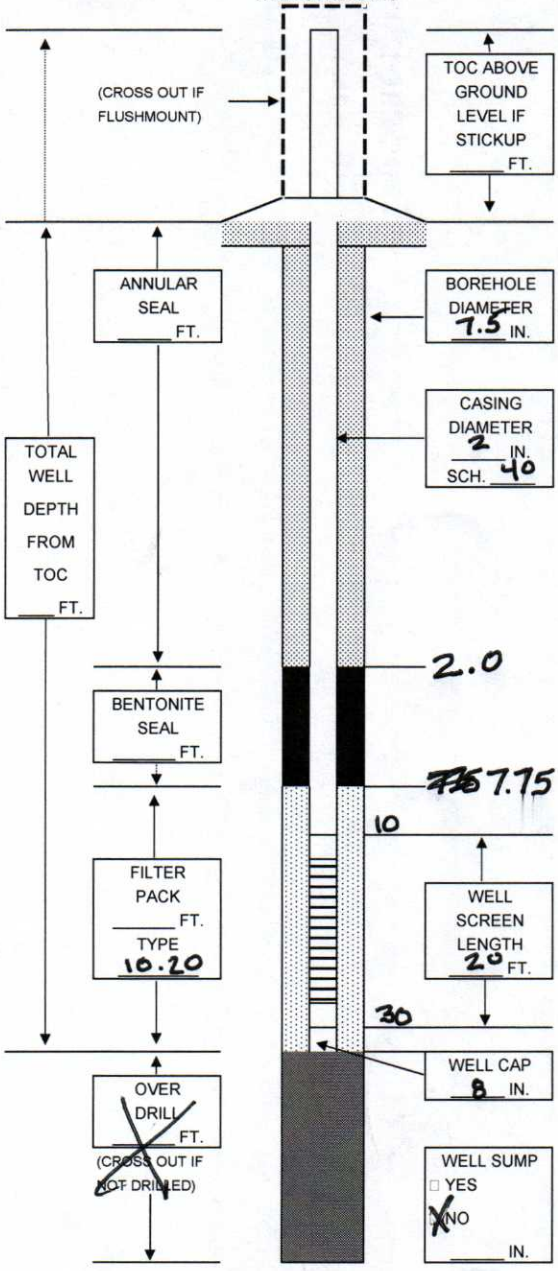
Well Number: MKTF-42
Prepared by: TRACY PAYNE
Start Date: 11.13.14
Finish Date: 11.13.14

WELL LOCATION:

Client Name: WESTERN REFINING SW, INC
Project No.: WEST14003
Project Name: GALLUP REFINERY – HYDROCARBON SEEP
Address of Site: 92 GIANT CROSSING ROAD, GALLUP NM 87301
Drilling Contractor: ENVIRO-DRILL, INC.
Driller: C. ORTIZ
GPS Coordinates: N 35°29.216' W108° 25.957

WELL TYPE: X MONITOR ☐ RECOVERY ☐ OBSERVATION
☐ TEMPORARY ☐ PERMANENT ☐ REPLACEMENT ☐ SINGLE CASED
☐ SHALLOW ☐ INTERMEDIATE ☐ DEEP ☐ DOUBLE CASED ☐ OTHER

WELL SCHEMATIC



INSTALLATION DATA

DECONTAMINATION: ☐ STEAM CLEAN ☐ SOAP WASH X HIGH PRESSURE WASH
CASING TYPE: X PVC ☐ STAINLESS ☐ TEFLON ☐ OTHER
JOINTS: X THREADED ☐ WELDED ☐ COUPLED ☐ SCREWED
SURFACE CASING: X NO ☐ YES ☐ DESCRIBE ____
WELL SCREEN: X PVC ☐ STAINLESS ☐ TEFLON ☐ OTHER
DIAMETER: X 2" ☐ 4" ☐ 6" ☐ OTHER ____ IN
SLOT SIZE: X 0.010 ☐ 0.020 ☐ OTHER ____ IN
SAND: SIZE 10.20 LBS/SACK ____ # 16
BENTONITE: SIZE 3/8" LBS/SACK ____ LBS/BUCKET ____ # 3
DRILLING METHOD: X HOLLOW STEM ☐ SOLID STEM ☐ MUD ROTARY ☐ HAND AUGER
☐ AIR ROTARY ☐ DIRECT PUSH ☐ OTHER ____
BIT SIZE: ☐ 6" ☐ 8" ☐ 10" ☐ 12" ☐ 14" X OTHER 7.5 IN
DRILLING MUD: X NONE ☐ BENTONITE ☐ WATER ☐ OTHER ____
CENTRALIZER: X NO ☐ YES INTERVAL ____
COMPLETION: ☐ FLUSH MOUNT X STICKUP ☐ VAULT
PAD: X 4' X 4' ☐ 5' X 5' ☐ OTHER ____
CUTTINGS: X DRUMMED NUMBER OF DRUMS 2
☐ ROLLOFF BOX ID NUMBER OF BOX ____
☐ SPREAD ☐ OTHER ____

COMMENTS: ____

WELL DEVELOPMENT DATA

DATE: ____ TIME: ____

PRE-DEVELOPMENT MEASUREMENTS/OBSERVATIONS:
DEPTH TO HC: ____ ☐ BTOC ☐ BGL
DEPTH TO GW: ____ ☐ BTOC ☐ BGL
TOTAL DEPTH: ____ ☐ BTOC ☐ BGL
APPEARANCE: ☐ PSH ☐ SILTY ☐ TURBID ☐ OPAQUE ☐ CLEAR
ODOR: ☐ YES ☐ NO TYPE ____

DEVELOPMENT METHOD: ☐ NONE ☐ BAILING ☐ PUMPING ☐ AIR LIFT
☐ SURGE & BLOCK ☐ OTHER ____
TIME: ☐ 10 MIN ☐ 20 MIN ☐ OTHER ____
AMOUNT: ☐ 5 GAL ☐ 10 GAL ☐ OTHER ____ GAL

POST-DEVELOPMENT MEASUREMENTS/OBSERVATIONS:
DEPTH TO HC: ____ ☐ BTOC ☐ BGL
DEPTH TO GW: ____ ☐ BTOC ☐ BGL
TOTAL DEPTH: ____ ☐ BTOC ☐ BGL
APPEARANCE: ☐ PSH ☐ SILTY ☐ TURBID ☐ OPAQUE ☐ CLEAR
ODOR: ☐ YES ☐ NO TYPE ____

DISPOSITION OF FLUIDS: ☐ DRUMMED ☐ WWTS ☐ TREATED ☐ POTW ☐ OTHER
☐ OTHER ____

COMMENTS: ____

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Client: WESTERN REFINING SOUTHWEST	Project Number: WEST14003	Boring No. \ Well No.: MKTF-43
Project Name: GALLUP REFINERY- HYDROCARBON SEEP		Sheet: 1 of 1
Saturation Depth: NE / Total Depth: 28' / GPS Coordinates: N 35°29.277' W 108°26.055'		Logged By: TRACY PAYNE
Drilling Methods \ Auger Size \ Bit Size: HOLLOW STEM AUGER / Drilling Rig: CME 75 / Driller: C. ORTIZ		Drilling Company: ENVIRO-DRILL, INC.
Sampling Method \ Size of Sampler: SPLIT SPOON 2" DIA; 2' LONG		Start Date: 11.11.14 / Finish Date: 11.11.14
Comments		Start Time: 0810 / Finish Time: 1040

Field Screening: Depth (feet bgl)	PID (ppm)	Air Temp. (°F)	Lithologic Interval (feet bgl)	Symbol	% Recovery	Description of Lithology
0-2	3.6	49	0-2	CH	100	CLAY- HIGH, STIFF, DAMP, BROWN, NO ODOR
2-4	4.6	49	2-4	CH	50	CLAY - STA, MOIST IN SEAMS
4-6	4.2	49	4-6	CH	90	CLAY - STA, MOIST IN SEAMS
6-8	4.6	49	6-8	CH	90	CLAY - STA, REDDISH BROWN
8-10	4.0	49	8-10	CL	90	SILTY CLAY - LOW, SOFT, DAMP, REDDISH BROWN, CRUMBLY, NO ODOR, TRACE GRAY CLAY @ 9.5'
10-12	3.3	49	10-12	CL	80	SILTY CLAY - STA, STIFF.
12-14	3.8	49	12-14	CL	60	SILTY CLAY - STA, VERY STIFF
14-16	3.8	49	14-16	CL	80	SILTY CLAY - STA, VERY STIFF, CALCAREOUS
16-18	2.9	49	16-18	CL	80	SILTY CLAY - STA
18-20	3.1	49	18-20	CL	50	SILTY CLAY - STA
20-22	3.1	49	20-22	CL	60	SILTY CLAY - STA
22-24	3.2	49	22-24	CL	10	SILTY CLAY - STA
24-26	3.3	49	24-26	CL	30	SILTY CLAY - STA, SANDSTONE SEAM 24.50'
26-28	3.2	49	26-28	CL	30	SILTY CLAY - STA

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WELL CONSTRUCTION DATA

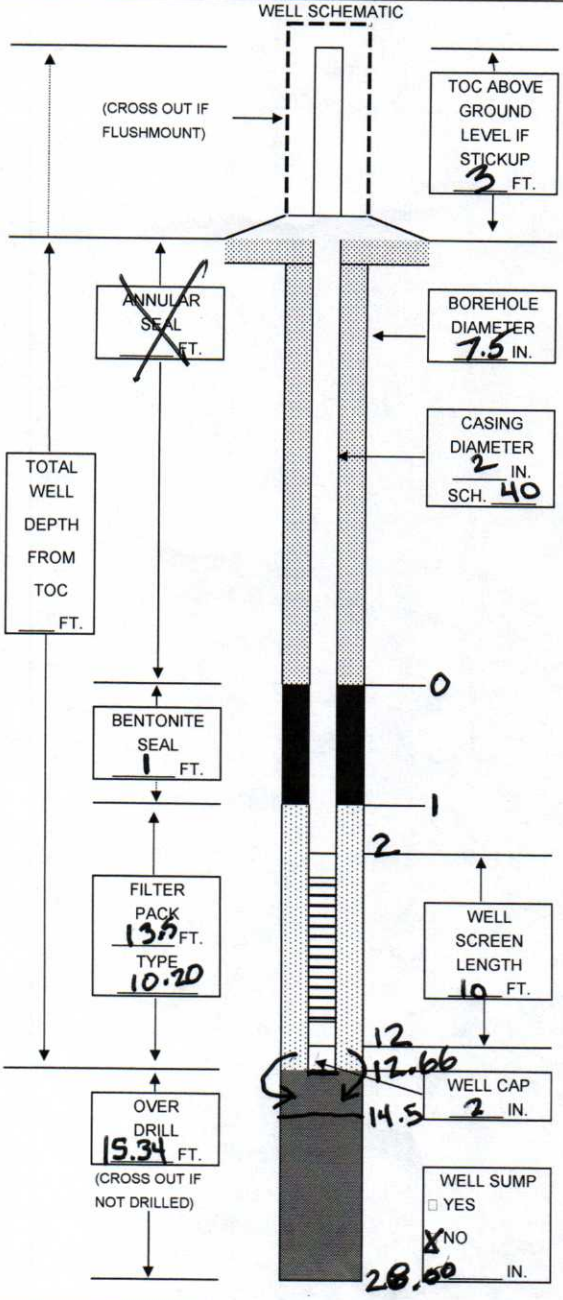
Well Number: MKTF-43
Prepared by: TRACY PAYNE
Start Date: 11.11.14
Finish Date: 11.11.14

WELL LOCATION:

Client Name: WESTERN REFINING SW, INC.
Project No. WEST14003
Project Name: GALLUP REFINERY - HYDROCARBON SEEP
Address of Site: 92 GIANT CROSSING ROAD - GALLUP, NM 87301
Drilling Contractor: ENVIRO-DRILL INC.
Driller: C. ORTIZ
GPS Coordinates:

WELL TYPE: [X] MONITOR [ ] RECOVERY [ ] OBSERVATION
[ ] TEMPORARY [ ] PERMANENT [ ] REPLACEMENT [ ] SINGLE CASED
[ ] SHALLOW [ ] INTERMEDIATE [ ] DEEP [ ] DOUBLE CASED [ ] OTHER

WELL SCHEMATIC



INSTALLATION DATA

DECONTAMINATION:	[ ] STEAM CLEAN	[ ] SOAP WASH	[X] HIGH PRESSURE WASH	
CASING TYPE:	[X] PVC	[ ] STAINLESS	[ ] TEFLON	[ ] OTHER
JOINTS:	[X] THREADED	[ ] WELDED	[ ] COUPLED	[ ] SCREWED
SURFACE CASING:	[X] NO	[ ] YES	[ ] DESCRIBE	
WELL SCREEN:	[X] PVC	[ ] STAINLESS	[ ] TEFLON	[ ] OTHER
DIAMETER:	[X] 2"	[ ] 4"	[ ] 6"	[ ] OTHER ____ IN
SLOT SIZE:	[X] 0.010	[ ] 0.020	[ ] OTHER ____ IN	
SAND:	SIZE 10.20	LBS/SACK		# 8 10.5
BENTONITE:	SIZE 3/8"	LBS/SACK	LBS/BUCKET	# 4
DRILLING METHOD:	[ ] HOLLOW STEM	[ ] SOLID STEM	[ ] MUD ROTARY	[ ] HAND AUGER
	[ ] AIR ROTARY	[ ] DIRECT PUSH	[ ] OTHER	
BIT SIZE:	[ ] 6" [ ] 8"	[ ] 10" [ ] 12"	[ ] 14"	[X] OTHER 7.5 IN
DRILLING MUD:	[X] NONE	[ ] BENTONITE	[ ] WATER	[ ] OTHER
CENTRALIZER:	[X] NO	[ ] YES	INTERVAL	
COMPLETION:	[ ] FLUSH MOUNT	[X] STICKUP	[ ] VAULT	
PAD:	[X] 4' X 4'	[ ] 5' X 5'	[ ] OTHER	
CUTTINGS:	[X] DRUMMED	NUMBER OF DRUMS 2		
	[ ] ROLLOFF BOX	ID NUMBER OF BOX		
	[ ] SPREAD	[ ] OTHER		

COMMENTS:

WELL DEVELOPMENT DATA

DATE: TIME:

PRE-DEVELOPMENT MEASUREMENTS/OBSERVATIONS:

DEPTH TO HC:		[ ] BTOC	[ ] BGL		
DEPTH TO GW:		[ ] BTOC	[ ] BGL		
TOTAL DEPTH:		[ ] BTOC	[ ] BGL		
APPEARANCE:	[ ] PSH	[ ] SILTY	[ ] TURBID	[ ] OPAQUE	[ ] CLEAR
ODOR:	[ ] YES	[ ] NO	TYPE		

DEVELOPMENT METHOD:	[ ] NONE	[ ] BAILING	[ ] PUMPING	[ ] AIR LIFT
	[ ] SURGE & BLOCK	[ ] OTHER		
TIME:	[ ] 10 MIN	[ ] 20 MIN	[ ] OTHER	
AMOUNT:	[ ] 5 GAL	[ ] 10 GAL	[ ] OTHER ____	GAL

POST-DEVELOPMENT MEASUREMENTS/OBSERVATIONS:

DEPTH TO HC:		[ ] BTOC	[ ] BGL		
DEPTH TO GW:		[ ] BTOC	[ ] BGL		
TOTAL DEPTH:		[ ] BTOC	[ ] BGL		
APPEARANCE:	[ ] PSH	[ ] SILTY	[ ] TURBID	[ ] OPAQUE	[ ] CLEAR
ODOR:	[ ] YES	[ ] NO	TYPE		

DISPOSITION OF FLUIDS	[ ] DRUMMED	[ ] WWTS	[ ] TREATED	[ ] POTW	[ ] OTHER
	[ ] OTHER				

COMMENTS:

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Client: WESTERN REFINING SW, INC.	Project Number: WEST14003	Boring No. \ Well No.: MKTF-44
Project Name: GALLUP REFINERY - HYDROCARBON SEEP		Sheet: 1 of 2
Saturation Depth: NE / Total Depth: 50 / GPS Coordinates: N35°29.313' W108°26.303'W		Logged By: TRACY PAYNE
Drilling Methods \ Auger Size \ Bit Size: HOLLOW STEM AUGER 7.5" / Drilling Rig: CME 75 / Driller: C. ORTIZ		Drilling Company: ENVIRO-DRILL, INC.
Sampling Method \ Size of Sampler: SPLIT SPOON 2" DIAMETER 2' LONG		Start Date: 11.11.14 / Finish Date:
Comments		Start Time: 1215 / Finish Time:

Field Screening: Depth (feet bgl)	PID (ppm)	Air Temp. (°F)	Lithologic Interval (feet bgl)	Symbol	% Recovery	Description of Lithology
0-2	6.3	60	0-2	CH	100	CLAY- HIGH, V. STIFF, DAMP, BROWN, NO ODOR
2-4	8.3	60	2-4	CH	80	CLAY- STA
4-6	8.2	60	4-6	CH	70	CLAY- STA
6-8	8.6	60	6-8	CH	90	CLAY- STA
8-10	8.2	60	8-10	CH	80	CLAY- STA
10-12	7.9	60	10-12	CH	90	CLAY- STA, TRACE SILT
12-14	7.8	60	12-14	CH	90	CLAY- HIGH, V. STIFF, DAMP, BROWN, NO ODOR
14-16	6.5	60	14-16	CH	10	CLAY- STA
16-18	7.1	60	16-18	CH	80	CLAY- STA
18-20	7.6	60	18-20	CL	70	SANDY SILTY CLAY- LOW, STIFF, DAMP, LIGHT BROWN, NO ODOR, GRAVEL @ AT BASE; SOFT / CRUMBLY 19-19.5' WITH LESSER AMOUNT OF CLAY
20-22	5.5	60	20-22	CL	80	SILTY CLAY- STA WITH SAND SEAMS / SANDSTONE FROM 20.5-22', DRY CRUMBLY
22-24	6.4	60	22-24	CL	80	SANDY SILTY CLAY- LOW, STIFF, DRY -> DAMP LIGHT BROWN, NO ODOR
24-26	4.8	60	24-26	CL	70	GRAVELLY CLAY - STA, @ GRAVEL
26-28	3.8	60	26-28	CL	50	GRAVELLY CLAY- STA, V. STIFF
28-30	4.8	60	28-30	CL	50	SILTY CLAY- LOW, V. STIFF, DAMP / DRY, REDDISH-BROWN, NO ODOR, CALCAREOUS
30-32	4.6	60	30-32	CL	90	SILTY CLAY- LOW, FIRM / CRUMBLY, DAMP -> DRY REDDISH BROWN, NO ODOR, CALAREOUS
32-34	4.3	60	32-34	CL	80	SILTY CLAY- STA, STIFF -> V. STIFF
34-36	3.6	60	34-36	CL	80	SILTY CLAY- STA
36-38	1.9	56	36-38	CL	80	SILTY CLAY- STA
38-40	4.4	56	38-40	CL	20	SILTY CLAY- STA
40-42	3.8	56	40-42	CL	80	SILTY CLAY- STA

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Client	Project Number	Boring No. \ Well No.
		MKTF-44
Project Name		**Sheet** 2 **of** 2
Saturation Depth / **Total Depth** / **GPS Coordinates**		**Logged By**
Drilling Methods \ Auger Size \ Bit Size / **Drilling Rig** / **Driller**		**Drilling Company**
Sampling Method \ Size of Sampler		**Start Date** 11.11.14 **Finish Date**
Comments		**Start Time** 1215 **Finish Time**

Field Screening: Depth (feet bgl)	Field Screening: PID (ppm)	Field Screening: Air Temp. (°F)	Lithologic Interval (feet bgl)	Symbol	% Recovery	Description of Lithology
42-44	3.8	56	42-44	CL	20	SILTY CLAY- LOW, ~~V-SIF~~ V. STIFF, CRUMBLY, DAMP→DRY, REDDISH BROWN, NO ODOR
44-46	3.9	56	44-46	CL	60	SILTY CLAY- STA
46-48	3.8	56	46-48	CL	40	SILTY CLAY- STA
48-50	3.7	56	48-50	CL	20	SILTY CLAY- STA

Opal Group, Inc.

Boring/Well Log

Well/Boring ID: STP1-SW

Sheet: 1 of 2

Project:	Western Refinery, Gallup, NM	Monument:	Flush Mounted Wellhead	Ground Elevation:	
Project #:	E13-106	Latitude:	35°29'32.73"	TOC Elevation:	
Customer:	Western Refining Southwest	Longitude:	-108°25'48.98"	Total Depth (bgs):	32 feet
Well Area:	STP-1	Drill Rig Type:	CME-75	Filter Pack:	15 to 30
Start Date/Time:	5/6/2014; 1251	Method:	Hollow Stem Auger	Seal	15 to 10 feet
Finish Date/Time:	5/6/2014; 1540	Casing ID:	2"	Grout	10 feet to surface
Contractor:	Envrio-Drilling Inc.	Boring ID:	7"	Riser:	2" Schedule 40 PVC
Operator:	Juan Barraza	Logged By:	PG Chang	Screen:	0.010 slotted screen

Blows per 6"	% Rec	PID (ppm)	Well Completion Log	Depth (ft)	Graphic	Soil and Rock Description USCS/ASTM Classification	Comments
				0		Red, brown Clay, **CL**	
3 4 / 6 8	30%			2			
				4			
				6		Red, brown Clay, CL	
5 4 / 7 9	100%			8		Dark Red Clay, Trace Gravel, **CL**	Damp
3 7 / 11 12	100%			10		Dark Red Clay, Trace Gravel, **CL**	Damp
8 11 / 11 13	100%			12		Light Brown Gravely Clay, **CL**	Very weathered at 13 feet
6 7 / 10 11	100%			14		Light Brown Gravely Clay, **CL**	Loose Gravel
3 12 / 16 19	100%			16		Brown Clay, **CL**	
				18			Drill to Shelby tube sample depth
				20		Shelby tube 19 to 21.5 ft below grade (bg)	Push shelby tube, met resistance - bent
40 50 for 4"	30%			22		Gray Weathered Silty Clay, **CL**	
						Auger for one foot	
21 50 for 6"	50%			24		Red-Brown Clay, **CL**	
24 50 for 6"	50%			26		Red-Brown Clay, **CL**	
				28			Auger to 30 feet
	80%			30		Brown - Gray, Clay, **CL**	
				32			

Cuttings Repack

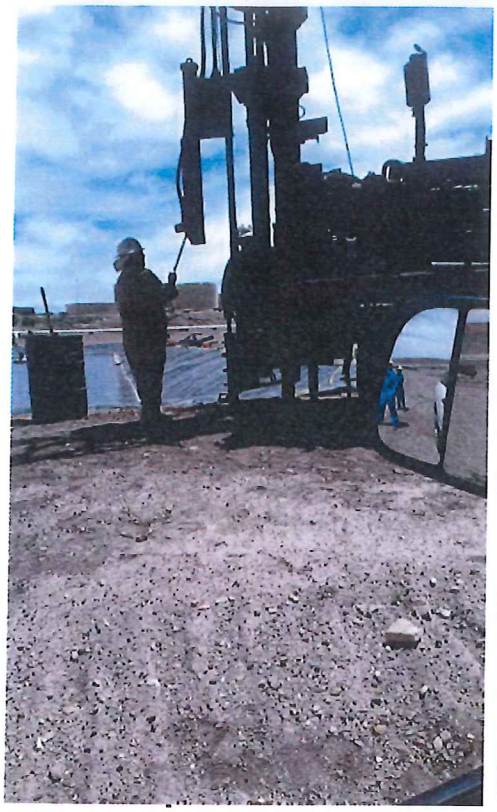
Bentonite Seal

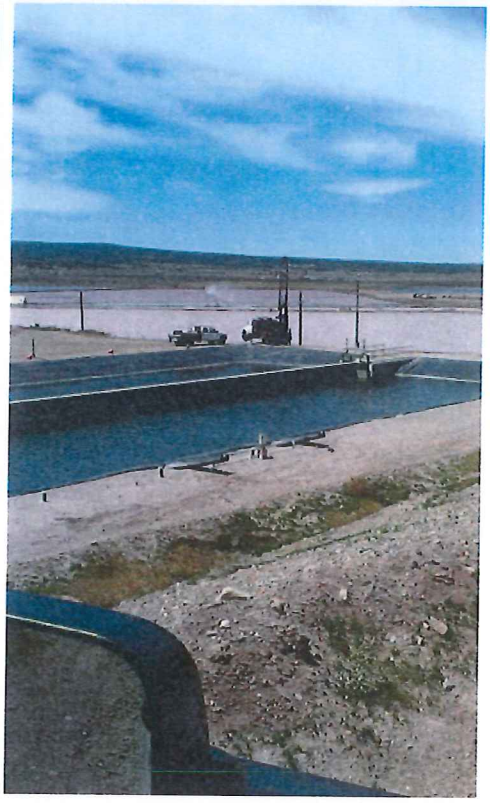
Grout

Sand Pack

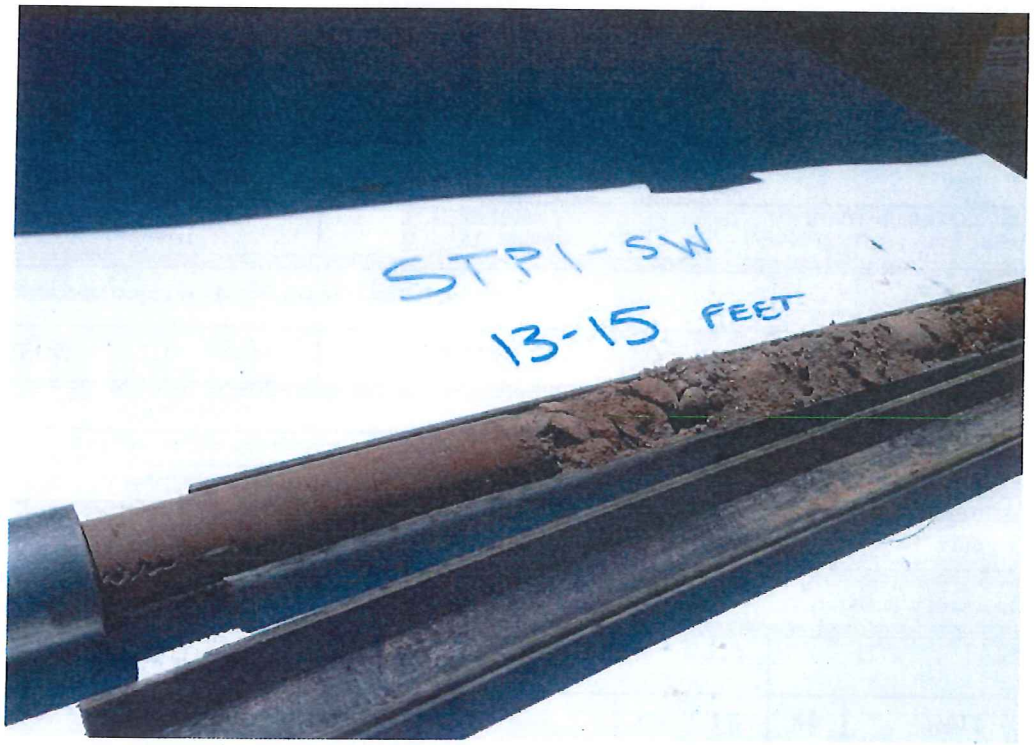
Well Screen

REMARKS: Dry well installed as observation well.





Looking northeast at well installation (left); looking southwest from northwest access road to STP-1 site(right)



View of core taken at STP1-SW from 13-15 feet, Brown-red clay, entire 32 foot boring - dry; Shelby tube taken at 19 to 21.5 feet, met resistence, bent

Opal Group, Inc.

Boring/Well Log

Well/Boring ID: STP1-NW

Sheet: 1 of 3

Project:	Western Refinery, Gallup, NM	Monument:	Flush Mounted Wellhead	Ground Elevation:	
Project #:	E13-106	Latitude:	35°29'33.52"	TOC Elevation:	
Customer:	Western Refining Southwest	Longitude:	-108°25'49.21"	Total Depth (bgs):	50 feet
Well Area:	STP-1	Drill Rig Type:	CME-75	Filter Pack:	30 to 50
Start Date/Time:	5/6/2014; 1632	Method:	Hollow Stem Auger	Seal	30 to 20 feet
Finish Date/Time:	5/6/2014; 1800	Casing ID:	2"	Grout	20 feet to surface
Contractor:	Envrio-Drilling Inc.	Boring ID:	7"	Riser:	2" Schedule 40 PVC
Operator:	Juan Barraza	Logged By:	PG Chang	Screen:	0.010 slotted screen

Blows per 6"	% Rec	PID (ppm)	Well Completion Log	Depth (ft)	Graphic	Soil and Rock Description USCS/ASTM Classification	Comments
4 7 7 8	100%			0		Brown, Red Clay, **CL**	
				2			
				4			
				6			
				8			Auger to 10 feet, cuttings brown, red clay, **CL**
13 18 18 24	100%			10		Brown, Red Clay, **CL**	Trace gravel
				12			
				14			Auger to 15 feet, cuttings brown, red clay, **CL**
13 32 39 50 5"	100%			16		Brown, Red Clay, **CL**	Slightly damp
				18			Auger to 20 feet, cutting brown, red clay, **CL**
17 23 32 39	100%			20		Grey, Brown Clay, **CL**	Some weathered rock
				22			
				24			Auger to 30 feet, cuttings brown, grey clay, **CL**

Cuttings Repack

Bentonite Seal

Grout

Sand Pack

Well Screen

REMARKS: Water level unknown at time of completion, to be determined during quarterly sampling.

Opal Group, Inc.

Boring/Well Log

Well/Boring ID: STP1-NW

Sheet: 2 of 3

Project:	Western Refinery, Gallup, NM	Monument:	Flush Mounted Wellhead	Ground Elevation:	
Project #:	E13-106	Latitude:	35°29'33.52"	TOC Elevation:	
Customer:	Western Refining Southwest	Longitude:	-108°25'49.21"	Total Depth (bgs):	50 feet
Well Area:	STP-1	Drill Rig Type:	CME-75	Filter Pack:	30 to 50
Start Date/Time:	5/6/2014; 1632	Method:	Hollow Stem Auger	Seal	30 to 20 feet
Finish Date/Time:	5/6/2014; 1800	Casing ID:	2"	Grout	20 feet to surface
Contractor:	Envrio-Drilling Inc.	Boring ID:	7"	Riser:	2" Schedule 40 PVC
Operator:	Juan Barraza	Logged By:	PG Chang	Screen:	0.010 slotted screen

Blows per 6"	% Rec	PID (ppm)	Well Completion Log	Depth (ft)	Graphic	Soil and Rock Description USCS/ASTM Classification	Comments
				25			
				27			Auger to 30 feet, cuttings brown, grey clay, **CL**
				29			
22 33 50 for 2"	100%			31		Gray, Brown Clay, **CL**	
				33			
				35			
				37			
				39			
				41			Auger to 50 feet, cuttings brown, red gray clay, **CL**
				43			
				45			
				47			
				49			

Cuttings Repack

Bentonite Seal

Grout

Sand Pack

Well Screen

REMARKS: Water level unknown at time of completion, to be determined during quarterly sampling.

View of core taken at STP-NW from 15-17 feet; Brown red clay with some gravel

Looking north at monitor well STP1-NW located downgradient from SPT-1, 38 feet south and 17 feet west of manhole in center of south end of pond. Approximately 8 feet below grade from top of liner.

APPENDIX F

DePauli Engineering
& Surveying, LLC.
Civil Engineers and Land Surveyors

Phone: 505-863-5440 • Fax: 505-863-1919 • www.depauliengineering.com
307 South 4th Street • Gallup, NM 87301
PO BOX 876 • Gallup, NM 87305

February 11, 2014

Mr. Ed Riege, Environmental Manager
Western Refining-Gallup Refinery
Route 3 Box 7
Gallup, NM 87301

Re: Western Refining Monitoring Wells

Dear Mr. Riege:

DePauli Engineering & Surveying, LLC completed the field survey of the 18 monitoring wells at Western Refining-Gallup Refinery on January 21, 2014. The wells were surveyed for the following parameter: ground level elevation, ground level elevation inside steel sleeve, center top steel lid elevation, well casing rim elevation and corresponding measuring point description associated with each elevation. Survey conducted enlisted NM Surveyor in Training and a Technician (under my direct supervision), from DePauli Engineering Surveying, LLC and one Gallup Refinery representative to assist with the location of the wells.

The instruments used to complete the survey consisted of a Leica VIVA GS10 GPS (global positing system) and System 1200 GPS. The method used to survey the wells was Real-time Kinematic GPS Surveying (RTK). RTK surveying requires that two or more receivers are operated simultaneously. The aspect of the procedure involves a radio transmitting a signal from the base station. The base station's coordinates are utilized to make the appropriate corrections to the error involved with the GPS signals. The rover receives the corrections thence giving the rover observation corrected valves. The horizontal and vertical positions are determined by differential GPS involving the base line surveyed from local base station to survey position. The base line measurements are surveyed for one minute (60 observations). This is verified by surveying known local control points and bench marks.

The horizontal and vertical positions of the top of the PVC casing (unless otherwise noted) and the vertical positions for the lid, ground elevation inside the steel casing, and the surrounding ground elevation is shown on the attached sheet labeled "Western Refining Monitoring Wells January 21, 2014." The horizontal position is NAD 83 datum and the vertical positions are NGVD 1929. Elevations were taken using the concrete pad surrounding each well and locations

noted on the report. Ground elevation was taken using the concrete pad surrounding each well and locations shown on the report.

The requested field survey was complete on January 21, 2014 in accordance with sections 500.1 through 500.12 of the Regulations and Rules of the Board of Registration for Professional Engineers and Surveyors Minimum Standards for Surveying in New Mexico; which horizontal positions were measured to the nearest 0.1-ft and vertical elevations were measured to an accuracy of 0.01-ft.

If you have any questions concerning this survey please do not hesitate to contact our office.

Sincerely,

Marc DePauli

Marc DePauli, PE/PS

Western Refining Monitoring Wells January 21, 2014

Well #	Northing	Easting	Elevation	Description
MKTF-10	1,633,807.47	2,545,853.54	6937.16	North edge PVC casing
			6937.51	Center steel lid
			6936.63	North side ground elev. inside steel sleeve
			6937.51	Average corner elevation of concrete collar
MKTF-15	1,633,845.57	2,545,934.58	6943.48	North edge PVC casing
			6943.73	Center steel lid
			6943.19	North side ground elev. inside steel sleeve
			6943.74	**Average elevation of concrete collar
			** Concrete collar is in general circular shape	
MKTF-16	1,633,718.14	2,546,068.55	6950.58	North edge PVC casing
			6950.97	Center steel lid
			6950.58	North side ground elev. inside steel sleeve
			6951.00	Average corner elevation of concrete collar
MKTF-11	1,633,806.93	2,545,754.77	6931.34	South edge PVC casing
			6931.61	Center steel lid
			6930.86	North side ground elev. inside steel sleeve
			6931.61	Average corner elevation of concrete collar
MKTF-03	1,633,746.53	2,545,756.87	6931.31	North edge PVC casing
			6931.69	Center steel lid
			6930.85	North side ground elev. inside steel sleeve
			6931.73	Average corner elevation of concrete collar
MKTF-04	1,633,649.46	2,545,752.83	6933.57	North edge PVC casing
			6933.91	Center steel lid
			6933.24	North side ground elev. inside steel sleeve
			6933.90	Average corner elevation of concrete collar
MKTF-05	1,633,472.30	2,545,769.95	6942.22	North edge PVC casing
			6942.80	Center steel lid
			6941.95	South side ground elev. inside steel sleeve
			6939.49	Average corner elevation of concrete collar
MKTF-09	1,633,681.33	2,545,895.93	6946.50	North edge PVC casing
			6947.21	Center steel lid
			6945.90	South side ground elev. inside steel sleeve
			6943.57	Average corner elevation of concrete collar

Well #	Northing	Easting	Elevation	Description
MKTF-08	1,633,598.94	2,545,885.02	6947.09	North edge PVC casing
			6947.48	Center steel lid
			6942.67	South side ground elev. inside steel sleeve
			6944.02	Average corner elevation of concrete collar
MKTF-07	1,633,555.11	2,545,885.42	6947.18	North edge PVC casing
			6947.84	Center steel lid
			6947.06	South side ground elev. inside steel sleeve
			6944.40	Average corner elevation of concrete collar
MKTF-06	1,633,556.28	2,545,811.85	6946.81	North edge PVC casing
			6947.29	Center steel lid
			6946.63	South side ground elev. inside steel sleeve
			6944.24	Average corner elevation of concrete collar
MKTF-18	1,633,497.53	2,546,006.29	6950.65	**North edge PVC casing
			6950.96	Center steel lid
			6950.17	North side ground elev. inside steel sleeve
			6950.97	Average corner elevation of concrete collar
				** Mark was existing on PVC casing
MKTF-12	1,633,542.07	2,545,688.29	6942.11	North edge PVC casing
			6942.84	Center steel lid
			6941.88	South side ground elev. inside steel sleeve
			6939.70	Average corner elevation of concrete collar
MKTF-13	1,633,625.25	2,545,697.39	6935.18	**North edge PVC casing
			6936.89	Center steel lid
			6934.83	South side ground elev. inside steel sleeve
			6933.67	Average corner elevation of concrete collar
				** PVC casing not typical
MKTF-14	1,633,719.43	2,545,625.96	6928.02	North edge PVC casing
			6928.75	Center steel lid
			6927.80	South side ground elev. inside steel sleeve
			6925.65	Average corner elevation of concrete collar
MKTF-01	1,633,864.41	2,545,561.73	6920.67	**North edge PVC casing
			6921.68	Center steel lid
			6920.67	South side ground elev. inside steel sleeve
			6918.28	**Average corner elevation of concrete collar
				** Inside ground elev. is flush with PVC casing

Well #	Northing	Easting	Elevation	Description
MKTF-02	1,633,946.93	2,545,530.46	6917.45	** North edge PVC casing
			6918.31	Center steel lid
			6917.18	South side ground elev. inside steel sleeve
			6915.00	Average corner elevation of concrete collar
				** PVC casing not typical
MKTF-17	1,633,268.93	2,545,850.73	6945.76	North edge PVC casing
			6946.00	Center steel lid
			6945.64	North side ground elev. inside steel sleeve
			6945.79	** Average corner elevation of concrete collar
			**	Concrete collar is in general circular shape

Marc DePauli

Marc DePauli PS13606

2-11-2014

Date

DePauli Engineering
& Surveying, LLC.
Civil Engineers and Land Surveyors

Phone: 505-863-5440 • Fax: 505-863-1919 • www.depauliengineering.com
307 South 4th Street • Gallup, NM 87301
PO BOX 876 • Gallup, NM 87305

May 12, 2014

Mr. Ed Riege, Environmental Manager
Western Refining-Gallup Refinery
Route 3 Box 7
Gallup, NM 87301

Re: Western Refining Monitoring Wells

Dear Mr. Riege:

DePauli Engineering & Surveying, LLC completed the field survey of the 16 monitoring wells at Western Refining-Gallup Refinery on April 30, 2014. The wells were surveyed for the following parameter: ground level elevation, ground level elevation inside steel sleeve, center top steel lid elevation, well casing rim elevation and corresponding measuring point description associated with each elevation. The survey was conducted by an enlisted NM Surveyor in Training and a Technician (under my direct supervision), from DePauli Engineering & Surveying, LLC and one Gallup Refinery representative to assist with the location of the wells.

The instruments used to complete the survey consisted of a Leica VIVA GS10 GPS (global positing system) and System 1200 GPS. The method used to survey the wells was Real-time Kinematic GPS Surveying (RTK). RTK surveying requires that two or more receivers are operated simultaneously. The aspect of the procedure involves a radio transmitting a signal from the base station. The base station's coordinates are utilized to make the appropriate corrections to the error involved with the GPS signals. The rover receives the corrections thence giving the rover observation corrected valves. The horizontal and vertical positions are determined by differential GPS involving the base line surveyed from local base station to survey position. The base line measurements are surveyed for one minute (60 observations). This is verified by surveying known local control points and bench marks.

The horizontal positions of the top of the PVC casing or top of the lid (unless otherwise noted) and the vertical positions for the PVC casing, lid, ground elevation inside the steel casing, and the surrounding ground elevation is shown on the attached sheet labeled "Coordinate and Elevation Summary, Western Refining Monitoring Wells" The horizontal position is NAD 83

datum and the vertical positions are NGVD 1929. Elevations were taken using the concrete pad surrounding each well and locations noted on the report. Ground elevation was taken using the concrete pad surrounding each well and locations shown on the report.

The requested field survey was completed on April 30, 2014 in accordance with sections 500.1 through 500.12 of the Regulations and Rules of the Board of Registration for Professional Engineers and Surveyors Minimum Standards for Surveying in New Mexico; which horizontal positions were measured to the nearest 0.1-ft and vertical elevations were measured to an accuracy of 0.01-ft.

If you have any questions concerning this survey please do not hesitate to contact our office.

Sincerely,

Marc DePauli

Marc DePauli, PE/PS

DePauli Engineering & Surveying, LLC.
307 S. 4th Street
Gallup, NM 87301

April 30, 2014

Coordinate and Elevation Summary, Western Refining Monitoring Wells

Well #	Northing	Easting	Elevation	Description
MKTF-21	1633570.30	2546110.00	6952.57	North edge PVC casing.
			6952.77	Center Steel Lid
			6952.00	North side ground elevation inside steel sleeve
			6952.68	Average elevation of concrete collar.
MKTF-20	1633698.28	2546111.23	6951.78	North edge PVC casing.
			6952.05	Center Steel Lid
			6951.17	North side ground elevation inside steel sleeve
			6951.89	Average elevation of concrete collar.
MKTF-24	1633853.19	2545468.48	6928.72	North edge PVC casing.
			6929.21	Center Steel Lid
			6924.62	North side ground elevation inside steel sleeve
			6926.07	Average elevation of concrete collar.
MKTF-23			6929.98	North edge PVC casing.
	1633750.93	2545503.70	6930.55	Center Steel Lid
			6925.79	North side ground elevation inside steel sleeve
			6927.23	Average elevation of concrete collar.
MKTF-22			6942.31	**North edge PVC casing.
	1633501.64	2545478.20	6942.94	Center Steel Lid
			6938.57	North side ground elevation inside steel sleeve
			6939.76	Average elevation of concrete collar.
				** PVC casing not typical.
MKTF-31			6906.87	North edge PVC casing.
	1633898.83	2544938.99	6907.58	Center Steel Lid
			6903.11	North side ground elevation inside steel sleeve
			6904.26	Average elevation of concrete collar.
MKTF-25			6916.19	North edge PVC casing.
	1634015.86	2545275.68	6916.66	Center Steel Lid
			6911.79	North side ground elevation inside steel sleeve
			6913.35	Average elevation of concrete collar.
MKTF-30			6900.80	North edge PVC casing.
	1634225.67	2544937.91	6901.34	Center Steel Lid
			6896.68	North side ground elevation inside steel sleeve
			6898.10	Average elevation of concrete collar.

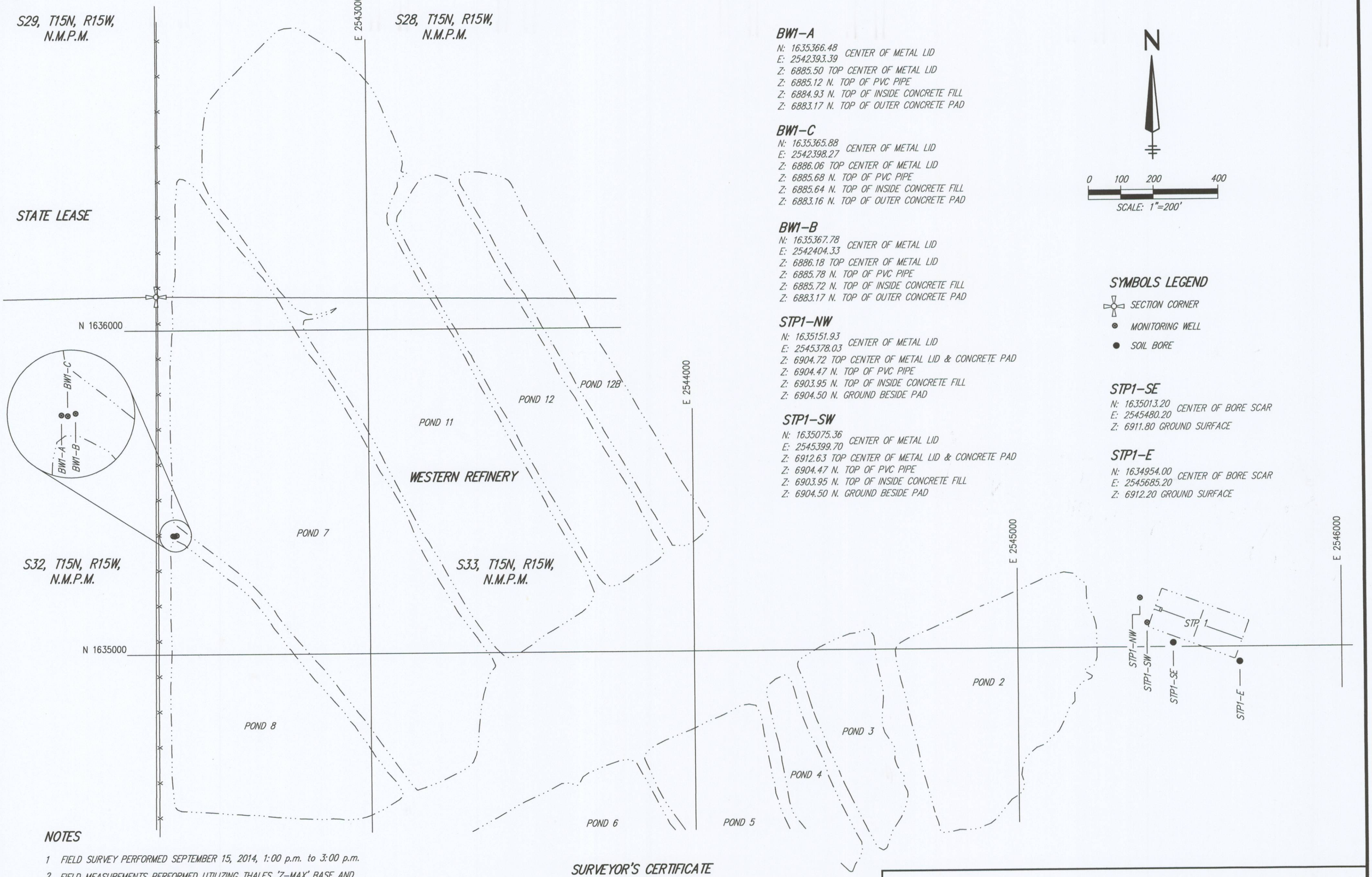
Coordinate and Elevation Summary, Western Refining Monitoring Wells

Well #	Northing	Easting	Elevation	Description
MKTF-29			6901.62	North edge PVC casing.
	1634249.76	2545258.34	6901.98	Center Steel Lid
			6897.67	North side ground elevation inside steel sleeve
			6898.83	Average elevation of concrete collar.
MKTF-28			6921.52	North edge PVC casing.
	1634263.44	2545650.04	6922.11	Center Steel Lid
			6917.51	North side ground elevation inside steel sleeve
			6918.67	Average elevation of concrete collar.
MKTF-27			6917.90	North edge PVC casing. (ex. mark)
	1634115.56	2545620.98	6918.49	Center Steel Lid
			6914.18	North side ground elevation inside steel sleeve
			6915.36	Average elevation of concrete collar.
MKTF-26			6915.31	North edge PVC casing.
	1634033.63	2545492.39	6915.86	Center Steel Lid
			6911.35	North side ground elevation inside steel sleeve
			6912.55	Average elevation of concrete collar.
MKTF-19	1633381.19	2545842.82	6944.67	North edge PVC casing.
			6945.00	Center Steel Lid
			6944.34	North side ground elevation inside steel sleeve
			6944.89	Average elevation of concrete collar.
MKTF-34			6945.35	North edge PVC casing.
	1633118.42	2545681.30	6945.71	Center Steel Lid
			6943.52	North side ground elevation inside steel sleeve
			6942.42	Average elevation of concrete collar.
MKTF-32			6911.11	North edge PVC casing.
	1633443.56	2544840.32	6911.68	Center Steel Lid
			6907.16	North side ground elevation inside steel sleeve
			6908.44	Average elevation of concrete collar.
MKTF-33	1633261.99	2545318.27	6939.75	North edge PVC casing.
			N/A	Center Steel Lid
			N/A	North side ground elevation inside steel sleeve
			6936.59	Elevation of surrounding ground.

Monitoring well has no concrete collar and steel casing.

Marc DePauli PS13606

5-12-2014
Date



BW1–A
N: 1635366.48 CENTER OF METAL LID
E: 2542393.39
Z: 6885.50 TOP CENTER OF METAL LID
Z: 6885.12 N. TOP OF PVC PIPE
Z: 6884.93 N. TOP OF INSIDE CONCRETE FILL
Z: 6883.17 N. TOP OF OUTER CONCRETE PAD

BW1–C
N: 1635365.88 CENTER OF METAL LID
E: 2542398.27
Z: 6886.06 TOP CENTER OF METAL LID
Z: 6885.68 N. TOP OF PVC PIPE
Z: 6885.64 N. TOP OF INSIDE CONCRETE FILL
Z: 6883.16 N. TOP OF OUTER CONCRETE PAD

BW1–B
N: 1635367.78 CENTER OF METAL LID
E: 2542404.33
Z: 6886.18 TOP CENTER OF METAL LID
Z: 6885.78 N. TOP OF PVC PIPE
Z: 6885.72 N. TOP OF INSIDE CONCRETE FILL
Z: 6883.17 N. TOP OF OUTER CONCRETE PAD

STP1–NW
N: 1635151.93 CENTER OF METAL LID
E: 2545378.03
Z: 6904.72 TOP CENTER OF METAL LID & CONCRETE PAD
Z: 6904.47 N. TOP OF PVC PIPE
Z: 6903.95 N. TOP OF INSIDE CONCRETE FILL
Z: 6904.50 N. GROUND BESIDE PAD

STP1–SW
N: 1635075.36 CENTER OF METAL LID
E: 2545399.70
Z: 6912.63 TOP CENTER OF METAL LID & CONCRETE PAD
Z: 6904.47 N. TOP OF PVC PIPE
Z: 6903.95 N. TOP OF INSIDE CONCRETE FILL
Z: 6904.50 N. GROUND BESIDE PAD

N

0 100 200 400
SCALE: 1"=200'

SYMBOLS LEGEND
- SECTION CORNER
- MONITORING WELL
- SOIL BORE

STP1–SE
N: 1635013.20 CENTER OF BORE SCAR
E: 2545480.20
Z: 6911.80 GROUND SURFACE

STP1–E
N: 1634954.00 CENTER OF BORE SCAR
E: 2545685.20
Z: 6912.20 GROUND SURFACE

NOTES

1 FIELD SURVEY PERFORMED SEPTEMBER 15, 2014, 1:00 p.m. to 3:00 p.m.

2 FIELD MEASUREMENTS PERFORMED UTILIZING THALES 'Z–MAX' BASE AND ROVER G.P.S. SYSTEM WHICH CAN NOT BE CALIBRATED. INSIDE AND OUTSIDE APPURTENANT MEASUREMENTS PERFORMED WITH STEEL TAPE.

3 THE BORE SITES WERE IDENTIFIED BY REFINERY PERSONNEL AND WERE VISIBLE AS EVIDENCE OF A BORE HOLE.

4 STATE PLANE COORDINATES BASED ON THE BRASS CAP I–040–105 USING DIFFERENTIAL G.P.S. DERIVED MEASUREMENTS.

5 THE COORDINATE LIST SHOWN ARE N.M. STATE PLANE WEST ZONE GRID COORDINATES, ELEVATIONS ARE NGVD29 (ADD 3.37 TO REACH NAVD88).

6 REFERENCE THE 1881 G.L.O. TOWNSHIP PLAT OF T15N, R15W, N.M.P.M.

CLYDE J. KING NEW MEXICO 13979 REGISTERED PROFESSIONAL SURVEYOR

SURVEYOR'S CERTIFICATE

I, Clyde J. King, a New Mexico Professional Surveyor do hereby certify that this plat was prepared from a field survey performed by me or under my direct supervision, that I am responsible for this survey, that this survey is true and correct to the best of my knowledge and belief, that this plat and the field survey upon which it is based meet the Minimum Standards for Surveying in New Mexico and that this survey is not a land division or subdivision as defined by the New Mexico Subdivision Act.

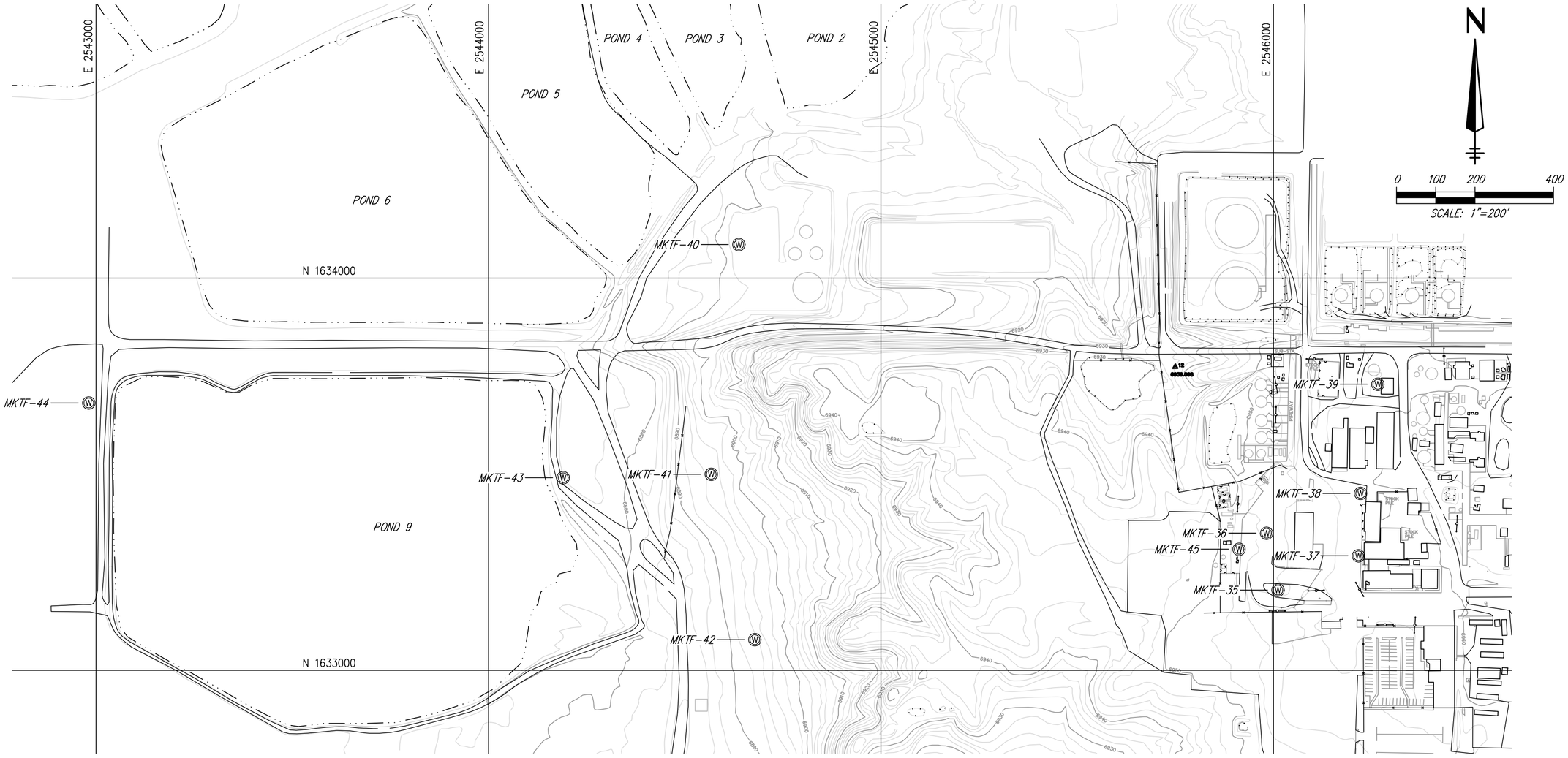
Clyde J. King, PS13979

9-27-14
Date

MONITORING WELL and BORE SITE SURVEY in Section 33, T15N, R15W, N.M.P.M., Western Refining, Jamestown, McKinley County, New Mexico, U.S.A.

H.E.I. HAMMON ENTERPRISES, INC.
PROFESSIONAL LAND SURVEYING SERVICES
P. O. Box 770 ▪ Ramah, NM 87321 ▪ Tel: (505) 870-6901 ▪ HEISurveys@Yahoo.com

140915 MW DATA.DWG RAWN BY: AH CHECKED BY: CK DATE: 9-27-14



MKTF-35
N: 1633204.45 CENTER OF METAL LID
E: 2546011.60
Z: 6951.90 TOP CENTER OF METAL LID
Z: 6951.65 N. TOP OF PVC PIPE
Z: 6951.25 N. TOP OF INSIDE GROUND LINE
Z: 6951.90 N. TOP OF OUTSIDE CONCRETE PAD

MKTF-36
N: 1633349.47 CENTER OF METAL LID
E: 2545982.58
Z: 6950.67 TOP CENTER OF METAL LID
Z: 6950.12 N. TOP OF PVC PIPE
Z: 6949.87 N. TOP OF INSIDE GROUND LINE
Z: 6950.67 N. TOP OF OUTSIDE CONCRETE PAD

MKTF-37
N: 1633291.89 CENTER OF METAL LID
E: 2546216.67
Z: 6959.07 TOP CENTER OF METAL LID
Z: 6958.87 N. TOP OF PVC PIPE
Z: 6958.62 N. TOP OF INSIDE GROUND LINE
Z: 6959.07 N. TOP OF OUTSIDE CONCRETE PAD

MKTF-38
N: 1633451.01 CENTER OF METAL LID
E: 2546222.09
Z: 6955.17 TOP CENTER OF METAL LID
Z: 6954.89 N. TOP OF PVC PIPE
Z: 6954.54 N. TOP OF INSIDE GROUND LINE
Z: 6955.17 N. TOP OF OUTSIDE CONCRETE PAD

MKTF-39
N: 1633729.23 CENTER OF METAL LID
E: 2546265.99
Z: 6953.97 TOP CENTER OF METAL LID
Z: 6953.75 N. TOP OF PVC PIPE
Z: 6953.12 N. TOP OF INSIDE GROUND LINE
Z: 6953.97 N. TOP OF OUTSIDE CONCRETE PAD

MKTF-40
N: 1634085.50 CENTER OF METAL LID
E: 2544637.81
Z: 6894.73 TOP CENTER OF METAL LID
Z: 6894.33 N. TOP OF PVC PIPE
Z: 6890.48 N. TOP OF INSIDE GROUND LINE
Z: 6891.35 N. TOP OF OUTSIDE CONCRETE PAD

MKTF-41
N: 1633499.80 CENTER OF METAL LID
E: 2544567.57
Z: 6894.13 TOP CENTER OF METAL LID
Z: 6893.64 N. TOP OF PVC PIPE
Z: 6889.80 N. TOP OF INSIDE GROUND LINE
Z: 6891.11 N. TOP OF OUTSIDE CONCRETE PAD

MKTF-42
N: 1633078.09 CENTER OF METAL LID
E: 2544678.55
Z: 6893.27 TOP CENTER OF METAL LID
Z: 6892.95 N. TOP OF PVC PIPE
Z: 6888.75 N. TOP OF INSIDE GROUND LINE
Z: 6890.42 N. TOP OF OUTSIDE CONCRETE PAD

MKTF-43
N: 1633490.97 CENTER OF METAL LID
E: 2544190.23
Z: 6877.40 TOP CENTER OF METAL LID
Z: 6876.90 N. TOP OF PVC PIPE
Z: 6873.22 N. TOP OF INSIDE GROUND LINE
Z: 6874.12 N. TOP OF OUTSIDE CONCRETE PAD

MKTF-44
N: 1633681.48 CENTER OF METAL LID
E: 2542981.45
Z: 6870.32 TOP CENTER OF METAL LID
Z: 6869.95 N. TOP OF PVC PIPE
Z: 6866.06 N. TOP OF INSIDE GROUND LINE
Z: 6867.41 N. TOP OF OUTSIDE CONCRETE PAD

MKTF-45
N: 1633308.57 CENTER OF METAL LID
E: 2545912.37
Z: 6951.33 TOP CENTER OF METAL LID
Z: 6949.59 N. TOP OF PVC PIPE
Z: 6948.27 N. TOP OF INSIDE GROUND LINE
Z: 6948.63 N. TOP OF OUTSIDE CONCRETE PAD

SYMBOLS LEGEND
Ⓦ MONITORING WELL

NOTES
1 FIELD SURVEY PERFORMED DECEMBER 16, 2014, 10:30 a.m. to 4:30 p.m. & JANUARY 12, 2015, 10:30 – a.m. to 11:00 a.m.

2 FIELD MEASUREMENTS PERFORMED UTILIZING THALES 'Z-MAX' BASE AND ROVER G.P.S. SYSTEM WHICH CAN NOT BE CALIBRATED. INSIDE AND OUTSIDE APPURTENANT MEASUREMENTS PERFORMED WITH STEEL TAPE.

3 STATE PLANE COORDINATES BASED ON THE BRASS CAP 1-040-105 USING DIFFERENTIAL G.P.S. DERIVED MEASUREMENTS.

4 THE COORDINATES SHOWN ARE N.M. STATE PLANE WEST ZONE GRID COORDINATES, ELEVATIONS ARE NGVD29 (ADD 3.37 TO REACH NAVD88 DATUM AND AN ADDITIONAL 1.14 TO REACH EXISTING WESTERN REFINING TOPOGRAPHC SURVEY DATUM WHICH IS SHOWN HEREON).

CLYDE J. KING NEW MEXICO 13979 REGISTERED PROFESSIONAL SURVEYOR

SURVEYOR'S CERTIFICATE
I, Clyde J. King, a New Mexico Professional Surveyor do hereby certify that this plat was prepared from a field survey performed by me or under my direct supervision, that I am responsible for this survey, that this survey is true and correct to the best of my knowledge and belief, that this plat and the field survey upon which it is based meet the Minimum Standards for Surveying in New Mexico and that this survey is not a land division or subdivision as defined by the New Mexico Subdivision Act.

Clyde J. King, PS13979 — 1-16-15 Date

MONITORING WELL SURVEY
in Section 33, T15N, R15W, N.M.P.M., Western Refining, Jamestown, McKinley County, New Mexico, U.S.A.

H.E.I. HAMMON ENTERPRISES, INC. PROFESSIONAL LAND SURVEYING SERVICES
P. O. Box 770 ■ Ramah, NM 87321 ■ Tel: (505) 870-6901 ■ HEISurveys Yahoo.com

141216 MW DATA.DWG DRAWN BY: AH CHECKED BY: CK DATE:1-16-15 REV. DATE: xxx

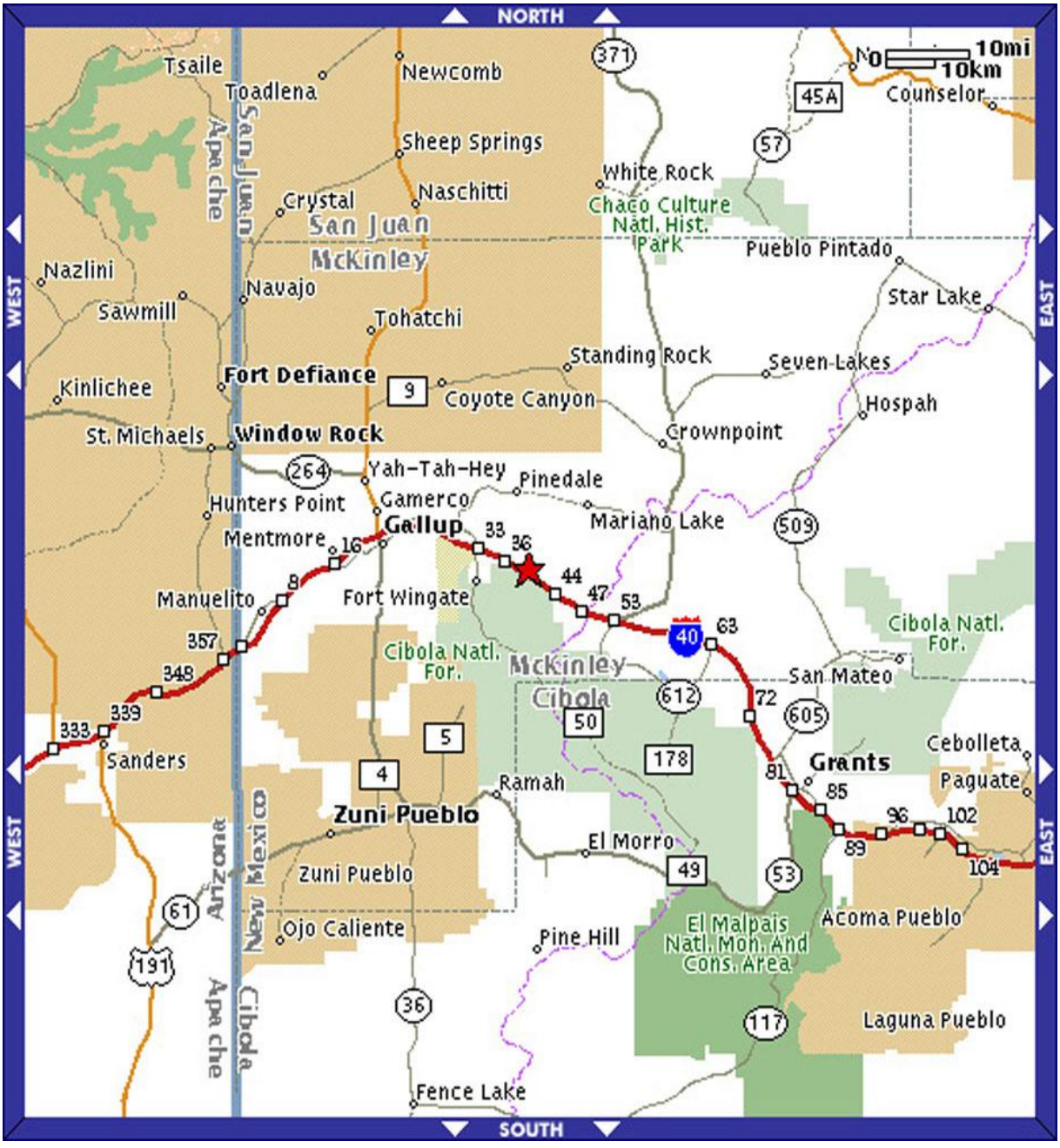


Figure 1: Regional map showing the location of the Gallup Refinery (red star along Interstate-40, 20 miles east of the City of Gallup).

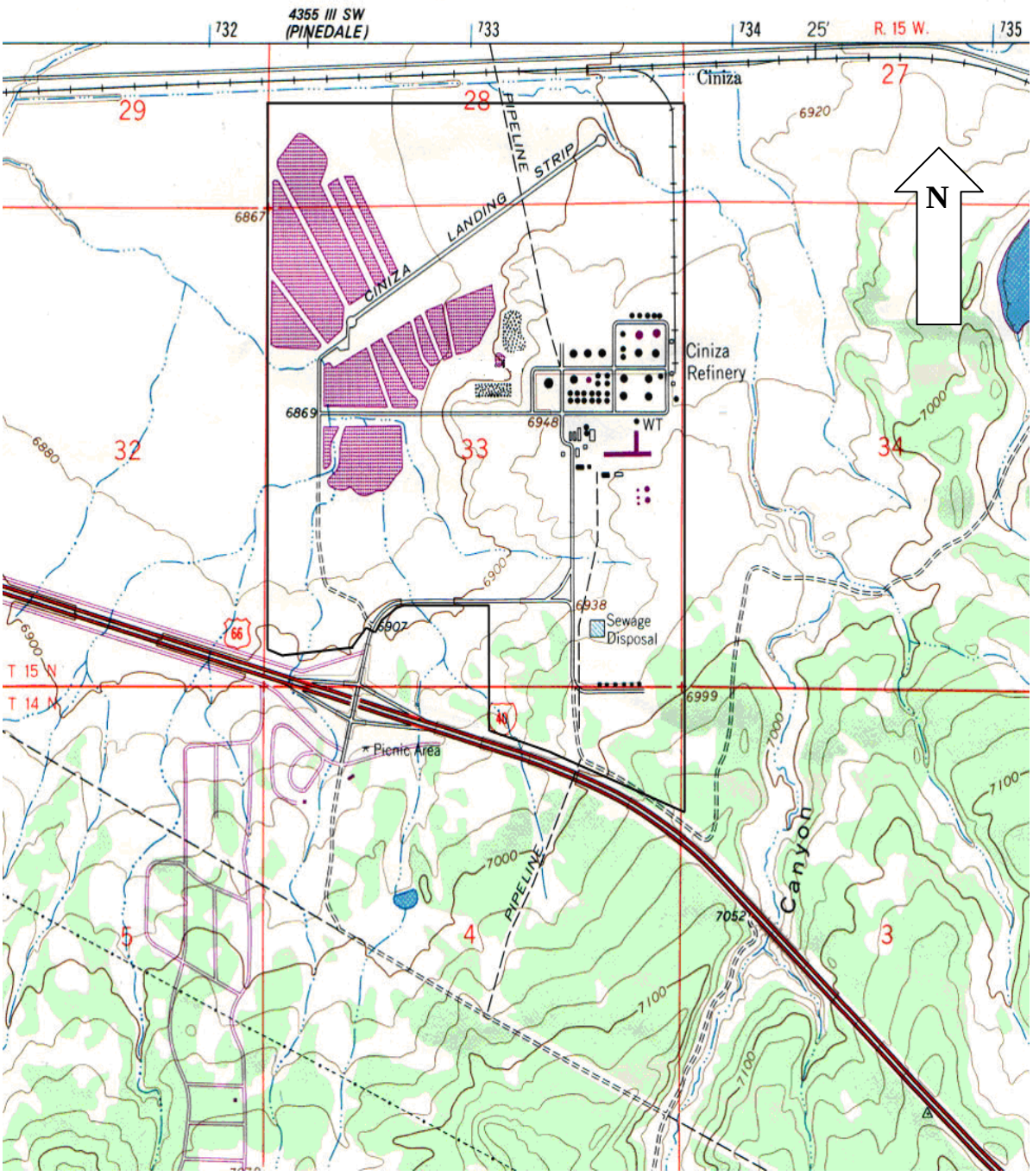


Figure 2: Topographic Map of the Gallup Refinery Site - USGS Topographical Map - Gallup Quadrangle (Revised 1980)

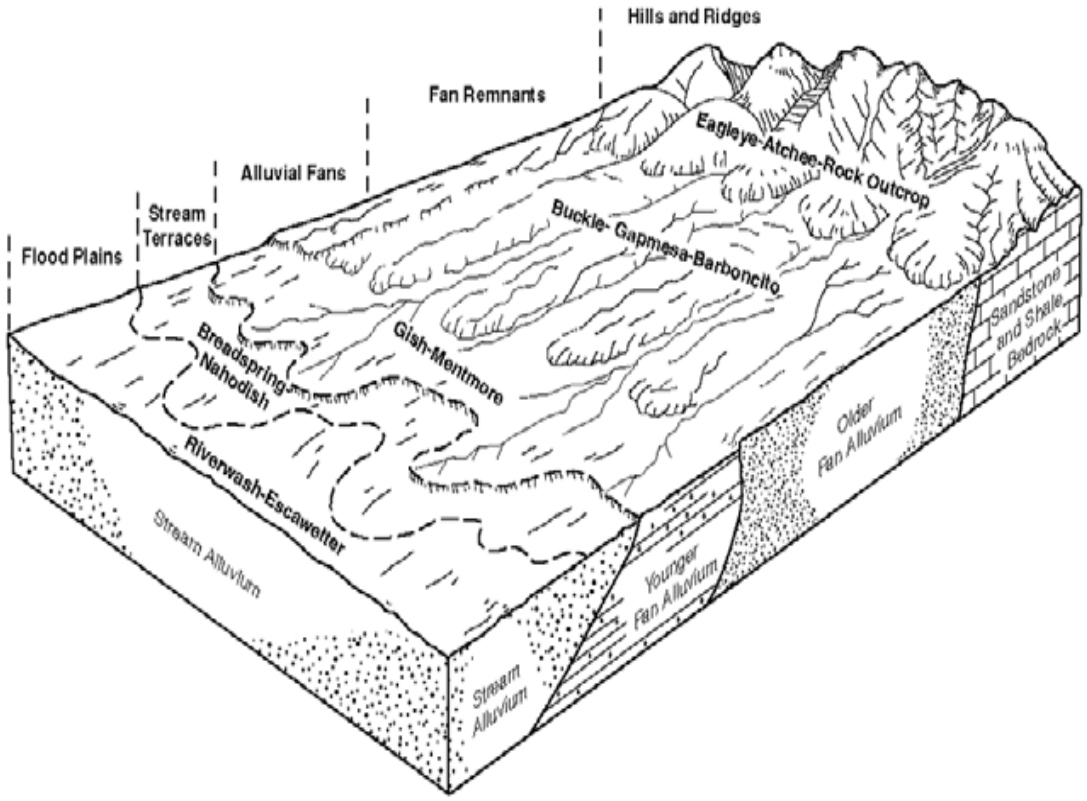
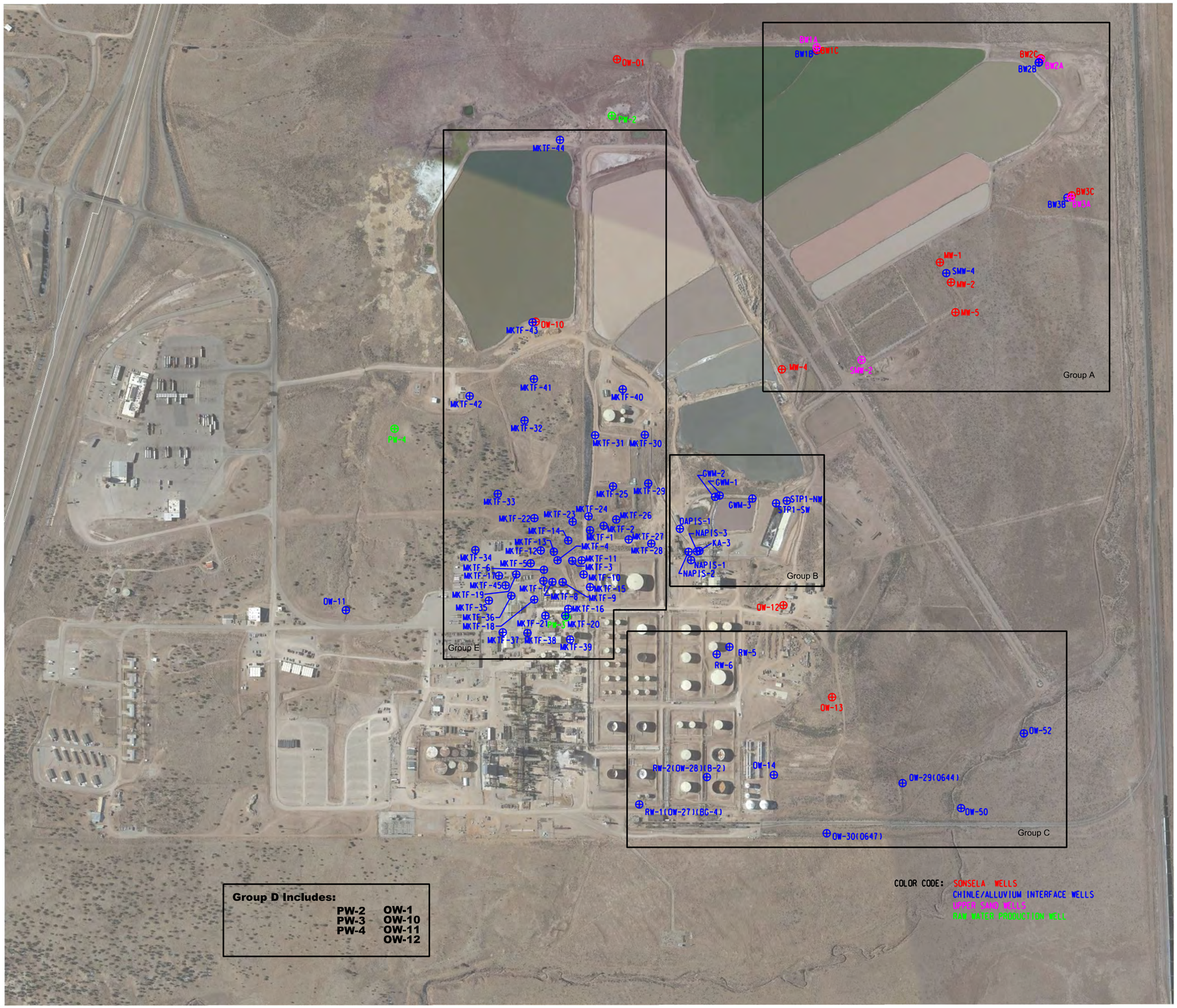


Figure 3: Generalized relationship of soils in the Gallup Refinery area: from NRCS/USDA Soil Survey of McKinley County.



psi
4601 Ripley
El Paso, Texas
79922
915-584-1317

1"=500'

Project #: 0625859

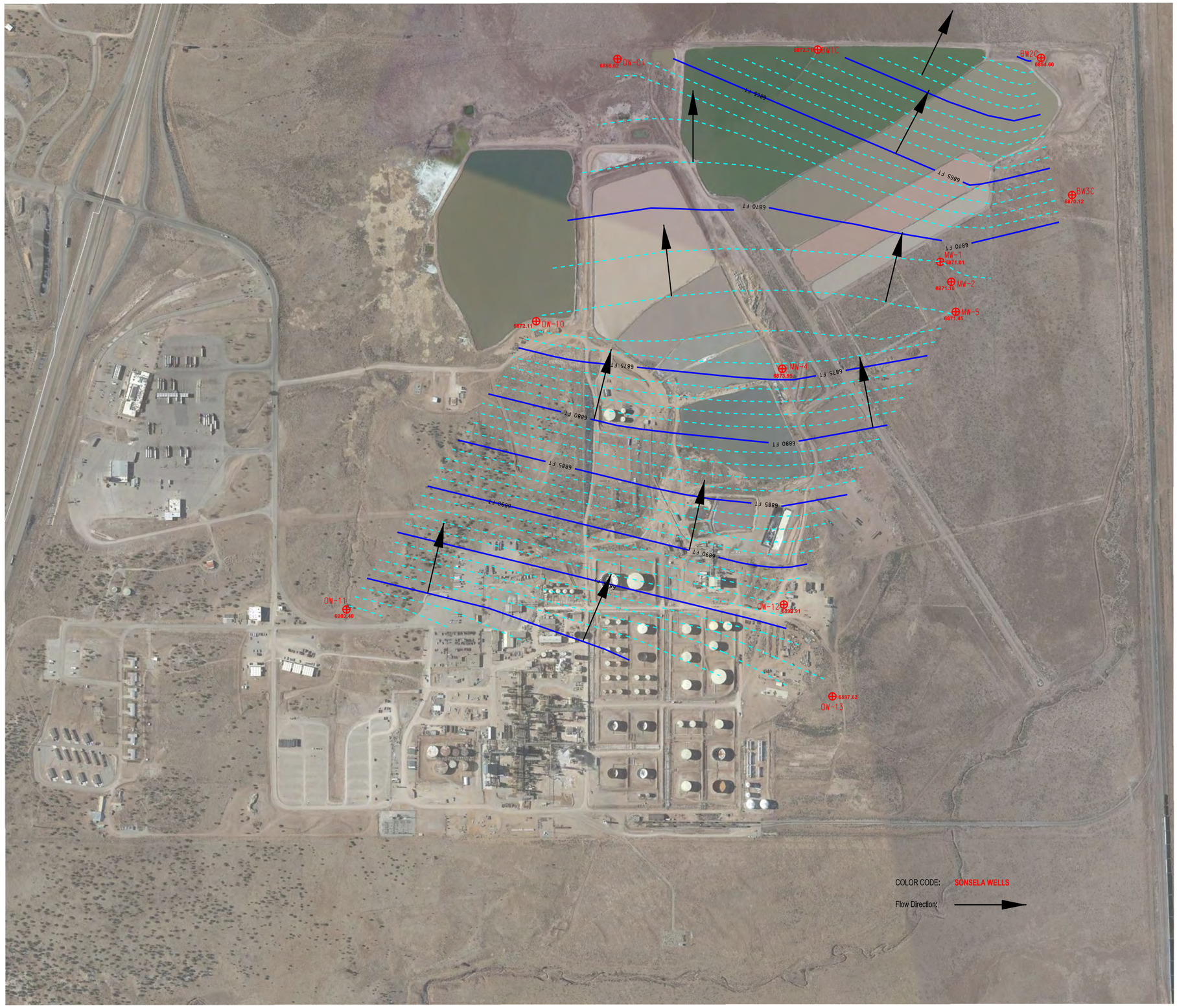
Figure 4

FACILITIES AND WELL GROUPS

WESTERN REFINING - GALLUP REFINERY

Western Refining - Gallup Refinery
92 Giant Crossing Road
Gallup, New Mexico 87347

Date: February 26, 2015



4601 Ripley
El Paso, Texas
79922
915-584-1317

1"=500'

Project #: 0625859

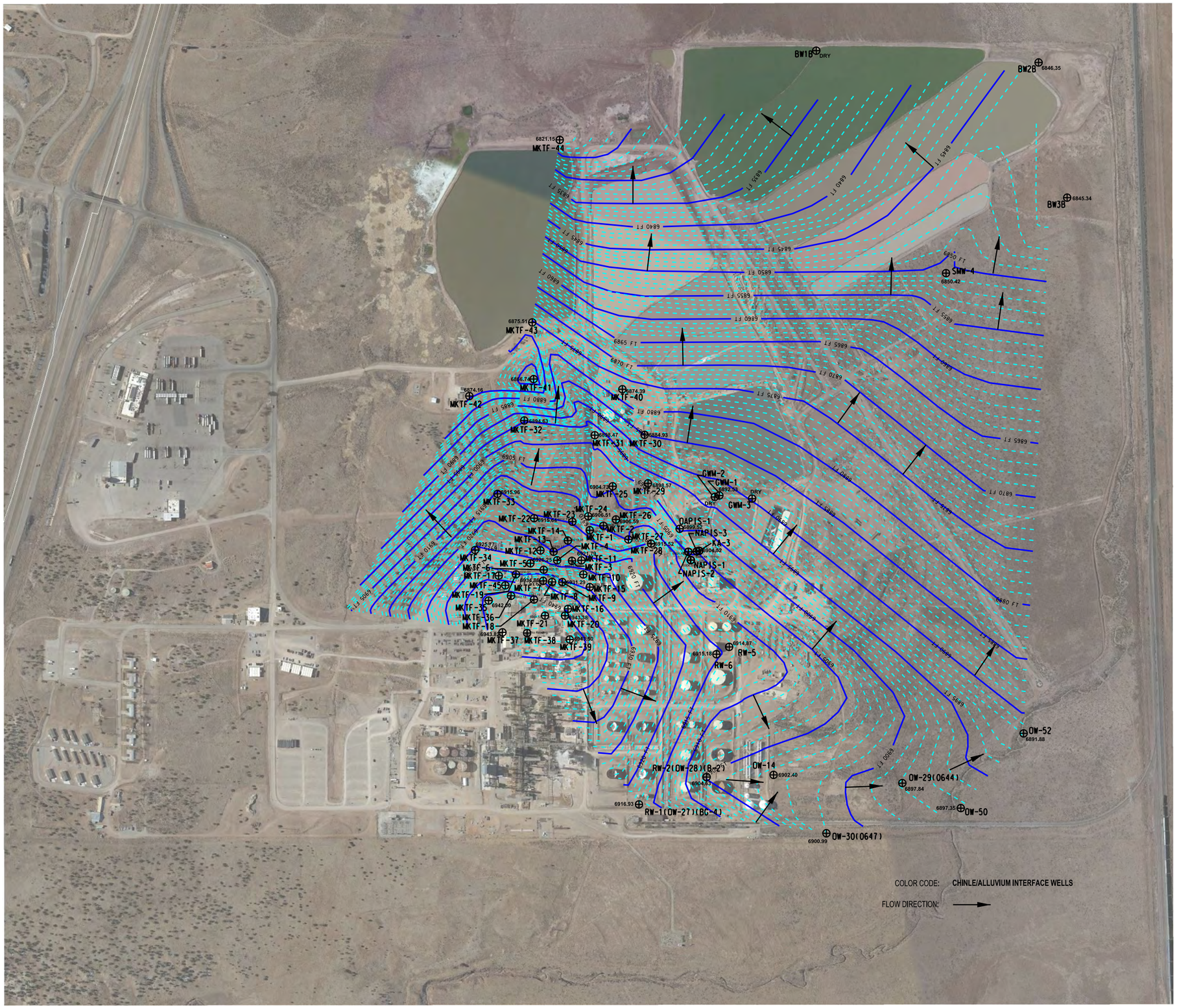
Figure 5

Sonsela Water Elevation Map 2014

WESTERN REFINING - GALLUP REFINERY

Western Refining - Gallup Refinery
92 Giant Crossing Road
Gallup, New Mexico 87347

Date: February 26, 2015



psi
4601 Ripley
El Paso, Texas
79922
915-584-1317

1"=500'

Project #: 0625859

Figure 6

Alluvium/Chinle Gp Interface Water Elevation Map

WESTERN REFINING - GALLUP REFINERY

Western Refining - Gallup Refinery
92 Giant Crossing Road
Gallup, New Mexico 87347

Date: February 26, 2015

Chavez, Carl J, EMNRD

From: Martinez, Cynthia, NMENV
Sent: Monday, March 28, 2016 3:17 PM
To: Ed.Riege@wnr.com
Cc: Kieling, John, NMENV; Cobrain, Dave, NMENV; Dhawan, Neelam, NMENV; VanHorn, Kristen, NMENV; Chavez, Carl J, EMNRD; king.laurie@epa.gov
Subject: Letter to Mr. Riege
Attachments: Approval-Extension Rqst. Facility-Wide Groundwater Monitoring Wkpln-2015 Updates-Western Refining-Gallup Refinery.pdf

Good Afternoon All,
The attached letter was mailed today.

Cynthia Martinez
New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Bldg.1
Santa Fe, New Mexico 87505
Phone 505-476-6000

NEW MEXICO
ENVIRONMENT DEPARTMENT

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Phone (505) 476-6000 Fax (505) 476-6030
www.env.nm.gov

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Governor
JOHN A. SANCHEZ
Lieutenant Governor

RYAN FLYNN
Cabinet Secretary
BUTCH TONGATE
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

March 28, 2016

Mr. Ed Riege
Manager of Remediation and Environmental Special Projects
Western Refining, Southwest Inc., Gallup Refinery
92 Giant Crossing Road
Gallup, New Mexico 87301

RE: APPROVAL
EXTENSION REQUEST
FACILITY-WIDE GROUND WATER MONITORING
WORK PLAN – 2015 UPDATES
WESTERN REFINING SOUTHWEST INC., GALLUP REFINERY
EPA ID # NMD000333211
HWB-WRG-MISC

Dear Mr. Riege:

The New Mexico Environment Department (NMED) received the extension request for submittal of the *Facility Wide Groundwater Monitoring Work Plan – 2015 Updates*, dated March 23, 2016 and submitted on behalf of Western Refining Southwest, Inc., Gallup Refinery (Permittee). The letter requests a 60 day extension from the April 1, 2016 submittal date required by Permit Section IV.C.2 due to staffing issues.

In accordance with Permit Section I.J.12 the Permittee demonstrates good cause for this extension request and NMED hereby approves the request.

The Permittee must submit the Facility Wide Groundwater Monitoring Plan no later than **May 30, 2016.**

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

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: D. Cobrain NMED HWB
N. Dhawan NMED HWB
K. Van Horn NMED HWB
C. Chavez OCD
L. King EPA Region 6

File: Reading File and WRG 2016 File
HWB-WRG-MISC

Western Refining
GALLUP

WNR LISTED NYSE

March 23, 2016

Kristen Van Horn
New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Bldg 1
Santa Fe, New Mexico 87505-6303

RE: FACILITY WIDE GROUNDWATER MONITORING WORK PLAN – 2015 UPDATES
WESTERN REFINING SOUTHWEST, INC. GALLUP REFINERY
EPA ID # NMD000333211

Dear Kristen Van Horn:

This letter is a follow-up to our telephone conversation on March 22. Gallup would like to request a sixty day extension to complete and submit the Facility Wide Groundwater Monitoring Work Plan – 2015 Updates. Cheryl Johnson of our department has been the author of the report over the last few years. Cheryl has been off on medical leave for the past five weeks and is not expected to return for another three weeks. Cheryl has started the report but we have not determined the percent completion to date.

A sixty day extension of the April 1 deadline to complete and submit the report would be May 30, 2016.

Thank you for your consideration and please contact me at (505) 722-0217 if you have any questions.

Sincerely,

Ed Riege
Manager of Remediation and Environmental Special Projects
Western Refining Southwest, Inc. – Gallup Refinery

NEW MEXICO
ENVIRONMENT DEPARTMENT

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Phone (505) 476-6000 Fax (505) 476-6030
www.env.nm.gov

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Lieutenant Governor

RYAN FLYNN
Cabinet Secretary
BUTCH TONGATE
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

March 11, 2016

Mr. Ed Riege
Environmental Manager
Western Refining, Southwest Inc., Gallup Refinery
92 Giant Crossing Road
Gallup, New Mexico 87301

RE: REJECTION
REVISED FACILITY-WIDE GROUND WATER MONITORING WORK PLAN – 2012 UPDATES; 2013 UPDATES; 2014 UPDATES FOR 2015
WESTERN REFINING SOUTHWEST INC., GALLUP REFINERY
EPA ID # NMD000333211
HWB-WRG-13-002
HWB-WRG-14-002
HWB-WRG-15-001

Dear Mr. Riege:

The New Mexico Environment Department (NMED) has reviewed the revised *Facility-Wide Ground Water Monitoring Work Plan -- 2012 Updates – 2013 Updates – 2014 Updates for 2015* (Work Plan) dated September 21, 2015 submitted on behalf of Western Refining Southwest Inc., Gallup Refinery (Permittee) and hereby issues this Rejection of the Work Plan in accordance with Permit Section I.J.11.

NMED's July 24, 2015 *Approval with Modifications* required the Permittee to make all required changes to the most recent version (2014) of the Work Plan, revise the 2014 Work Plan and resubmit it for NMED's review rather than submitting revisions to all three work plans. The Permittee submitted a comment response letter, a red-line strikeout, and replacement pages rather than a full, revised Work Plan. The disc included with the submittal provided only the red-line strikeout of the Work Plan and tables and did not provide the full, revised Work Plan.

Additionally, rather than submit Table 1 as a clean revised table, the Permittee made changes to the table in red font. NMED had required that the Permittee provide a redline version of Table 1 to show the revisions and also provide a clean revised Table 1 with the revised Work Plan.

NMED and OCD required that the Permittee provide a table which shows the current approved monitoring schedule and analytical suites, the Permittee's requested changes to the schedule and analytical suites, and the rationale for the requested changes. The Permittee provided a Table 2 (Requested/Approved Changes to the Groundwater Monitoring Schedule). Table 2 includes columns for "2014 Requested Changes" and "Approved Changes to Date Per NMED 7/24/2015" but does not include the rationale for requesting these changes. In addition, the "Approved Changes to Date…" column does not include approved changes, but includes requests for changes. Modifications to Table 1 shall reflect NMED and OCD's approval of any requested changes. Modify Table 2 to provide the following information: the most current, approved sampling program; the Permittee's requested changes and the rationale for the requested changes.

Additionally, the Permittee's response to NMED's Comment 10e did not clarify where the requirement for additional sampling originated. NMED was not able to find any comments regarding the statement in Table 1 "[a]ll wells including the recovery wells containing separate phase hydrocarbons" for annual sampling requirements. The Permittee must clarify where this statement originated.

The Permittee must revise and re-submit a full, complete version of the 2014 Work Plan. The submittal must include two bound paper copies and also an electronic copy. The revised Work Plan must be submitted on or before **April 18, 2016**.

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

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: D. Cobrain NMED HWB
N. Dhawan NMED HWB
K. Van Horn NMED HWB
C. Chavez OCD
A. Hains WRG
C. Johnson WRG
L. King EPA Region 6

File: Reading File and WRG 2016 File
HWB-WRG-13-002
HWB-WRG-14-002
HWB-WRG-15-001

NEW MEXICO
ENVIRONMENT DEPARTMENT

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Phone (505) 476-6000 Fax (505) 476-6030
www.nmenv.state.nm.us

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Lieutenant Governor

RYAN FLYNN
Cabinet Secretary
BUTCH TONGATE
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

May 11, 2015

Mr. Ed Riege
Environmental Manager
Western Refining, Southwest Inc., Gallup Refinery
92 Giant Crossing Road
Gallup, New Mexico 87301

RE: REQUIREMENT TO SUBMIT WORK PLANS
REGARDING GROUNDWATER MONITORING
OW SERIES WELLS AND CONTAMINANT PLUME MIGRATION
WESTERN REFINING SOUTHWEST INC., GALLUP REFINERY
EPA ID # NMD000333211
HWB-WRG-MISC

Dear Mr. Riege:

The New Mexico Environment Department (NMED) received Western Refining Southwest, Inc., Gallup Refinery's (Permittee) First Quarter 2015 groundwater monitoring results via email on April 16, 2015. NMED is also in the process of reviewing the Facility-Wide Groundwater Monitoring Work Plans and the Facility-Wide Groundwater Monitoring Reports submitted by the Permittee. During review of these documents, it became apparent that there are contaminant plumes affecting groundwater in the northeast part of the refinery property. The OW-series wells on the northeast side of the property have exhibited increasing concentrations of methyl tert-butyl ether (MTBE), benzene and other petroleum-related compounds over the last several years. Additionally, based on the data, there appear to be two separate contaminant plumes in the area. The Permittee must submit two work plans to: 1) further investigate the known MTBE plume at the Facility and, 2) investigate a suspected plume north of the Tank Farm (SWMU 6).

Background

The OW-series monitoring wells (OW-13, OW-14, OW-29, OW-30, OW-50, and OW-52) were installed to monitor separate phase hydrocarbons (SPH) and MTBE contaminant plumes from historical contamination from a leaking MTBE tank. The tank was removed from service and MTBE has not been used at the refinery since April 2006. A series of recovery wells (RW-1, RW-2, RW-5, and RW-6) were installed to remove SPH from groundwater. Over time, less product has been recovered from the RW-wells. In the 2013 Annual Groundwater Monitoring Report (not yet approved by NMED), Section 7.3, the Permittee states,

> "[p]roduct recovery continues in RW-1 as there is measurable hydrocarbon column thickness level. Field notes indicate that product recovery from RW-1 has decreased in quantity over the years with two gallon[s] of product recovered in 2013. RW-5 and RW-6 product recovery has also been steadily declining. From 2010 through 2013, no product has been recovered from RW-5 and no product was recovered from RW-6 in 2013. 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 visible sheen)."

In the same section, the Permittee states, "[i]t is possible that the MTBE plume may be migrating in a north-northwest direction from OW-29 following the natural formation of the Chinle-Alluvium interface. Analytical data indicates that MTBE concentrations have been slowly increasing from year to year in OW-29 as well as OW-30." Based on this information it appears that the plume continues to migrate. The groundwater monitoring wells OW-50 and OW-52, which were installed to monitor contaminant migration to the north have had no detections of MTBE as yet; however, these wells must continue to be monitored. Groundwater monitoring wells OW-29 and OW-30 are within the contaminant plume and OW-30 is located at the eastern edge of the refinery property. The Permittee must propose to install additional groundwater monitoring wells to completely define the extent of the contaminant plume.

There is a possibility that SPHs are present in other OW-series wells; however, most of the monitoring wells are screened below the water table, which prohibits this determination because, the wells are not screened across the water table to detect the presence of the SPH. Historically, the OW-13, OW-14, OW-29, and OW-30 wells have only been analyzed for VOCs and WQCC metals. The Permittee analyzed samples from groundwater monitoring wells OW-13, OW-14, OW-29, and OW-30 for diesel-range organics, gasoline-range organics and motor-oil range organics (DRO, GRO, and MRO) in September 2013. In the 2013 Annual Groundwater Monitoring Report, the Permittee notes in Table 8.8.1 that "[q]uarterly combined with 2013 Annual sampling event which required addition of these analyses." The concentrations of DRO and GRO for groundwater monitoring wells OW-14, OW-29, and OW-30 are OW-14: 7.7 mg/L DRO, 7.6 mg/L GRO; OW-29: 0.88 mg/L GRO; and OW-30: 1.4 mg/L GRO. The Permittee must analyze for GRO/DRO at all of the OW-series wells during the next sampling event (this summer) and update the Facility-Wide Groundwater Monitoring Work Plan to reflect the additional analyses.

Comments

The Permittee must submit a Work Plan to propose installation of additional groundwater monitoring wells to determine the extent of the contaminant plume and determine if the plume is migrating off-site. The new groundwater monitoring wells must be located down-gradient and to the north-northwest of groundwater monitoring wells OW-29 and OW-30. The Permittee must propose to install the wells in accordance with Permit Section IV.K (Monitoring Well Construction Requirements). The Permittee must include a figure that depicts the proposed locations of the groundwater monitoring wells. The groundwater monitoring wells must be screened across the water table.

In addition, there may be a second plume north of the Tank Farm. This is indicated by an increase in benzene in well OW-14, which is located just north of the Tank Farm. Analytical results for benzene in OW-14 have increased from 0.25 mg/L in March 2010 to 3.9 mg/L in March 2015, respectively. Benzene typically moves through soil and groundwater at a faster rate and is found on the leading edge of plumes. Ethylbenzene has also been increasing in OW-14; increasing from 0.018 mg/L in February 2011 to 0.13 mg/L in November 2013. Additionally, as stated in above, DRO and GRO were present in analytical results from sampling conducted in September 2013. The Permittee must submit a separate work plan proposing to investigate the source of the contamination detected in groundwater monitoring well OW-14.

A work plan proposing to install additional monitoring wells to define the extent of MTBE and other hydrocarbons down-gradient and to the north-northwest of existing groundwater monitoring wells OW-29 and OW-30 must be submitted no later than **August 17, 2015**. The Permittee must also submit a work plan to investigate the source of contaminants present in groundwater monitoring well OW-14. This work plan must be submitted no later than **September 8, 2015**.

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

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: D. Cobrain NMED HWB
N. Dhawan NMED HWB
K. Van Horn NMED HWB
C. Chavez OCD
C. Johnson WRG
L. King EPA R6

File: Reading File and WRG 2015 File
WRG-MISC

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Governor
JOHN A. SANCHEZ
Lieutenant Governor

RYAN FLYNN
Cabinet Secretary
BUTCH TONGATE
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

July 24, 2015

Mr. Ed Riege
Environmental Manager
Western Refining, Southwest Inc., Gallup Refinery
92 Giant Crossing Road
Gallup, New Mexico 87301

RE: APPROVAL WITH MODFICATIONS
FACILITY-WIDE GROUND WATER MONITORING
WORK PLAN – 2012 UPDATES; 2013 UPDATES; 2014 UPDATES FOR 2015
WESTERN REFINING SOUTHWEST INC., GALLUP REFINERY
EPA ID # NMD000333211
HWB-WRG-13-002
HWB-WRG-14-002
HWB-WRG-15-001

Dear Mr. Riege:

The New Mexico Environment Department (NMED) has reviewed the revised *Facility-Wide Ground Water Monitoring Work Plan -- 2012 Updates* (Work Plan), dated February 2013; the *Facility-Wide Ground Water Monitoring Work Plan – 2013 Updates*, dated March 31, 2014; and the *Facility-Wide Ground Water Monitoring Work Plan – 2014 Updates for 2015*, dated February 23, 2015 submitted on behalf of Western Refining Southwest Inc., Gallup Refinery (Permittee) and hereby issues this Approval with the following modifications.

This Approval with Modifications addresses the Work Plans submitted for 2012, 2013, and 2014. Many of the comments apply to all three Work Plans; therefore, NMED is providing comments for all of the Work Plans simultaneously. The Permittee must make all required changes presented in this letter to the most recent version (2014) of the Work Plan. Revise only the 2014 Work Plan and resubmit it for NMED's review and approval.

A general note on the Permittee's requested changes to the Plan: NMED and OCD request that the Permittee provide a table which shows the current approved monitoring schedule and analytical suites, the Permittee's requested changes to the schedule and analytical suites, and rationale for the requested changes. The requested table will facilitate the review process. This table would be in lieu of making changes to Table 1 for requests that have not yet been approved by the agencies.

Comment 1
The Permittee included a hard copy of the red-line strikeout version of the Work Plan, which highlighted some, but not all changes to the Work Plan. Include a red-line strikeout version of Table 1 if changes are made to Table 1 each year. Additionally, in the future, there is no need to provide a paper copy of the red-line strikeout if an electronic copy is provided.

2012 Work Plan Comments
Comment 2
On page 13 the Permittee states, "Method 8021B analysis is required for groundwater detected in GWM-2 and GWM-3 and Western would like to change method 8021B analysis to Method 8260B + MTBE for a more detailed list of volatile organic carbons." This proposed change was incorporated into Table 1 as well. The Permittee also requests this change in Section 5.3.1 (Request for Modifications to the Sampling Plan). NMED hereby approves this proposed change and it must be incorporated into all future Work Plans. Please revise Table 1 as necessary.

Comment 3
In Section 4.1.1 (Well Gauging) the Permittee states, "[a]ll measurements will be made relative to the same datum for all wells." Each well casing should have been surveyed and a measuring point marked on the top of the casing, all measurements must be made from that surveyed point on the well casing for each individual well as noted in Work Plan Appendix B; Field Data Collection; paragraph two; "wells also have a permanent marked reference point on the well casing from which ground water levels and well depths are measured." In all future Work Plans, revise the sentence in Section 4.1.1 to accurately describe the measurement points as described in Appendix B and ensure that information in the main text and appendices correspond.

Comment 4
In Section 5.3.1 (Request for Modifications to the Sampling Plan), the Permittee noted that monitoring well OAPIS-1 was included in the monitoring schedule and sampled on a quarterly basis for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), WQCC metals (totals and dissolved), gasoline-range organics (GRO), diesel-range organics (DRO) extended, and major cations and anions. The addition of OAPIS-1 is approved as well as the list of proposed laboratory analyses.

Comment 5

In Section 5.3.1 (Request for Modifications to the Sampling Plan) the Permittee notes that, "[t]here is no more flow at these sample points in the outfalls except for the Pilot Effluent which continues to flow to EP-1." As long as the Pilot Effluent flow is now routed to STP-1 and the changes made to Table 1 are reflective of the changes to the waste water treatment system; the changes are approved.

2013 Work Plan Comments

Comment 6

On page 13, the Permittee notes the hydrocarbon seep discovered in June 2013 and the 18 permanent monitoring wells that were installed to monitor the seep. In Section 5.3.1 (Request for Modifications to Sampling Plan) the Permittee stated that 18 permanent monitoring wells (MKTF-1 through -18) have been added. The Permittee proposes quarterly sampling for VOCs, SVOCs, WQCC metals (total and dissolved), GRO, DRO extended, and major cations and anions. The Permittee notes that samples would not be collected, if measureable separate phase hydrocarbon (SPH) was detected. The addition of the MKTF monitoring wells to the Work Plan is approved as well as the proposed analytical suites. All SPH in the groundwater wells must be measured and the thickness reported in the Facility-Wide Groundwater Monitoring Reports.

Comment 7

The Permittee requests several other changes to the Work Plan in Section 5.3.1 (Request for Modifications to Sampling Plan):

a) The Permittee request to change the analyses for OW-1 and OW-10 to VOCs, major cations and anions, arsenic and uranium. The current requirements for OW-1 are: quarterly monitoring, collection of groundwater elevation data, water quality parameters, and a visual check for artesian conditions and sample for major cations, anions, VOCs, GRO, DRO extended, and WQCC metals. The current requirements for OW-10 are: quarterly monitoring, groundwater elevation data, water quality parameters, and water level measurement of the Sonsela aquifer, analysis for major cations, anions, VOCs, GRO, DRO extended, and WQCC metals. For monitoring well OW-1, the Permittee must continue sampling for chromium, iron, manganese, arsenic and uranium as well as VOCs, GRO, DRO extended, and WQCC metals, and major cations and anions. For monitoring well OW-10, the Permittee must continue sampling for methyl tert-butyl ether (MTBE), GRO, DRO-extended, uranium and arsenic as well as VOCs, and major cations and anions. The OW-series of groundwater monitoring wells are used for detection and compliance monitoring and it is necessary to continue to monitor for these constituents and any changes in groundwater conditions over time. The Permittee must also continue to collect groundwater level measurements, and water quality parameters for both monitoring wells. Revise Table 1 as required.

b) The Permittee requests to reduce the analyses for groundwater samples collected from groundwater monitoring wells BW-1A, BW-1B, BW-1C, BW-2A, BW-2B, BW-2C, BW-3A, BW-3B, BW-3C to RCRA metals (total and dissolved), and discontinue SVOCs, because the only analyte recently detected is bis-2-ethylhexlyphthalate a possible laboratory contaminant. Currently BW-wells are analyzed for major cations, anions, VOCs, SVOCs, WQCC metals, groundwater levels, and water quality parameters. The purpose of the BW-series wells is for boundary detection monitoring and to monitor any potential contamination that may migrate off-site. The Permittee must therefore continue to sample and analyze for major cations and anions, VOCs, WQCC metals, groundwater level, and water quality parameters. The Permittee may discontinue sampling for SVOCs, but must add analysis for GRO and DRO-extended. Please revise Table 1 as necessary.

c) The Permittee requests that well OW-11 analyses be reduced to major cations and anions and WQCC metals (total and dissolved), stating that there have been no detections of VOCs or SVOCs except one hit of bis-2-ethylhexlyphthalate (possible lab contaminant). The Permittee must continue to sample for major cations and anions, VOCs, and WQCC metals. The OW-series of groundwater monitoring wells are used for detection and compliance monitoring and it is necessary to continue to monitor for these constituents and any changes in groundwater conditions over time. The Permittee may discontinue analysis for SVOCs. However, analyses must also include uranium as well as GRO and DRO-extended. Revise Table 1 as necessary.

d) The Permittee requests to reduce the analytical suites for wells OW-50 and OW-52 to VOCs and WQCC metals. Currently the required analyses are VOCs, SVOCs, GRO/DRO extended, WQCC metals, and general chemistry. The purpose of these wells is to monitor the MTBE plume which appears to be migrating towards OW-50 and OW-52 as well as off-site. Therefore it is not appropriate to reduce the analyses for these wells. However, the Permittee may discontinue analysis for SVOCs, but must include GRO and DRO-extended analyses.

e) The Permittee requests that groundwater monitoring well SMW-2 sample analyses be reduced to VOCs and WQCC metals. SMW-2 is part of the "sentinel well" system around the closed RCRA Land Treatment Unit. Therefore, the Permittee must continue to sample, as required, at SMW-2 for major cations, anions, VOCs, GRO/DRO-extended, WQCC metals, and cyanide.

f) The Permittee request to remove recovery wells RW-1, RW-2, RW-5, and RW-6 from an annual sampling schedule since these are hydrocarbon recovery wells. The Permittee proposed to continue to inspect on quarterly basis. The Permittee must continue to monitor separate phase hydrocarbon (SPH) and groundwater levels in these wells and

report hydrocarbon recovery in the annual Facility-Wide Groundwater Monitoring Report. If SPH are not present in the wells, then the Permittee must sample the wells for the BTEX, MTBE, DRO, and GRO.

g) The Permittee requests to return to the three-year schedule beginning in 2016 for production well PW-3. No SVOCs or VOCs have been detected in PW-3 since August 2008. However, because PW-3 is located hydrogeologically downgradient and is in proximity to the process areas, it is important to monitor it at least annually. The Permittee must continue monitoring PW-3 annually. Revise Table 1 as needed.

2014 Work Plan Comments

Comment 8

In Section 1.0 (Introduction), page 1-2, the Permittee states, "Group E includes a total of 45 new monitoring wells installed to delineate a hydrocarbon seep discovered west of Tank 101. Also included in this group is a pre-existing well located directly west of the truck loading rack. This well has been labeled as MKTF-45 as no markings or boring logs have been located to identify when this well was installed." In Appendix C, the Permittee lists the screened interval of MKTF-45. In the Interim Measures Report required by NMED (in a letter dated April 8, 2015), please include a description of the well survey and describe the methods used to determine the screened interval in well MKTF-45. Include information regarding the reasons the monitoring well was installed, if known. No revision to the Work Plan is necessary.

Comment 9

In Section 3.2 (Drainages) the Permittee discusses the evaporation ponds, springs, ponds, arroyos, and the South Fork of the Rio Puerco River. Please revise this section to include a discussion of the drainage outfalls and other drainage ditches (e.g., the "conveyance" ditch affected by the DGF Feed Tank release, August 2014) in the revised Work Plan.

Comment 10

In Section 6 (Monitoring Program Revisions) the Permittee requests to change the monitoring plan. Some of the requests are carried over from the previous year (see Comment 7 for NMED requirements and approval or disapproval of the requested changes). In addition, the Permittee requests several other changes:

a) The Permittee states, "Gallup Refinery has installed twenty-nine (29) monitoring wells to be added to the 2014 sampling plan for 2014 and are listed as follows: MKTF-19 through MKTF-45 and STP1-NW, STP1-SW. MKTF 19 through 34 were developed in early 2014 and have been sampled and or inspected for four consecutive quarters. A review of the quarterly analytical laboratory data does not indicate any significant changes over time that would warrant continued quarterly monitoring. Western request sampling frequency to be changed to an annual basis for wells MKTF-19 through MKTF-26,

MKTF 26, MKTF-28, MKTF-30, MKTF-37, MKTF-38, MKTF-39, MKTF-40, MKTF-43 and MKTF-44 beginning in 2015." The Permittee is conducting corrective action related to the release from the Contact Wastewater System/Stormwater Collection System. The above-referenced wells are used to monitor the releases from the Contact Wastewater System/Stormwater Collection System. Therefore, the Permittee must continue to sample and analyze these MKTF-series groundwater monitoring wells on a quarterly basis.

b) The Permittee states, "STP1-NW and STP1-SW. Initial sampling began in the second quarter of 2014. Analytical data for the past three quarters indicate no detection of BTEX, VOCs, or SVOCs in STP1-NW. No detection of fluid has been detected in STP1-SW in 2014. Based on the analytical data, Western requests changing the test methods to VOCs and WQCC Metals and change the sampling frequency of these wells to an Annual basis beginning in 2015." The Permittee must continue quarterly monitoring of the STP-wells and analyze for GRO, DRO, MRO, VOCs, and metals. Revise Table 1 as needed.

c) Requests in paragraphs C through I are carried over from 2013, see Comment 7.

d) The Permittee states, "MKTF 1-18: MKTF 1 through 18 have been sampled or inspected on a quarterly basis for all of 2014. A review of the quarterly laboratory results does not indicate any significant changes over time that would warrant continued quarterly monitoring. Western requests quarterly sampling frequency be changed to annual beginning in 2015." See Comment 10a above.

e) The Permittee requests to, "[r]evise statement 'All wells including the recovery wells containing separate phase hydrocarbons", to read 'Annual sampling for all wells that are not currently on an annual schedule will also include Major cations/anions, VOC, SVOC, WQCC metals.' Do not sample wells that have an SPH level." The Permittee's statement is unclear; therefore NMED's decision regarding this request is deferred pending the Permittee's clarification in the revised Work Plan.

f) The Permittee notes that the requested changes have been made to Table 1. Provide a revised Table 1 that reflects the original sampling and monitoring approved in the 2011 Work Plan and include the approved changes to the Work Plans from this letter. In addition, provide a red-line strikeout version of Table 1 with the revised Work Plan.

Comment 11

It is not clear why Appendix A was included in the submission since Appendix A does not contain any information. Remove Appendix A from the Work Plan or revise to include the necessary information.

Comment 12
The table presented in Appendix C-1 (Well Data 2014 Annual/Quarterly Sampling DTB/DTW Measurements) contains several errors:

a) It appears that the some of the data presented is incorrect (for example, the 2011 Survey Well Casing Rim Elevation, Stick Up Lengths for monitoring wells BW1-A through C). Review and correct the table as necessary.

b) The Permittee lists "DRY" for several wells and "0.00" for several other wells. For the wells with 0.00 reported in the Depth to Water (ft) column, there are groundwater elevations listed in the Groundwater Elevation (ft) column. A reading of 0.00 indicates that groundwater is at the top of the well casing. NMED suspects that 0.00 is not an indicator that groundwater is at the top of casing. Either explain the difference between a dry well and a well with 0.00 recorded for the depth to water (ft) or revise the table to display the correct data.

c) The Permittee must ensure that the table in Appendix C-2 is correct and that the data in that table is correlated to the data presented in the table in Appendix C-1.

d) Review all tables included in the Work Plan for accuracy and make corrections as necessary.

Comment 13
Revise Table 1 in Appendix D to reflect the changes required in this letter. Provide a red-line strikeout version of the table indicating where all of the changes were made.

Comment 14
The Permittee included well logs for the new MKTF-series groundwater monitoring wells in Appendix E. The Permittee also included the logs in the 2013 Annual Groundwater Monitoring Report. NMED will review the logs as part of the required Interim Measures Report for the Hydrocarbon Seep (NMED letter dated April 8, 2015). NMED did not review the logs as part of the Work Plan, but they may remain in the Work Plan for informational purposes.

Comment 15
Figure 6 depicts the groundwater elevation for the Chinle/Alluvium interface. The groundwater contours are heavily influenced by the MKTF-series groundwater monitoring wells which were affected by the hydrocarbon seep and represent what is likely a temporary groundwater elevation level. No response is required.

The Permittee must revise and submit only the 2014 Work Plan for NMED review. The Permittee must address all comments in this Approval with Modifications and submit a revised Work Plan by **September 28, 2015**. The revised 2014 Work Plan must be accompanied by a response letter that details where all revisions have been made, cross-referencing NMED's numbered comments. In addition, the Permittee must submit a redline-strikeout version that identifies all changes and edits to the 2014 Work Plan (the red-line strikeout may be an electronic copy) with the response.

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: D. Cobrain NMED HWB
N. Dhawan NMED HWB
K. Van Horn NMED HWB
C. Chavez OCD
A. Hains WRG
C. Johnson WRG
L. King EPA Region 6

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