Western Refining
GALLUP

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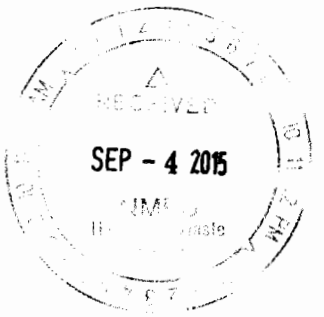

September 3, 2015

Mr. John E. Kieling, Chief
New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Bldg 1
Santa Fe, New Mexico 87505-6303

RE: OW-14 SOURCE AREA INVESTIGATIION WORK PLAN
OW SERIES WELLS AND CONTAMINANT PLUME MIGRATION
WESTERN REFINING SOUTHWEST INC., GALLUP REFINERY
EPA ID # NMD000333211
HWB-WRG-MISC

Dear Mr. Kieling:

The enclosed Investigation Work Plan was prepared pursuant to your letter dated May 11, 2015, which requested submittal of a work plan to investigate the source of contaminants present in groundwater monitoring well OW-14. If there are any questions regarding the enclosed Investigation Work Plan, please contact Mr. Ed Riege at (505) 722-0217.

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 property 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.

Sincerely,

William Carl McClain

Mr. Billy McClain
Refinery Manager
Western Refining Southwest, Inc. – Gallup Refinery

cc D. Cobrain NMED HWB
N. Dhawan, NMED HWB
K. Van Horn, NMED HWB
C. Chavez, OCD
L. King, EPA
A. Allen, Western El Paso

Investigation Work Plan
OW-14 Source Area

Western Refining

Gallup Refinery
Western Refining Southwest, Inc.
Gallup, New Mexico

EPA ID# NMD000333211

SEPTEMBER 2015

William Carl McClain

Billy McClain
Refinery Manager
Western Refining Southwest, Inc.
Gallup Refinery

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List of Acronyms

benzene, toluene, ethylbenzene, and xylene (BTEX)
Code of Federal Regulations (CFR)
Contract Laboratory Program (CLP)
data quality objective (DQO)
diesel range organics (DRO)
dilution attenuation factor (DAF)
Environmental Protection Agency (EPA)
investigation derived waste (IDW)
Maximum Contaminant Level (MCL)
mean sea level (msl)
monitoring well (MW)
motor oil range organics (MRO)
methyl tert butyl ether (MTBE)
New Mexico Administrative Code (NMAC)
New Mexico Environment Department (NMED)
New Mexico Oil Conservation Division (NMOCD)
photoionization detector (PID)
polynuclear aromatic hydrocarbon (PAH)
polyvinyl chloride (PVC)
quality assurance/quality control (QA/QC)
Resource Conservation and Recovery Act (RCRA)
separate-phase hydrocarbon (SPH)
semi-volatile organic compound (SVOC)
Solid Waste Management Unit (SWMU)
total petroleum hydrocarbon (TPH)
toxicity characteristic leaching procedure (TCLP)
volatile organic compound (VOC)

Executive Summary

The Gallup Refinery, which is located 17 miles east of Gallup, New Mexico, has been in operation since the 1950s. Pursuant to the terms and conditions of the facility Resource Conservation and Recovery Act (RCRA) Post-Closure Care Permit and 20.4.1.500 New Mexico Administrative Code, this Investigation Work Plan has been prepared for the area up-gradient of monitoring well OW-14.

Groundwater samples collected from monitoring well OW-14 have indicated increasing concentrations of benzene and ethylbenzene since 2009, although the concentrations of ethylbenzene remain below screening levels. Methyl tert butyl ether (MTBE) has been detected at concentrations above the screening level since 2008 and 1-methylnaphthalene has sporadically been reported at concentrations above the screening level. OW-14 is located down-gradient of recovery wells RW-1 (OW-27) and RW-2 (OW-28), which were installed in near Tanks 569 and 576 in 1995 to address the presence of separate-phase hydrocarbon (SPH). The investigation effort near Tanks 569 and 576 was conducted as part of the investigation of Solid Waste Management Unit (SWMU) No. 6.

The purpose of this investigation is to determine the source of the increasing concentrations of primarily benzene that are being observed in monitoring well OW-14. To accomplish this objective, two new monitoring wells will be installed between Tank 569 and monitoring well OW-14.

Section 1
Introduction

The Gallup Refinery is located approximately 17 miles east of Gallup, New Mexico along the north side of Interstate Highway I-40 in McKinley County. The physical address is I-40, Exit #39 Jamestown, New Mexico 87347. The Gallup Refinery is located on 810 acres. Figure 1 presents the refinery location and the regional vicinity.

The Gallup Refinery is a crude oil refinery currently owned and operated by Western Refining Southwest, Inc. ("Western"), formerly known as Giant Industries Arizona, Inc. and formerly doing business as Giant Refining Company Ciniza Refinery, an Arizona corporation. The Gallup Refinery generally processes crude oil from the Four Corners area transported to the facility by pipeline or tanker truck.

Various process units are operated at the facility, including crude distillation, reforming, fluidized catalytic cracking, alkylation, isomerization, sulfur recovery, merox treater, and hydrotreating. Current and past operations have produced gasoline, diesel fuels, jet fuels, kerosene, propane, butane, and residual fuel.

This investigation work plan addresses the area up-gradient of monitoring well OW-14. The area of interest is located in the eastern portion of the refinery tank farm (Figure 2). The purpose of this investigation is to determine the source of the increasing concentrations of primarily benzene that are being observed in monitoring well OW-14. The investigation activities will be conducted in accordance with Section IV.H.5 of the Post-Closure Care Permit.

Section 2
Background

This section presents background information for the area of the refinery property near monitoring well OW-14, including a review of historical waste management activities to identity the following:

- Type and characteristics of all waste and all contaminants handled in the subject areas;
- Known and possible sources of contamination;
- History of operations; and
- Prior investigations.

Monitoring well OW-14 is located immediately north of the main refinery tank farm, which was built in the late 1950s. The *Inventory of Solid Waste Management Units* prepared in June 1985 identified six product storage tanks that contained leaded gasoline (Geoscience Consultants, Ltd., 1985). These six, as well as, additional tanks were subsequently identified as SWMU No. 6 due to the historic practice of disposing of leaded tank bottoms within the tank berms. The practice of cleaning the tanks and burying the leaded tank bottoms was reported to have occurred every five years and was terminated after November 19, 1980.

The three leaded gasoline storage tanks (TK-568, TK-569, and TK-570) closest to OW-14 were investigated as part of SWMU No. 6 in the early to mid 1990s. Impacts to soil and the presence of separate-phase hydrocarbon (SPH) on groundwater was found within the alluvium overlying the Chinle Group. Boring BG-4, which was later identified as OW-27 and RW-1, was drilled east of TK-569 to a depth of 48.5 feet (Figure 2). A water-bearing sand layer was logged at approximately 30 feet with a strong hydrocarbon odor and an elevated PID reading. Subsequently 4-inch well screen was installed in the boring from 40.0 to 25.0 feet. The water level was initially measured at a depth of 28' 7" with an accumulation of 8" of SPH. A second soil boring B-2, which was later identified as OW-28 and RW-2, was drilled southwest of TK-576 to a depth of 38 feet. Saturation was first encountered in a sand layer at a depth of 23.6 feet with additional deeper water-bearing sand/gravel layers extending to top of the Chinle Group at a depth of 32.9 feet. The well screen was set from 36.1 feet to 26.1 feet below ground surface. The water level initially was measured at 24' 3" with 2" of SPH. The boring logs are included in Appendix A.

A possible leak from a seam in an unidentified storage tank located adjacent to Tank 569 was reported to have been repaired in 1995 (Giant, 1997). It is likely that this leaking tank resulted in the observed presence of SPH instead of the burial of leaded tank bottoms.

RW-1 had an estimated 2.33 gallons of SPH recovered in 2013 using a submersible bladder pump, while no SPH has been observed in RW-2 since before 2005 (Western, 2013). The estimated annual volumes of SPH recovered at RW-1 from 2005 through 2013 are shown in Table 1. Based on the continuously declining recovery volumes at RW-1 and no measureable SPH at RW-2, there does not appear to be an active release of petroleum hydrocarbons in this area.

Beginning in 2011 groundwater samples have been collected annually from RW-1 and RW-2 and analyzed for dissolved-phase organic constituents and metals. Elevated concentrations of benzene, toluene, ethylbenzene, and xylenes (BTEX) and MTBE have been reported for samples collected at both recovery wells. The concentrations of BTEX are significantly higher at the recovery wells than observed in down-gradient well OW-14. MTBE is also detected at higher concentrations in the up-gradient recovery wells, but the difference is less than what is observed for BTEX. The dissolved-phase concentrations are included in Table 2. The chemical analyses for recovery wells RW-5 and RW-6 are also included in Table 2 as they are located within the refinery main tank farm; however, these wells are over 800 feet southwest of well OW-14 and are unlikely to represent a possible source for the constituents detected at OW-14. BTEX concentrations are less in groundwater samples collected at RW-5 and RW-6 than those collected at RW-1, RW-2, and OW-14.

Section 3
Site Conditions

3.1 Surface Conditions

A topographic map of the area near the monitoring well OW-14 and the refinery main tank farm is included as Figure 3. Site topographic features include high ground in the southeast gradually decreasing to a lowland fluvial plain the northwest. Elevations on the refinery property range from 7,040 feet to 6,860 feet. The area of the site near OW-14 is at an approximate elevation of 6,934 feet above mean sea level (msl).

The soils in the vicinity of OW-14 include two soil types. Surface soils within most of the area of investigation are primarily Rehobeth silty clay loam. To the north are the bordering Simitarq-Celavar sandy loams. Rehobeth soil properties include a pH ranging from 8 to 9 standard units and salinity (naturally occurring and typically measuring up to approximately 8 mmhos/cm). The Simitarq-Celavar soils are well drained with a conservative permeability of 0.20 inches/hour and minimal salinity. Simitarq soils have nearly neutral pH values ranging from 7.2 to 7.4 standard units.

Regional surface water features include the refinery evaporation ponds and a number of small ponds (one cattle water pond and two small unnamed spring fed ponds). The site is located in the Rio Puerco Valley, north of the Zuni Uplift with overland flows directed northward to the tributaries of the Rio Puerco. The Rio Puerco continues to the east to the confluence with the Rio Grande. The South Fork of the Puerco River is intermittent and retains flow only during and immediately following precipitation events.

3.2 Subsurface Conditions

The shallow subsurface soils consist of fluvial and alluvial deposits comprised of clay and silt with minor inter-bedded sand layers. Very low permeability bedrock (e.g., claystones and siltstones) underlie the surface soils and effectively form an aquitard. The Chinle Group, which is Upper Triassic, crops out over a large area on the southern margin of the San Juan Basin. The uppermost recognized local Formation is the Petrified Forest Formation and the Sonsela Sandstone Bed is the uppermost recognized regional aquifer. Aquifer test of the Sonsela Bed northeast of Prewitt indicated a transmissivity of greater than 100 ft^2/day (Stone and others, 1983). The Sonsela Sandstone's highest point occurs southeast of the site and slopes downward to the northwest as it

passes under the refinery. The Sonsela Sandstone forms a water-bearing reservoir with artesian conditions throughout the central and western portions of the refinery property.

The diverse properties and complex, irregular stratigraphy of the surface soils across the site cause a wide range of hydraulic conductivity ranging from less than 10-2 cm/sec for gravel like sands immediately overlying the Petrified Forest Formation to 10-8 cm/sec in the clay soils located near the surface (Western, 2009). Generally, shallow groundwater at the refinery follows the upper contact of the Petrified Forest Formation with prevailing flow from the southeast to the northwest, although localized areas may have varying flow directions (Figure 4). Fluid level measurements for 2013 and 2014 are included in Table 3.

Section 4
Scope of Services

The site investigation of groundwater will be conducted to determine the source of the increasing concentrations of benzene that have been observed in monitoring well OW-14. The investigation will commence upon approval of this investigation work plan by NMED.

4.1 Investigation

An investigation of groundwater conditions in the northeast corner of the Refinery main tank farm is proposed to determine the source of constituents apparently migrating down-gradient towards OW-14. Recovery well RW-2 is located due south of OW-14 and provides information on the groundwater quality in this area. Two new permanent monitoring wells are proposed to the northeast and northwest of RW-2 (Figure 5). This configuration will provide information on the quality of groundwater as it migrates from the main tank farm to the north towards the location of OW-14. The proposed well to the northeast of RW-2 will also evaluate if sources exist near the rail loading racks. The coverage with the two new wells and RW-2 will span a distance of approximately 500 feet east to west and should help to determine if the observed impacts at OW-14 are the result of migration from the area of RW-2 or if other potential sources exist in the area. The borings will be advanced to the top of bedrock, anticipated to be the Petrified Forest Formation.

4.1.1 Soil Sample Field Screening and Logging

All soil borings will be continuously logged and samples field screened. Samples obtained from the soil borings will be screened in the field on 2.0 foot intervals for evidence of contaminants. Field screening results will be recorded on the exploratory boring logs. Field screening results will be used to aid in selection of soil samples for laboratory analysis. As the purpose of this investigation is to evaluate potential sources for impacts observed in groundwater at OW-14, this investigation focuses on groundwater quality; however, if significant impacts to vadose zone soils are observed in the proposed borings then soil samples will be retained for analysis as described below. The primary screening methods include: (1) visual examination, (2) olfactory examination, and (3) headspace vapor screening for volatile organic compounds. Additional screening for site- or release-specific characteristics such as pH or for specific compounds using field test kits may be conducted where appropriate.

Visual screening includes examination of soil samples for evidence of staining caused by petroleum-related compounds or other substances that may cause staining of natural soils such as elemental sulfur or cyanide compounds. Headspace vapor screening targets volatile organic compounds and involves placing a soil sample in a plastic sample bag or a foil sealed container allowing space for ambient air. The container will be sealed and then shaken gently to expose the soil to the air trapped in the container. The sealed container will be allowed to rest for a minimum of 5 minutes while vapors equilibrate. Vapors present within the sample bag's headspace will then be measured by inserting the probe of the instrument in a small opening in the bag or through the foil. The maximum value and the ambient air temperature will be recorded on the field boring or test pit log for each sample.

The monitoring instruments will be calibrated each day to the manufacturer's standard for instrument operation. A photoionization detector (PID) equipped with a 10.6 or higher electron volt (eV) lamp or a combustible gas indicator will be used for VOC field screening. Field screening results may be site- and boring-specific and the results may vary with instrument type, the media screened, weather conditions, moisture content, soil type, and type of contaminant, therefore, all conditions capable of influencing the results of field screening will be recorded on the field logs.

Discrete soil samples will be retained for laboratory analysis from within the following intervals:

- From the interval in each soil boring with the greatest apparent degree of contamination in the vadose zone, based on field observations and field screening; and
- Any additional intervals as determined based on field screening results.

The physical characteristics of the samples (such as mineralogy, ASTM soil classification, moisture content, texture, color, presence of stains or odors, and/or field screening results), depth where each sample was obtained, method of sample collection, and other observations will be recorded in the field log by a qualified geologist or engineer. Detailed logs of each boring will be completed in the field by a qualified engineer or geologist. Additional information, such as the presence of water-bearing zones and any unusual or noticeable conditions encountered during drilling, will be recorded on the logs.

Quality Assurance/Quality Control (QA/QC) samples will be collected to monitor the validity of the soil sample collection procedures as follows:

- Field duplicates will be collected at a rate of 10 percent; and
- Equipment blanks will be collected from all sampling apparatus at a frequency of one per day.

4.1.2 Drilling Activities

Soil borings will be drilled using hollow-stem augers. The drilling equipment will be properly decontaminated before drilling each boring. The NMED will be notified as early as practicable if conditions arise or are encountered that do not allow the advancement of borings to the specified depths or at planned sampling locations. Appropriate actions (e.g., installation of protective surface casing or relocation of borings to a less threatening location) will be taken to minimize any negative impacts from investigative borings. The soil borings for the permanent monitoring wells will be drilled to the alluvium/Chinle Group contact. Slotted (0.01 inch) PVC well screen will be placed at the bottom of the permanent wells and will extend for 10 to 15 feet to ensure that the well is screened across the water table, where water table conditions exist, and to the extent possible the entire saturated zone is open to the well. A 10/20 sand filter pack will be installed to two feet over the top of the well screen.

4.1.3 Groundwater Sample Collection

Groundwater samples will be collected from the two new permanent monitoring wells. Groundwater samples will be collected within 24 hours of the completion of well purging using disposal bailers. Alternatively, well sampling may also be conducted in accordance with the NMED's Position Paper *Use of Low-Flow and other Non-Traditional Sampling Techniques for RCRA Compliant Groundwater Monitoring* (October 30, 2001, as updated). 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 procedures will be in accordance with the procedures presented below in Section 4.1.4.

Groundwater samples intended for metals analysis will be submitted to the laboratory as both total and dissolved metals samples. QA/QC samples will be collected to monitor the validity of the groundwater sample collection procedures as follows:

- Field duplicate water samples will be obtained at a frequency of ten percent, with a minimum, of one duplicate sample per sampling event;

- Equipment rinsate blanks will be obtained for chemical analysis at the rate of ten percent or a minimum of one rinsate blank per sampling day. Equipment rinsate blanks will be collected at a rate of one per sampling day if disposable sampling equipment is used. Rinsate samples will be generated by rinsing deionized water through unused or decontaminated sampling equipment. The rinsate sample will be placed in the appropriate sample container and submitted with the groundwater samples to the analytical laboratory for the appropriate analyses; and
- 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 deionized water prepared by the laboratory and placed in an appropriate sample container. The trip blank will be prepared by the analytical laboratory prior to the sampling event and will be kept with the shipping containers and placed with other water samples obtained from the site each day. Trip blanks will be analyzed at a frequency of one for each shipping container of groundwater samples to be analyzed for VOCs.

4.1.4 Sample Handling

At a minimum, the following procedures will be used at all times when collecting samples during investigation, corrective action, and monitoring activities:

1. Neoprene, nitrile, or other protective gloves will be worn when collecting samples. New disposable gloves will be used to collect each sample;
2. All samples collected of each medium for chemical analysis will be transferred into clean sample containers supplied by the project analytical laboratory with the exception of soil, rock, and sediment samples obtained in Encore® samplers. 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; and
3. Sample labels and documentation will be completed for each sample following procedures discussed below. 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 below, will be followed for all samples collected. All samples will be submitted to the laboratory

soon enough to allow the laboratory to conduct the analyses within the method holding times.

Chain-of-custody and shipment procedures will include the following:

1. Chain-of-custody forms will be completed at the end of each sampling day, prior to the transfer of samples off site.
2. 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. Temperature blanks will be included with each shipping container.
3. Each cooler or other container will be delivered directly to the analytical laboratory.
4. Glass bottles will be separated in the shipping container by cushioning material to prevent breakage.
5. Plastic containers will be protected from possible puncture during shipping using cushioning material.
6. The chain-of-custody form and sample request form will be shipped inside the sealed storage container to be delivered to the laboratory.
7. Chain-of-custody seals will be used to seal the sample-shipping container in conformance with EPA protocol.
8. Signed and dated chain-of-custody seals will be applied to each cooler prior to transport of samples from the site.
9. 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 and copies will be returned to the relinquishing party.
10. Copies of all chain-of-custody forms generated as part of sampling activities will be maintained on-site.

4.1.5 Collection and Management of Investigation Derived Waste

Drill cuttings, excess sample material and decontamination fluids, and all other investigation derived waste (IDW) associated with soil borings will be contained and characterized using methods based on the boring location, boring depth, drilling method, and type of contaminants suspected or

encountered. All purged groundwater and decontamination water will be characterized prior to disposal unless it is disposed in the refinery wastewater treatment system upstream of the API Separator. An IDW management plan is included as Appendix B.

Field equipment requiring calibration will be calibrated to known standards, in accordance with the manufacturers' recommended schedules and procedures. At a minimum, calibration checks will be conducted daily, or at other intervals approved by the Department, 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. In the interim, a properly calibrated replacement instrument will be used.

4.1.6 Documentation of Field Activities

Daily field activities, including observations and field procedures, will be recorded in a field log book. Copies of the completed forms will be maintained in a bound and sequentially numbered field file for reference during field activities. Indelible ink will be used to record all field activities. Photographic documentation of field activities will be performed, as appropriate. The daily record of field activities will include the following:

1. Site or unit designation;
2. Date;
3. Time of arrival and departure;
4. Field investigation team members including subcontractors and visitors;
5. Weather conditions;
6. Daily activities and times conducted;
7. Observations;
8. Record of samples collected with sample designations and locations specified;
9. Photographic log, as appropriate;
10. Field monitoring data, including health and safety monitoring;
11. Equipment used and calibration records, if appropriate;
12. List of additional data sheets and maps completed;
13. An inventory of the waste generated and the method of storage or disposal; and
14. Signature of personnel completing the field record.

4.1.7 Chemical Analyses

All samples collected for laboratory analysis will be submitted to an accredited laboratory. The laboratory will use the most recent standard EPA and industry-accepted analytical methods for target analytes as the testing methods for each medium sampled. Chemical analyses will be performed in accordance with the most recent EPA standard analytical methodologies and extraction methods.

Groundwater and soil samples will be analyzed by the following methods:

- SW-846 Method 8260 for Skinner List volatile organic compounds;
- SW-846 Method 8270 for Skinner List semi-volatile organic compounds; and
- SW-846 Method 8015B gasoline range (C5-C10), diesel range (>C10-C28), and motor oil range (>C28-C36) organics.

Groundwater and soil samples will also be analyzed for the following Skinner List metals and iron and manganese using the indicated analytical methods shown. The groundwater samples collected for metals analysis will be analyzed for total and dissolved concentrations. Groundwater samples will also be analyzed for chloride, fluoride, and sulfate.

Inorganic Analytical Methods

Analyte	Analytical Method
Antimony	SW-846 method 6010/6020
Arsenic	SW-846 method 6010/6020
Barium	SW-846 method 6010/6020
Beryllium	SW-846 method 6010/6020
Cadmium	SW-846 method 6010/6020
Chromium	SW-846 method 6010/6020
Cobalt	SW-846 method 6010/6020
Cyanide	SW-846 method 335.4/335.2 mod
Lead	SW-846 method 6010/6020
Mercury	SW-846 method 7470/7471
Nickel	SW-846 method 6010/6020
Selenium	SW-846 method 6010/6020
Silver	SW-846 method 6010/6020
Vanadium	SW-846 method 6010/6020

Zinc	SW-846 method 6010/6020
Iron	SW-846 method 6010/6020
Manganese	SW-846 method 6010/6020

Groundwater field measurements will be obtained for pH, specific conductance, dissolved oxygen concentrations, oxidation-reduction potential, and temperature.

4.1.8 Data Quality Objectives

The Data Quality Objectives (DQOs) were developed to ensure that newly collected data are of sufficient quality and quantity to address the project goals, including Quality Assurance/Quality Control (QA/QC) issues (EPA, 2006). The project goals are established to determine and evaluate the presence, nature, and extent of releases of contaminants at specified SWMUs. The type of data required to meet the project goals includes chemical analyses of soil and groundwater to determine if there has been a release of contaminants.

The quantity of data is location specific and is based on the historical operations at individual locations. Method detection limits should be 20% or less of the applicable background levels, cleanup standards and screening levels.

Additional DQOs include precision, accuracy, representativeness, completeness, and comparability. Precision is a measurement of the reproducibility of measurements under a given set of circumstances and is commonly stated in terms of standard deviation or coefficient of variation (EPA, 1987). Precision is also specific to sampling activities and analytical performance. Sampling precision will be evaluated through the analyses of duplicate field samples and laboratory replicates will be utilized to assess laboratory precision.

Accuracy is a measurement in the bias of a measurement system and may include many sources of potential error, including the sampling process, field contamination, preservation, handling, sample matrix, sample preparation, and analysis techniques (EPA, 1987). An evaluation of the accuracy will be performed by reviewing the results of field/trip blanks, matrix spikes, and laboratory QC samples.

Representativeness is an expression of the degree to which the data accurately and precisely represent the true environmental conditions. Sample locations and the number of samples have been selected to ensure the data is representative of actual environmental conditions. Based on SWMU specific conditions, this may include either biased (i.e., judgmental) locations/depths or unbiased (systematic grid samples) locations. In addition, sample collection techniques (e.g., field

monitoring and decontamination of sampling equipment) will be utilized to help ensure representative results.

Completeness is defined as the percentage of measurements taken that are actually valid measurements, considering field QA and laboratory QC problems. EPA Contract Laboratory Program (CLP) data has been found to be 80-85% complete on a nationwide basis and this has been extrapolated to indicate that Level III, IV, and V analytical techniques will generate data that are approximately 80% complete (EPA, 1987). As an overall project goal, the completeness goal is 85%; however, some samples may be critical based on location or field screening results and thus a sample-by-sample evaluation will be performed to determine if the completeness goals have been obtained.

Comparability is a qualitative parameter, which expresses the confidence with which one data set can be compared to another. Industry standard sample collection techniques and routine EPA analytical methods will be utilized to help ensure data are comparable to historical and future data. Analytical results will be reported in appropriate units for comparison to historical data and cleanup levels.

Section 5
References

EPA, 1987, Data Quality Objectives for Remedial Response Activities; United States Environmental Protection Agency, Office of Emergency and Remedial Response and Office of Waste Programs Enforcement, OSWER Directive 9355.0-7B, 85p.

EPA, 2006, Guidance on Systematic Planning Using the Data Quality Objectives Process, United States Environmental Protection Agency, Office of Environmental Information; EPA/240/B-06/001, p. 111.

Geoscience Consultants, Ltd, 1985, Inventory of Solid Waste Management Units, June 14, 1985, p. 22.

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NMED, 2014, Risk Assessment Guidance for Site Investigation and Remediation, New Mexico Environment Department.

Stone, W.J., Lyford, F.P., Frenzel, P.F., Mizel, N.H., and Padgett, E.T., 1983, Hydrogeology and Water Resources of San Juan Basin, New Mexico; Hydrogeologic Report 6, New Mexico Bureau of Mines and Mineral Resources, p. 70.

Western, 2009, Facility-wide Groundwater Monitoring Plan: Gallup Refinery, p. 97.

Western, 2013, Annual Ground Water Monitoring Report: Gallup Refinery - 2013, p. 225.

Tables

Table 1 - RW-1 Recovery Volumes
Western Refining Southwest, Inc. - Gallup Refinery

Year	Product Recovered (gallons)	Water Recovered (gallons)
2005	431.5	1,210.5
2006	23.52	1,107.0
2007	1.72	148.5
2008	3.99	152.0
2009	1.78	338.0
2010	0.66	128.0
2011	0.42	165.0
2012	0.97	137.0
2013	2.328	86.0
total	466.888	3,472.0

recovery volumes are field estimates for RW-1

Table 2 - Groundwater Analyses
Western Refining Southwest, Inc. - Gallup Refinery

		Benzene (mg/L)	Toluene (mg/L)	Ethyl Benzene (mg/L)	Total Xylenes (mg/L)	MTBE (mg/L)	1,2,4-Trimethyl benzene (mg/L)	1,3,5-Trimethyl benzene (mg/L)	1,2-Dichloroethane (EDC) (mg/L)	Naphthalene (mg/L)	1-Methyl naphthalene (mg/L)	2-Methylnaphthalene (mg/L)	1,1-Dichloroethane (mg/L)	Isopropyl benzene (mg/L)	n-Butylbenzene (mg/L)	n-Propylbenzene (mg/L)	2,4-Dimethylphenol (mg/L)	Acetone (mg/L)	Sec-butylbenzene (mg/L)
WQCC 20NMAC 6.2.3103		0.01	**0.75**	0.75	**0.62**	NE	NE	NE	0.01	NE	NE	NE	**0.025**	NE	NE	NE	NE	NE	NE
40 CFR 141.62 MCL		**0.005**	1.0	**0.7**	10	NE	NE	NE	**0.005**	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
NMED Tap Water (DEC 2014)		0.00454	1.1	0.0149	0.193	**0.143**	NE	NE	0.002	**0.00165**	NE	NE	0.0275	**0.447**	NE	NE	**0.354**	**14.1**	NE
EPA RSL for Tap Water (JAN 2015)		0.00045	0.11	0.0015	0.019	0.014	**0.0015**	**0.012**	0.0017	0.00017	**0.0011**	**0.15**	0.0027	0.045	**0.1**	**0.066**	0.73	22	**0.2**
Well ID	DATE SAMPLED																		
OW-13	6/1/2015	<0.001	<0.001	<0.001	<0.0015	0.025	<0.001	NA	<0.001	<0.002	<0.004	NA	<0.001	<0.001	<0.003	<0.001	NA	NA	<0.001
	3/9/2015	<0.001	<0.001	<0.001	<0.0015	0.026	<0.001	NA	<0.001	<0.002	<0.004	NA	<0.001	<0.001	<0.003	<0.001	NA	NA	<0.001
	11/10/2014	<0.001	<0.001	<0.001	<0.0015	0.027	<0.001	NA	<0.001	<0.002	<0.004	NA	<0.001	<0.001	<0.003	<0.001	NA	NA	<0.001
	9/15/2014	<0.001	<0.001	<0.001	<0.0015	0.023	<0.001	NA	<0.001	<0.002	<0.004	NA	<0.001	<0.001	<0.003	<0.001	NA	NA	<0.001
	6/3/2014	<0.001	<0.001	<0.001	<0.0015	0.02	<0.001	NA	<0.001	<0.002	<0.004	NA	<0.004	<0.001	<0.003	<0.001	NA	NA	<0.001
	3/7/2014	<0.001	<0.001	<0.001	<0.0015	0.023	<0.001	NA	<0.001	<0.002	<0.004	NA	<0.001	<0.001	<0.003	<0.001	NA	NA	<0.001
	11/11/2013	<0.001	<0.001	<0.001	<0.0015	0.017	<0.001	NA	<0.001	<0.002	<0.004	NA	<0.001	<0.001	<0.003	<0.001	NA	NA	<0.001
	9/4/2013 [2]	<0.001	<0.001	<0.001	<0.0015	0.014	<0.001	NA	<0.001	<0.002	<0.004	NA	<0.001	<0.001	<0.003	<0.001	NA	NA	<0.001
	6/13/2013	<0.001	<0.001	<0.001	<0.0015	0.015	<0.001	NA	<0.001	<0.002	<0.004	NA	<0.001	<0.001	<0.003	<0.001	NA	NA	<0.001
	3/19/2013	<0.001	<0.001	<0.001	<0.0015	0.012	<0.005	NA	<0.005	<0.01	<0.004	NA	<0.001	<0.001	<0.003	<0.001	<0.001	<0.001	<0.001
	11/27/2012	<0.001	<0.001	<0.001	<0.0015	0.011	<0.001	NA	<0.001	<0.002	<0.004	NA	<0.001	<0.001	<0.003	<0.001	<0.001	<0.001	<0.001
	8/23/2012	<0.001	<0.001	<0.001	<0.0015	0.0092	<0.001	NA	<0.001	<0.002	<0.004	NA	<0.001	<0.001	<0.003	<0.001	<0.001	<0.001	<0.001
	6/14/2012	<0.001	<0.001	<0.001	<0.0015	0.0079	<0.001	NA	<0.001	<0.002	<0.004	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	3/21/2012	<0.001	<0.001	<0.001	<0.0015	0.0082	<0.001	NA	<0.001	<0.002	<0.004	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	12/13/2011	<0.001	<0.001	<0.001	<0.0015	0.0065	<0.001	NA	<0.001	<0.002	<0.004	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	10/25/2011	<0.001	<0.001	<0.001	<0.0015	0.0062	<0.001	NA	<0.001	<0.002	<0.004	NA	<0.001	<0.001	<0.001	<0.001	NA	NA	<0.001
	6/20/2011	<0.001	<0.001	<0.001	<0.0015	0.0048	<0.001	NA	<0.001	<0.002	<0.004	NA	<0.001	<0.001	<0.001	<0.001	NA	NA	<0.001
	2/24/2011	<0.001	<0.001	<0.001	<0.0015	0.0040	<0.001	NA	<0.001	<0.002	<0.004	NA	<0.001	<0.001	<0.001	<0.001	NA	NA	<0.001
	11/8/2010	<0.001	<0.001	<0.001	<0.0015	0.0038	<0.001	NA	<0.001	<0.002	<0.004	NA	<0.001	<0.001	<0.001	<0.001	NA	NA	<0.001
	9/22/2010	<0.001	<0.001	<0.001	<0.0015	0.0031	<0.001	NA	<0.001	<0.002	<0.004	NA	<0.001	<0.001	<0.001	<0.001	NA	NA	<0.001
	6/7/2010	<0.001	<0.001	<0.001	<0.0015	0.0027	<0.001	NA	<0.001	<0.002	<0.004	NA	<0.001	<0.001	<0.001	<0.001	NA	NA	<0.001
	3/25/2010	<0.001	<0.001	<0.001	<0.0015	0.0023	<0.001	NA	<0.001	<0.002	<0.004	NA	<0.001	<0.001	<0.001	<0.001	NA	NA	<0.001

Table 2 - Groundwater Analyses
Western Refining Southwest, Inc. - Gallup Refinery

		Benzene (mg/L)	Toluene (mg/L)	Ethyl Benzene (mg/L)	Total Xylenes (mg/L)	MTBE (mg/L)	1,2,4-Trimethyl benzene (mg/L)	1,3,5-Trimethyl benzene (mg/L)	1,2-Dichloro ethane (EDC) (mg/L)	Naphthalene (mg/L)	1-Methyl naphthalene (mg/L)	2-Methylnaphthalene (mg/L)	1,1-Dichloroethane (mg/L)	Isopropyl benzene (mg/L)	n-Butylbenzene (mg/L)	n-Propylbenzene (mg/L)	2,4-Dimethylphenol (mg/L)	Acetone (mg/L)	Sec-butylbenzene (mg/L)
WQCC 20NMAC 6.2.3103		0.01	**0.75**	0.75	**0.62**	NE	NE	NE	0.01	NE	NE	NE	**0.025**	NE	NE	NE	NE	NE	NE
40 CFR 141.62 MCL		**0.005**	1.0	**0.7**	10	NE	NE	NE	**0.005**	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
NMED Tap Water (DEC 2014)		0.00454	1.1	0.0149	0.193	**0.143**	NE	NE	0.002	**0.00165**	NE	NE	0.0275	**0.447**	NE	NE	**0.354**	**14.1**	NE
EPA RSL for Tap Water (JAN 2015)		0.00045	0.11	0.0015	0.019	0.014	**0.0015**	**0.012**	0.0017	0.00017	**0.0011**	**0.15**	0.0027	0.045	**0.1**	**0.066**	0.73	22	**0.2**
Well ID	DATE SAMPLED																		
OW-14	6/1/2015	4.6	<0.02	0.16	<0.03	0.74	<0.02	NA	<0.02	<0.04	<0.08	NA	<0.02	<0.02	<0.06	<0.02	NA	NA	<0.02
	3/9/2015	3.9	<0.02	0.16	<0.03	0.76	<0.02	NA	<0.02	<0.04	<0.08	NA	<0.02	<0.02	<0.06	<0.02	NA	NA	<0.02
	11/10/2014	3.6	0.015	0.17	<0.015	0.81	<0.01	NA	<0.01	<0.02	0.044	NA	<0.01	<0.01	<0.03	<0.01	NA	NA	<0.01
	9/15/2014	3.8	<0.02	0.16	<0.03	0.82	<0.02	NA	<0.02	<0.04	0.016	NA	<0.02	<0.02	<0.06	<0.02	NA	NA	<0.02
	6/3/2014	3.7	<0.02	0.12	<0.03	0.93	<0.02	NA	<0.02	<0.04	<0.08	NA	<0.08	<0.02	<0.06	<0.02	NA	NA	<0.02
	3/7/2014	4.0	0.026	0.14	0.032	1.1	<0.01	NA	<0.01	<0.02	<0.04	NA	<0.04	<0.01	<0.03	<0.01	NA	NA	<0.01
	11/11/2013	3.3	0.046	0.13	0.019	1.1	<0.005	NA	<0.005	<0.01	0.027	NA	<0.005	0.0066	<0.015	<0.005	NA	NA	<0.005
	9/4/2013 [2]	2.6	<0.005	0.063	<0.0075	0.94	<0.005	NA	<0.005	<0.01	0.024	NA	<0.005	0.006	<0.015	<0.005	NA	NA	<0.005
	6/13/2013	3.4	<0.01	0.073	<0.015	1.3	<0.01	NA	<0.01	<0.02	<0.04	NA	<0.01	<0.01	<0.03	<0.01	NA	NA	<0.01
	3/19/2013	2.8	<0.01	0.065	<0.015	1.3	<0.01	NA	<0.01	<0.02	<0.04	NA	<0.01	<0.01	<0.03	<0.01	NA	NA	<0.01
	11/27/2012	2.7	<0.01	0.056	<0.015	1.4	<0.01	NA	<0.01	<0.02	<0.04	NA	<0.01	<0.01	<0.03	<0.01	NA	NA	<0.01
	8/23/2012	2.1	<0.01	0.037	<0.015	1.6	<0.01	NA	<0.01	<0.02	<0.04	NA	<0.01	<0.01	<0.03	<0.01	NA	NA	<0.01
	6/14/2012	2.6	<0.01	0.053	<0.015	1.2	<0.01	NA	<0.01	<0.02	<0.04	NA	<0.01	<0.01	<0.01	<0.01	NA	NA	<0.01
	3/21/2012	2.3	<0.01	0.051	<0.015	1.4	<0.01	NA	<0.01	<0.02	<0.04	NA	<0.01	<0.01	<0.01	<0.01	NA	NA	<0.01
	12/13/2011	1.5	<0.005	0.036	<0.0075	1.3	<0.005	NA	<0.005	<0.01	0.021	NA	<0.005	0.007	<0.005	<0.005	NA	NA	<0.005
	10/24/2011	1.4	<0.005	0.045	<0.0075	1.4	<0.005	NA	<0.005	<0.01	0.022	NA	<0.005	0.008	<0.005	<0.005	NA	NA	<0.005
	6/20/2011	1.8	0.0015	0.0610	<0.0015	1.6	0.001	NA	0.002	0.002	0.020	NA	0.001	0.007	<0.001	0.002	NA	NA	0.002
	2/24/2011	1.3	0.0019	0.0420	<0.0015	1.4	0.001	NA	0.002	<0.002	0.019	NA	<0.001	0.005	<0.001	0.001	NA	NA	0.003
	11/8/2010	0.63	<0.001	0.0180	<0.0015	1.3	0.001	NA	0.002	<0.002	0.022	NA	<0.001	0.004	<0.001	<0.001	NA	NA	0.003
	9/22/2010	0.47	<0.001	0.0083	<0.0015	1.4	<0.001	NA	0.002	<0.002	0.022	NA	<0.001	0.003	<0.001	<0.001	NA	NA	0.003
	6/7/2010	0.33	0.0018	0.0085	<0.0015	1.4	0.001	NA	0.002	<0.002	0.020	NA	<0.001	0.003	<0.001	<0.001	NA	NA	0.002
	3/24/2010	0.25	<0.005	0.0100	<0.0075	1.5	<0.005	<0.005	<0.005	<0.01	<0.02	<0.005	<0.005	<0.005	<0.005	<0.005	NA	NA	<0.005
RW-1	9/18/2014	37	35.0	1.8	10	1.2	<1.0	<1.0	NA	<2.0	<4.0	<4.0	NA	<1.0	NA	<1.0	0.037	NA	<1.0
	9/16/2013	54	35	2.4	13	2.2	1.3	<1.0	NA	<2.0	<4.0	<4.0	NA	<1.0	NA	<1.0	0.087	NA	<1.0
	8/23/2012	45	82	4.9	31	3.1	2.8	<1.0	NA	<2.0	<4.0	<4.0	NA	<0.01	NA	<0.01	0.21	NA	NA
	10/3/2011	51	37	3.7	23	2.9	5.8	0.98	NA	0.6	0.15	0.15	NA	<0.01	NA	0.4	<0.1	NA	NA
RW-2	9/18/2014	40	4.5	0.86	2.5	1.9	0.15	<0.1	NA	<0.2	<0.4	<0.4	NA	<0.1	NA	<0.1	0.084	NA	NA
	9/16/2013	48	3.4	0.87	2.3	2.8	0.13	<0.1	NA	<0.2	<0.4	<0.4	NA	<0.1	NA	<0.1	0.15	NA	NA
	8/23/2012	42	2.6	0.59	1.7	3.3	<0.1	<0.1	NA	<0.2	<0.4	<0.4	NA	<0.1	NA	<0.1	0.22	NA	NA
	10/3/2011	39	5.3	0.57	1.5	3.7	0.098	0.024	NA	0.057	0.054	<0.04	NA	<0.01	NA	0.036	0.16	NA	NA

Table 2 - Groundwater Analyses
Western Refining Southwest, Inc. - Gallup Refinery

		Benzene (mg/L)	Toluene (mg/L)	Ethyl Benzene (mg/L)	Total Xylenes (mg/L)	MTBE (mg/L)	1,2,4-Trimethyl benzene (mg/L)	1,3,5-Trimethyl benzene (mg/L)	1,2-Dichloro ethane (EDC) (mg/L)	Naphthalene (mg/L)	1-Methyl naphthalene (mg/L)	2-Methylnaphthalene (mg/L)	1,1-Dichloroethane (mg/L)	Isopropyl benzene (mg/L)	n-Butylbenzene (mg/L)	n-Propylbenzene (mg/L)	2,4-Dimethylphenol (mg/L)	Acetone (mg/L)	Sec-butylbenzene (mg/L)
WQCC 20NMAC 6.2.3103		0.01	**0.75**	0.75	**0.62**	NE	NE	NE	0.01	NE	NE	NE	**0.025**	NE	NE	NE	NE	NE	NE
40 CFR 141.62 MCL		**0.005**	1.0	**0.7**	10	NE	NE	NE	**0.005**	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
NMED Tap Water (DEC 2014)		0.00454	1.1	0.0149	0.193	**0.143**	NE	NE	0.002	**0.00165**	NE	NE	0.0275	**0.447**	NE	NE	**0.354**	**14.1**	NE
EPA RSL for Tap Water (JAN 2015)		0.00045	0.11	0.0015	0.019	0.014	**0.0015**	**0.012**	0.0017	0.00017	**0.0011**	**0.15**	0.0027	0.045	**0.1**	**0.066**	0.73	22	**0.2**
Well ID	DATE SAMPLED																		
RW-5	9/18/2014	**0.35**	<0.01	0.11	0.056	<0.01	**0.045**	0.011	NA	**0.1**	**0.084**	0.11	NA	0.012	NA	0.039	<0.01	NA	0.01
	9/16/2013	**0.37**	<0.01	0.11	0.089	<0.01	**0.09**	**0.022**	NA	**0.12**	**0.097**	0.13	NA	<0.01	NA	0.031	<0.01	NA	<0.01
	8/23/2012	**0.19**	<0.01	0.26	0.091	0.032	**0.054**	**0.016**	NA	**0.11**	**0.11**	**0.17**	NA	<0.01	NA	**0.068**	<0.01	NA	0.013
	10/3/2011	**0.56**	<0.01	0.21	0.26	0.095	**0.13**	**0.046**	NA	**0.17**	**0.11**	**0.16**	NA	0.01	NA	0.04	<0.01	NA	NA
RW-6	9/18/2014	**0.47**	0.23	0.45	**1.3**	0.046	**0.17**	**0.17**	NA	**0.57**	**0.19**	**0.28**	NA	0.045	NA	**0.11**	<0.01	NA	<0.01
	9/16/2013	**0.68**	<0.05	0.18	**1.1**	<0.05	**0.28**	**0.14**	NA	**0.48**	**0.2**	**0.27**	NA	<0.05	NA	<0.05	<0.01	NA	<0.05
	8/23/2012	**0.74**	0.052	0.4	**1.6**	0.073	**0.38**	**0.17**	NA	**0.58**	**0.22**	**0.36**	NA	<0.05	NA	**0.074**	<0.01	NA	<0.05
	10/3/2011	**0.87**	0.029	0.33	<0.015	<0.01	**0.42**	**0.16**	NA	**0.52**	**0.21**	**0.31**	NA	0.043	NA	**0.078**	<0.1	NA	NA

All values expressed in milligrams per liter

DEFINITIONS

NE = Not established

NA = Not analyzed

Bold and highlighted values represent values above the applicable standards

Bold screening level is applicable screening under RCRA Permit

STANDARDS

WQCC 20 NMAC 6.2.3103 - Standards for Ground Water of 10,000 mg/l TDS Concentration or Less.

a) Human Health Standards; b) Other Standards for Domestic Water

40 CFR 141.62 Maximum Contaminant Levels

EPA Regional Screening Level (RSL) Summary Table

NMED Tap Water (Dec. 2014)

Table 3 - Fluid Level Measurements
Western Refining Southwest, Inc. - Gallup Refinery

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	Stick-up length (ft)	2011 Survey [1] Well Casing Bottom Elevations	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)	Stratigraphic unit screened
12/10/1980	OW-13	3/19/2013	4.00	6,918.95	6,920.07	6,915.33	1.12	6,820.92	99.15	NPP	NPP	22.54	6,897.53	N/A	78.2 - 98.2	Sonsela
		6/13/2013	4.00	6,918.95	6,920.07	6,915.33	1.12	6,820.92	99.15	NPP	NPP	22.74	6,897.33	N/A	78.2 - 98.2	Sonsela
		9/3/2013	4.00	6,918.95	6,920.07	6,915.33	1.12	6,820.92	99.15	NPP	NPP	22.80	6,897.27	N/A	78.2 - 98.2	Sonsela
		11/11/2013	4.00	6,918.95	6,920.07	6,915.33	1.12	6,820.92	99.15	NPP	NPP	22.38	6,897.69	N/A	78.2 - 98.2	Sonsela
		3/7/14	4.00	6,918.95	6,920.07	6,915.33	1.12	6,820.92	99.15	NPP	NPP	21.77	6,898.30	N/A	78.2 - 98.2	Sonsela
		6/3/14	4.00	6,918.95	6,920.07	6,915.33	1.12	6,820.92	99.15	NPP	NPP	21.95	6,898.12	N/A	78.2 - 98.2	Sonsela
		9/15/14	4.00	6,918.95	6,920.07	6,915.33	1.12	6,820.92	99.15	NPP	NPP	22.61	6,897.46	N/A	78.2 - 98.2	Sonsela
		11/10/14	4.00	6,918.95	6,920.07	6,915.33	1.12	6,820.92	99.15	NPP	NPP	22.45	6,897.62	N/A	78.2 - 98.2	Sonsela
12/17/1980	OW-14	3/19/2013	4.00	6,924.55	6,926.65	6,924.40	2.10	6,880.13	46.52	NPP	NPP	24.79	6,901.86	N/A	35 - 45	Chinle/Alluvium Interface
		6/13/2013	4.00	6,924.55	6,926.65	6,924.40	2.10	6,880.13	46.52	NPP	NPP	24.89	6,901.76	N/A	35 - 45	Chinle/Alluvium Interface
		9/3/2013	4.00	6,924.55	6,926.65	6,924.40	2.10	6,880.13	46.52	NPP	NPP	24.92	6,901.73	N/A	35 - 45	Chinle/Alluvium Interface
		11/11/2013	4.00	6,924.55	6,926.65	6,924.40	2.10	6,880.13	46.52	NPP	NPP	24.59	6,902.06	N/A	35 - 45	Chinle/Alluvium Interface
		3/7/14	4.00	6,924.55	6,926.65	6,924.40	2.10	6,880.13	46.52	NPP	NPP	24.12	6,902.53	N/A	35 - 45	Chinle/Alluvium Interface
		6/3/14	4.00	6,924.55	6,926.65	6,924.40	2.10	6,880.13	46.52	NPP	NPP	24.15	6,902.50	N/A	35 - 45	Chinle/Alluvium Interface
		9/15/14	4.00	6,924.55	6,926.65	6,924.40	2.10	6,880.13	46.52	NPP	NPP	24.40	6,902.25	N/A	35 - 45	Chinle/Alluvium Interface
		11/10/14	4.00	6,924.55	6,926.65	6,924.40	2.10	6,880.13	46.52	NPP	NPP	24.25	6,902.40	N/A	35 - 45	Chinle/Alluvium Interface
3/28/1995	RW-1	3/26/2013	4.00	6,942.86	6,946.06	6,941.25	3.20	6,903.02	43.04	29.11	3.49	32.60	6,913.46	6916.25	25 - 40	Chinle/Alluvium Interface
		6/17/2013	4.00	6,942.86	6,946.06	6,941.25	3.20	6,903.02	43.04	29.37	3.73	33.10	6,912.96	6915.94	25 - 40	Chinle/Alluvium Interface
		9/16/2013	4.00	6,942.86	6,946.06	6,941.25	3.20	6,903.02	43.04	28.75	4.34	33.09	6,912.97	6916.44	25 - 40	Chinle/Alluvium Interface
		11/12/2013	4.00	6,942.86	6,946.06	6,941.25	3.20	6,903.02	43.04	28.73	4.38	33.11	6,912.95	6916.45	25 - 40	Chinle/Alluvium Interface
		3/14/14	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	6917.24	25 - 40	Chinle/Alluvium Interface
		6/9/14	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	6917.01	25 - 40	Chinle/Alluvium Interface
		9/18/14	4.00	6,942.86	6,946.06	6,941.25	3.20	6,903.02	43.04	28.31	NR	NR	NR	N\A	25 - 40	Chinle/Alluvium Interface
		11/13/14	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	6916.93	25 - 40	Chinle/Alluvium Interface
3/29/1995	RW-2	3/26/2013	4.00	6,926.40	6,928.53	6,925.02	2.13	6,888.73	39.80	NPP	NPP	24.74	6,903.79	6901.66	26.1 - 36.1	Chinle/Alluvium Interface
		6/17/2013	4.00	6,926.40	6,928.53	6,925.02	2.13	6,888.73	39.80	NPP	NPP	24.80	6,903.73	6901.6	26.1 - 36.1	Chinle/Alluvium Interface
		9/16/2013	4.00	6,926.40	6,928.53	6,925.02	2.13	6,888.73	39.80	NPP	NPP	24.64	6,903.89	6901.76	26.1 - 36.1	Chinle/Alluvium Interface
		11/12/2013	4.00	6,926.40	6,928.53	6,925.02	2.13	6,888.73	39.80	NPP	NPP	24.66	6,903.87	6901.74	26.1 - 36.1	Chinle/Alluvium Interface
		17/03/2014	4.00	6,926.40	6,928.53	6,925.02	2.13	6,888.73	39.80	NPP	NPP	24.59	6,903.94	6903.94	26.1 - 36.1	Chinle/Alluvium Interface
		09/06/2014	4.00	6,926.40	6,928.53	6,925.02	2.13	6,888.73	39.80	NPP	NPP	23.79	6,904.74	6904.74	26.1 - 36.1	Chinle/Alluvium Interface
		18/09/2014	4.00	6,926.40	6,928.53	6,925.02	2.13	6,888.73	39.80	NPP	NPP	23.95	6,904.58	6904.58	26.1 - 36.1	Chinle/Alluvium Interface
		13/11/2014	4.00	6,926.40	6,928.53	6,925.02	2.13	6,888.73	39.80	NPP	NPP	23.90	6,904.63	6904.63	26.1 - 36.1	Chinle/Alluvium Interface
8/27/1997	RW-5	3/26/2013	4.00	6,941.53	6,943.57	6,940.82	2.04	6,903.98	39.59	NPP	NPP	29.45	6,914.12	6912.08	29.5 - 39.5	Chinle/Alluvium Interface
		6/17/2013	4.00	6,941.53	6,943.57	6,940.82	2.04	6,903.98	39.59	NPP	NPP	29.44	6,914.13	6912.09	29.5 - 39.5	Chinle/Alluvium Interface
		9/16/2013	4.00	6,941.53	6,943.57	6,940.82	2.04	6,903.98	39.59	NPP	NPP	28.98	6,914.59	6912.55	29.5 - 39.5	Chinle/Alluvium Interface
		11/12/2013	4.00	6,941.53	6,943.57	6,940.82	2.04	6,903.98	39.59	NPP	NPP	28.96	6,914.61	6912.57	29.5 - 39.5	Chinle/Alluvium Interface
		14/03/2014	4.00	6,941.53	6,943.57	6,940.82	2.04	6,903.98	39.59	NPP	NPP	27.92	6,915.65	6915.65	29.5 - 39.5	Chinle/Alluvium Interface
		09/06/2014	4.00	6,941.53	6,943.57	6,940.82	2.04	6,903.98	39.59	NPP	NPP	28.80	6,914.77	6914.77	29.5 - 39.5	Chinle/Alluvium Interface
		18/09/2014	4.00	6,941.53	6,943.57	6,940.82	2.04	6,903.98	39.59	NPP	NPP	28.81	6,914.76	6914.76	29.5 - 39.5	Chinle/Alluvium Interface
		13/11/2014	4.00	6,941.53	6,943.57	6,940.82	2.04	6,903.98	39.59	NPP	NPP	28.70	6,914.87	6914.87	29.5 - 39.5	Chinle/Alluvium Interface

Table 3 - Fluid Level Measurements
Western Refining Southwest, Inc. - Gallup Refinery

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	Stick-up length (ft)	2011 Survey [1] Well Casing Bottom Elevations	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)	Stratigraphic unit screened
8/27/1997	RW-6	3/26/2013	4.00	6,941.96	6,944.01	6,941.49	2.05	6,903.11	40.90	NPP	NPP	29.59	6,914.42	6912.37	28.5 - 38.5	Chinle/Alluvium Interface
		6/17/2013	4.00	6,941.96	6,944.01	6,941.49	2.05	6,903.11	40.90	NPP	NPP	29.52	6,914.49	6912.44	28.5 - 38.5	Chinle/Alluvium Interface
		9/16/2013	4.00	6,941.96	6,944.01	6,941.49	2.05	6,903.11	40.90	NPP	NPP	29.13	6,914.88	6912.83	28.5 - 38.5	Chinle/Alluvium Interface
		11/12/2013	4.00	6,941.96	6,944.01	6,941.49	2.05	6,903.11	40.90	NPP	NPP	29.10	6,914.91	6912.86	28.5 - 38.5	Chinle/Alluvium Interface
		17/03/2014	4.00	6,941.96	6,944.01	6,941.49	2.05	6,903.11	40.90	NPP	NPP	28.04	6,915.97	6915.97	28.5 - 38.5	Chinle/Alluvium Interface
		23/06/2014	4.00	6,941.96	6,944.01	6,941.49	2.05	6,903.11	40.90	NPP	NPP	28.85	6,915.16	6915.16	28.5 - 38.5	Chinle/Alluvium Interface
		18/09/2014	4.00	6,941.96	6,944.01	6,941.49	2.05	6,903.11	40.90	NPP	NPP	28.89	6,915.12	6915.12	28.5 - 38.5	Chinle/Alluvium Interface
		13/11/2014	4.00	6,941.96	6,944.01	6,941.49	2.05	6,903.11	40.90	NPP	NPP	28.83	6,915.18	6915.18	28.5 - 38.5	Chinle/Alluvium Interface

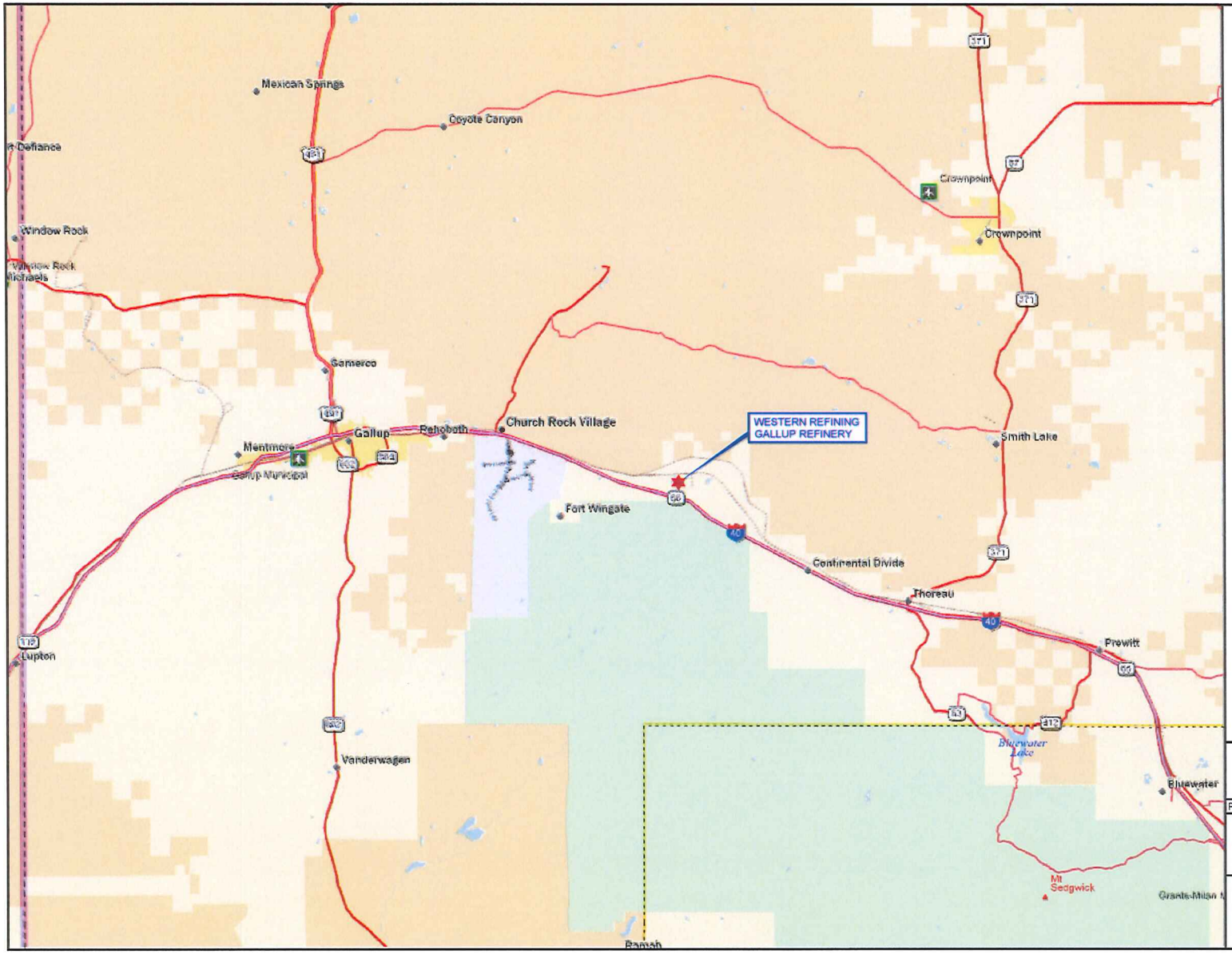
DEFINITIONS:

N\A - Not applicable
SPH = Separate Phase Hydrocarbons
NPP - No Product Present
NR - Not recorded

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)

Figures



Map Source: DeLorme Street Atlas USA 2007 Plus.

N

0 5
SCALE IN MILES

Western Refining
GALLUP REFINERY

PROJ. NO.: Western Refining | DATE: 07/13/14 | FILE: WestRef-B198

FIGURE 1
SITE LOCATION MAP
GALLUP REFINERY

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

Aerial Map Source: Google Map, 01/05/2014.

N

0 260
SCALE IN FEET

LEGEND

OW-14 CHINLE/ALLUVIUM INTERFACE WELL LOCATION AND IDENTIFICATION NUMBER

OW-13 SONSELA MONITORING WELL LOCATION AND IDENTIFICATION NUMBER

NEW MEXICO

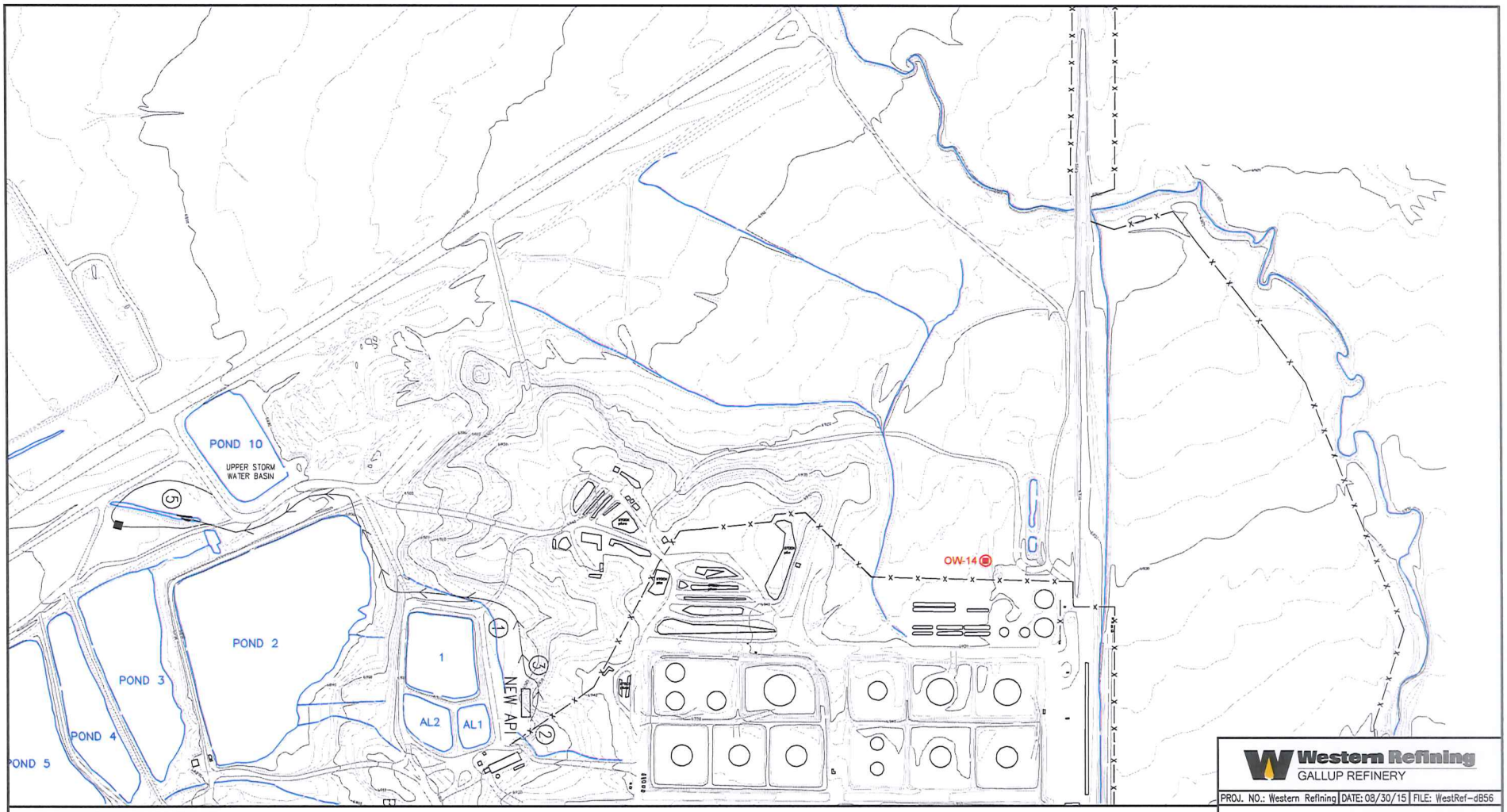
GALLUP SITE LOCATION

Western Refining
GALLUP REFINERY

PROJ. NO.: Western Refining | DATE: 08/30/15 | FILE: WestRef-dB55

FIGURE 2
SITE MAP

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



Western Refining
GALLUP REFINERY

PROJ. NO.: Western Refining | DATE: 08/30/15 | FILE: WestRef-d856

FIGURE 3
TOPOGRAPHIC MAP

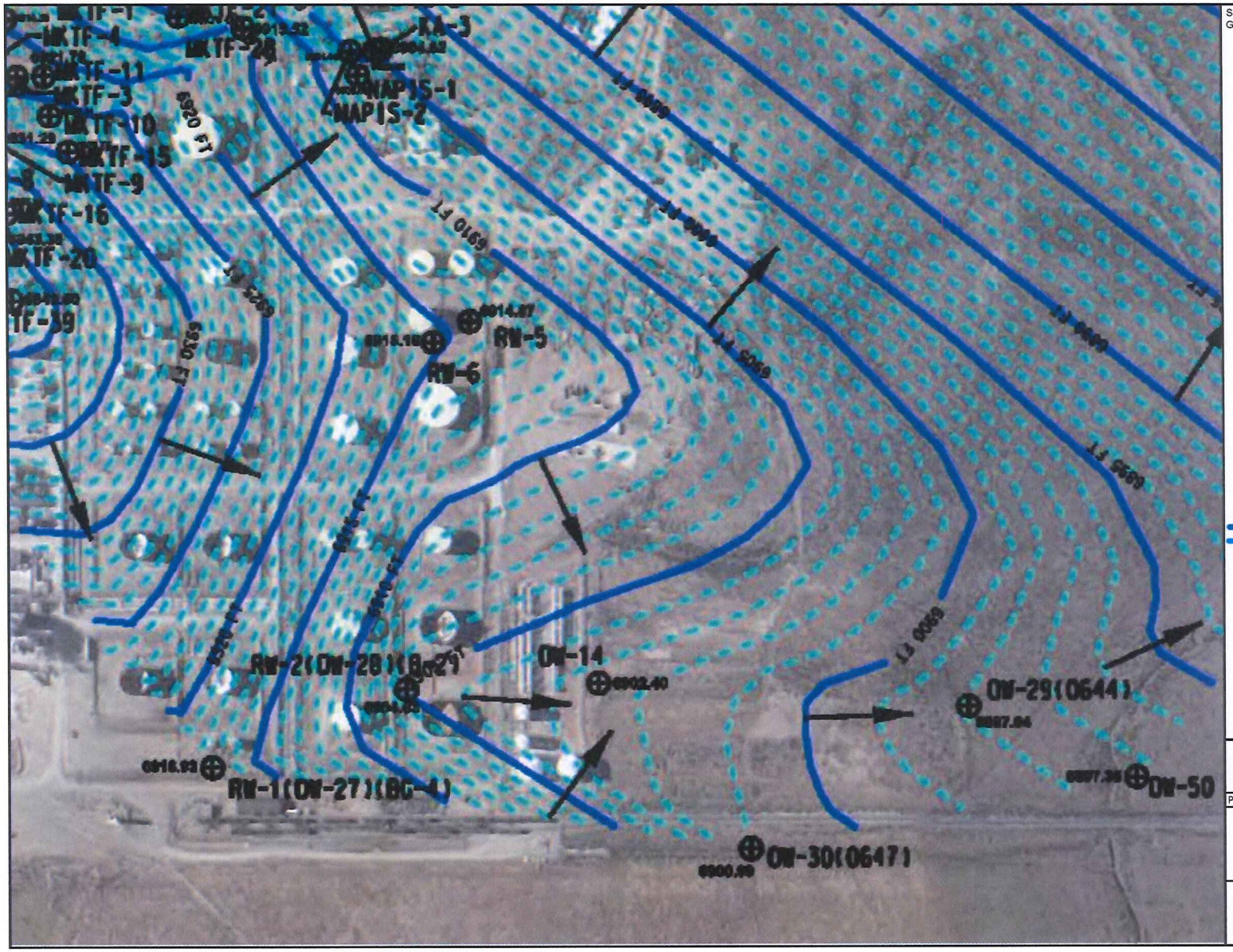
N

0 300
SCALE IN FEET

LEGEND

OW-14 CHINLE/ALLUVIUM INTERFACE WELL LOCATION AND IDENTIFICATION NUMBER

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



Source: psi / Western Refining Southwest Inc. - Facility Wide Ground Water Monitoring Work Plan - 2014 Updates for 2015.

0 220
APPROXIMATE SCALE IN FEET

NEW MEXICO

GALLUP SITE LOCATION

LEGEND

6900 FT — POTENTIOMETRIC SURFACE CONTOUR (FT ABOVE MSL)

FLOW DIRECTION

6891.68 — WATER LEVEL (FT ABOVE MSL) MEASURED ON 11/11/2014

Western Refining
GALLUP REFINERY

PROJ. NO.: Western Refining | DATE: 08/30/15 | FILE: WestRef-d857

FIGURE 4

ALLUVIUM / CHINLE GP INTERFACE WATER ELEVATION MAP

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

Aerial Map Source: Google Map, 01/05/2014.

N

0 160
SCALE IN FEET

LEGEND

OW-14 CHINLE/ALLUVIUM INTERFACE WELL LOCATION AND IDENTIFICATION NUMBER

PROPOSED WELL LOCATION AND IDENTIFICATION NUMBER

GALLUP SITE LOCATION

Western Refining
GALLUP REFINERY

PROJ. NO.: Western Refining | DATE: 08/30/15 | FILE: WestRef-d858

FIGURE 5
WELL LOCATION MAP

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

Appendix A
Boring Logs

PRECISION ENGINEERING, INC.

PROJECT: Tank 569
LOCATION: See Boring Plan

LOG OF TEST BORINGS

FILE #: 95-018
ELEVATION: 6943.7
TOTAL DEPTH: 48.5
LOGGED BY: WHK
DATE: 3-28-95
STATIC WATER: 28.0
BORING ID: BG4
PAGE: 1

DEPTH	PLOT	SAMPLE	SAMPLE	MATERIAL CHARACTERISTICS (MOISTURE,CONDITION,COLOR,GRAINSIZE,ETC.)	PID (ppm)
0.0-0.3	*********		C	**Sand**, fine, dry, brown, loose	
0.3-0.4	xxxxxxxxx	1.0	C	**Asphalt Cement Concrete**	11.0
0.4-5.0	///***///		C	**Clay**, sandy, wet, brown, firm, (fill), odor below 3.9', water saturated @ 4.8'	>1438
	///***///		C	bottom of fill is at 4.8'	
	///***///		C		
	///***///		C		
	///***///		C		
	///***///		C		
	///***///		C		
	///***///		C		
5.0-11.8	///--+///	5.0	C	**Clay**, silty, blocky, wet, brown, firm, scattered carbonate filaments, some	0.0
	///--+///		C	nodules, native, no odor, redder >10'	
	///--+///		C		
	///--+///		C		
	///--+///		C		
	///--+///		C		
	///--+///		C		
	///--+///		C		
	///--+///		C		
	///--+///		C		
	///--+///		C		
	///--+///		C		
	///--+///		C		
	///--+///	11	C		
	///--+///		C		
11.8-13.0	///***///	12	C	**Clay**, sandy, very fine, wet, red brown to brown, soft	0.0
	///***///		C		
13.0-14.1	////+++//	13	C	**Clay**, stiff, fissured, wet, brown, some carbonate nodules	0.0
	////+++//		C		
14.1-14.6	*********	14	C	**Sand**, fine, clean, damp, white, loose	0.0
14.6-15.0	///**0*//		C	**Clay**, sandy, slightly gravelly, wet, brown, very stiff to hard	0.0
15.0-16.9	///**////	15	C	**Clay**, very fine sandy, laminar bedded, wet, brown, soft	0.0
	///**////		C		
	///**////		C		
	///**////		C		
16.9-18.1	///*/////	17	C	**Clay**, very fine sandy, slightly less than above, slightly blocky, wet, brown, firm	0.0
	///*/////		C		
	///*/////	18	C		
18.1-19.8	****//***		C	**Sand**, some clay, sandy in bands, moist to wet, brown, moderately dense to soft	0.0
	****//***		C	interbedded with finer soil	
19.8-21.3	000***000		C	**Gravel**, sandy, moist, light grey to white, dense, subrounded	0.0
	000***000	20	C		
	000***000		C		
	000***000	21	C		
21.3-21.8	///***///		C	**Clay**, sandy, wet, brown, soft	
21.8-25.5	000**/000	22	C	**Gravel**, slightly sandy, some clay as binder, moist, grey to brown, dense	
	000**/000		C	odor @ 24.4'	20 @ 22.5'
	000**/000		C		

LOGGED BY: WHK

SIZE AND TYPE OF BORING: 4'-1/4" HSA

PRECISION ENGINEERING, INC.

PROJECT: Tank 569
LOCATION: See Boring Plan

LOG OF TEST BORINGS

FILE #: 95-018
ELEVATION: 6943.7
TOTAL DEPTH: 48.5
LOGGED BY: WHK
DATE: 3-28-95
STATIC WATER: 28.0
BORING ID: BG4
PAGE: 2

DEPTH	PLOT	SAMPLE	SAMPLE TYPE	MATERIAL CHARACTERISTICS (MOISTURE,CONDITION,COLOR,GRAINSIZE,ETC.)	PID (ppm)
	000**/000		C	continued from page 1	
	000**/000	24	C		
	000**/000		C		160 @ 24.4'
	000**/000	25	C		
25.5-29.4	*********		C	Sand, fine, clean of silt and clay, moist, brown, loose	45.0
	*********	26	C		
	*********		C		
	*********		C		
	*********		C		
	*********		C		
	*********		C		
	*********	29	C		
29.4-30.5	*********		C	Sand as above but very weakly water bearing @ 29.4', grey to black, strong odor	1100
	*********	30	C		
30.5-31.2	///***///		C	Clay, sandy, wet, brown, soft, odor	770
	///***///	31	C		
31.2-34.0	///+++///		C	Clay, blocky, wet, very stiff, numerous carbonate filaments, brown, slightly	770
	///+++///		C	fissured, odor	
	///+++///		C		
	///+++///		C		
	///+++///		C		
34.0-35.0	***---***	34	C	Sand, silty, very fine, does not appear water bearing, but sample covered with	700
	---		C	water from above, very dark brown to black, soft, strong odor	
35.0-37.3	***///***	35	C	Sand, very fine, clayey, saturated, water bearing zones--2" thick, gradational to	1000
	///		C	clay below, brown, strong odor	
	///		C		
	///		C		
	///	37	C		
37.3-39.2	///+++///		C	Clay, wet, brown, stiff, carbonate filaments, soft to firm, not blocky or fissured	320
	///+++///		C		
	///+++///		C		
	///+++///	39	C		
39.2-40.9	000**/000		C	Gravel, sandy, slightly clayey, water bearing, brown, dense, rounded to subrounded	800
	000**/000		C	odor	
	000**/000		C		
40.9-45.0	----*----	41	C	CHINLE FORMATION	
	----*----		C	Shale, slightly sandy, fissle, fissured, slightly blocky, moist, red brown, hard	2.0
	----*----		C	some grey green banding, no odor	
	----*----		C		
	----*----		C		
	----*----		C		
	----*----		C		
	----*----		C		
45.0-48.5	----**---	45	C	Shale, sandy, fissle, moist to damp, hard, water from above runs into fissle	
	----**---		C	partings (dry on interior of sample) difficult to obtain uncontaminated sample	
	----**---		C	dark red brown, suspect samples taken may be contaminated by water from above	

LOGGED BY: WHK

SIZE AND TYPE OF BORING: 4'-1/4" HSA

PRECISION ENGINEERING, INC.

PROJECT: Tank 569
LOCATION: See Boring Plan

LOG OF TEST BORINGS

FILE #: 95-018
ELEVATION: 6943.7
TOTAL DEPTH: 48.5
LOGGED BY: WHK
DATE: 3-28-95
STATIC WATER: 28'-7"
BORING ID: BG4
PAGE: 3

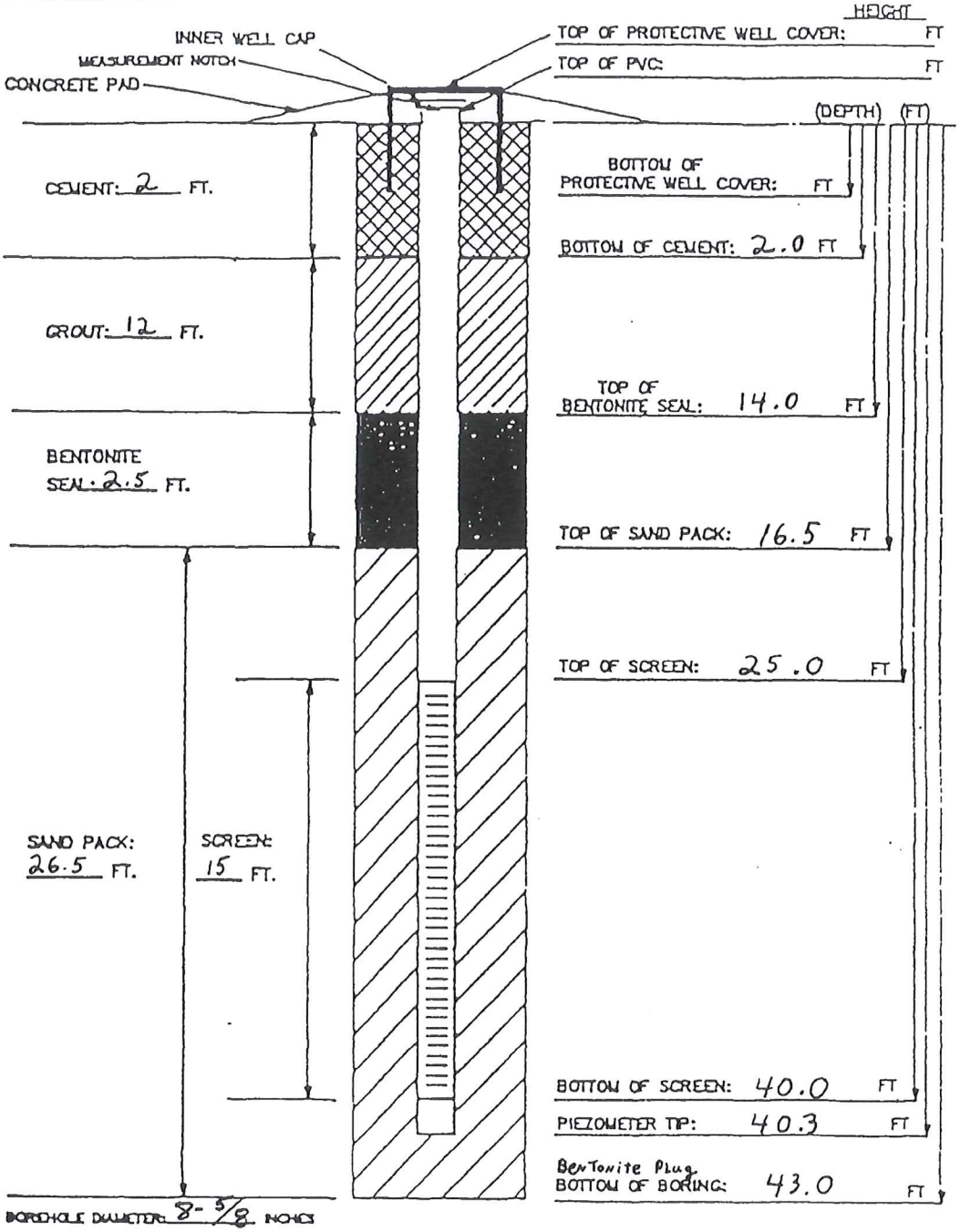
DEPTH	PLOT	SAMPLE	SAMPLE TYPE	MATERIAL CHARACTERISTICS (MOISTURE,CONDITION,COLOR,GRAINSIZE,ETC.)	PID (ppm)
	----**---		C	continued from page 2	
	----**---	47	C		23 @ 47.0'
	----**---		C		
	----**---	48	C		
	----**---		C		12 @ 48.5'
TD				stop drilling 11:05a	
				water @ 18.8' @ 11:30a -- 8" of hydrocarbon on water @ 2:00p water level @ 28'-7"	
				completed 4" well, screened from 25' to 40'	
				(see attached completion diagram)	

LOGGED BY: WHK

SIZE AND TYPE OF BORING: 4'-1/4" HSA

INSTALLATION DATE: 032895

INSTALLATION DIAGRAM
MONITORING WELL NO.
B6-4



MATERIALS USED:

SAND TYPE AND QUANTITY: 20-40
BENTONITE PELLETS (5-GALLON BUCKETS): 1
BAGS OF GROUT: 1
AMOUNT OF CEMENT: 8-94# Bags + 75# Gel
AMOUNT OF WATER USED: 8 gal
OTHER:

Bottom Cap Used? YES
Screen Lengths: 15'
Riser Used: 30'
Top Cap Used? ____
Well Size: 4" Dia.

J-Plug Used? YES
Flush Mount Vault ____
Avove Ground Vault YES
Bollards, No.& Size:

TASK: Tank 569 GEOLOGIST/ENGINEER: WHK

PRECISION ENGINEERING, INC.

PROJECT: Tank 569
LOCATION: See Boring Plan
Tank 576

LOG OF TEST BORINGS

FILE #: 95-018
ELEVATION: 6927.3
TOTAL DEPTH: 38.0
LOGGED BY: WHK
DATE: 3-29-95
STATIC WATER: 24'-3"
BORING ID: B2
PAGE: 1

DEPTH	PLOT	SAMPLE	SAMPLE	MATERIAL CHARACTERISTICS (MOISTURE,CONDITION,COLOR,GRAINSIZE,ETC.)	PID (ppm)
0.0-5.0	///-*////		C	start at 10:00a	
	///-*////		C	Clay, slightly silty, little sand, wet, brown, soft to firm, no odor	0.0
	///-*////		C		
	///-*////		C		
	///-*////		C		
	///-*////		C		
	///-*////		C		
	///-*////		C		
	///-*////		C		
	///-*////		C		
	///-*////	5.0	C		
	///-*////		C		
	///-*////		C		
	///-*////		C		
	///-*////		C		
	///-*////		C		
	///-*////		C		
	///-*////	8.0	C		
8.4-10.6	///***///		C	Clay, fine sandy, gradational fine above and to below, wet, brown, firm, no odor	0.0
	///***///		C		
	///***///		C		
	///***///	10	C		
10.6-12.0	***---***		C	Sand, silty, fine, moist, light red brown, loose, no odor	0.0
	---		C		
	---		C		
12.0-12.5	***000***	12	C	Sand, very gravelly, to 2", moist, light red brown, dense, slightly rounded rock	0.0
12.5-13.1	***---***		C	Sand, silty, moist, light red brown, loose, no odor	0.0
13.1-15.0	///**--//	13	C	Clay, sandy, silty, moist, red brown, firm to stiff, some root filaments	0.0
	///**--//		C		
	///**--//		C		
	///**--//		C		
15.0-16.8	***///***	15	C	Sand, clayey, fine, moist, red brown, moderately dense, no odor	0.0
	///		C		
	///		C		
	///		C		
16.8-19.1	//*++-///	17	C	Clay, silty grading to very fine sandy, moist to wet, red brown, stiff, no odor	0.0
	//*++-///		C	carbonate filaments common	
	//*++-///		C		
	//*++-///		C		
	//*++-///	19	C		
19.1-20.0	//--oo++/		C	Clay, silty, large gravel present (2"), wet, dark brown, hard, no odor	0.0
	//--oo++/	20	C	numerous carbonate filaments	
20.0-23.6	//--++///		C	Clay, silty, brown, stiff, slightly blocky, no odor, carbonate filaments	0.0
	//--++///		C		
	//--++///		C		
	//--++///		C		
	//--++///		C		540 @ 22.6'
	//--++///		C		

LOGGED BY: WHK

SIZE AND TYPE OF BORING: 4'-1/4" HSA

PRECISION ENGINEERING, INC.

PROJECT: Tank 569
LOCATION: See Boring Plan

LOG OF TEST BORINGS

FILE #: 95-018
ELEVATION: 6927.3
TOTAL DEPTH: 38.0
LOGGED BY: WHK
DATE: 3-29-95
STATIC WATER: 24'-3"
BORING ID: B2
PAGE: 2

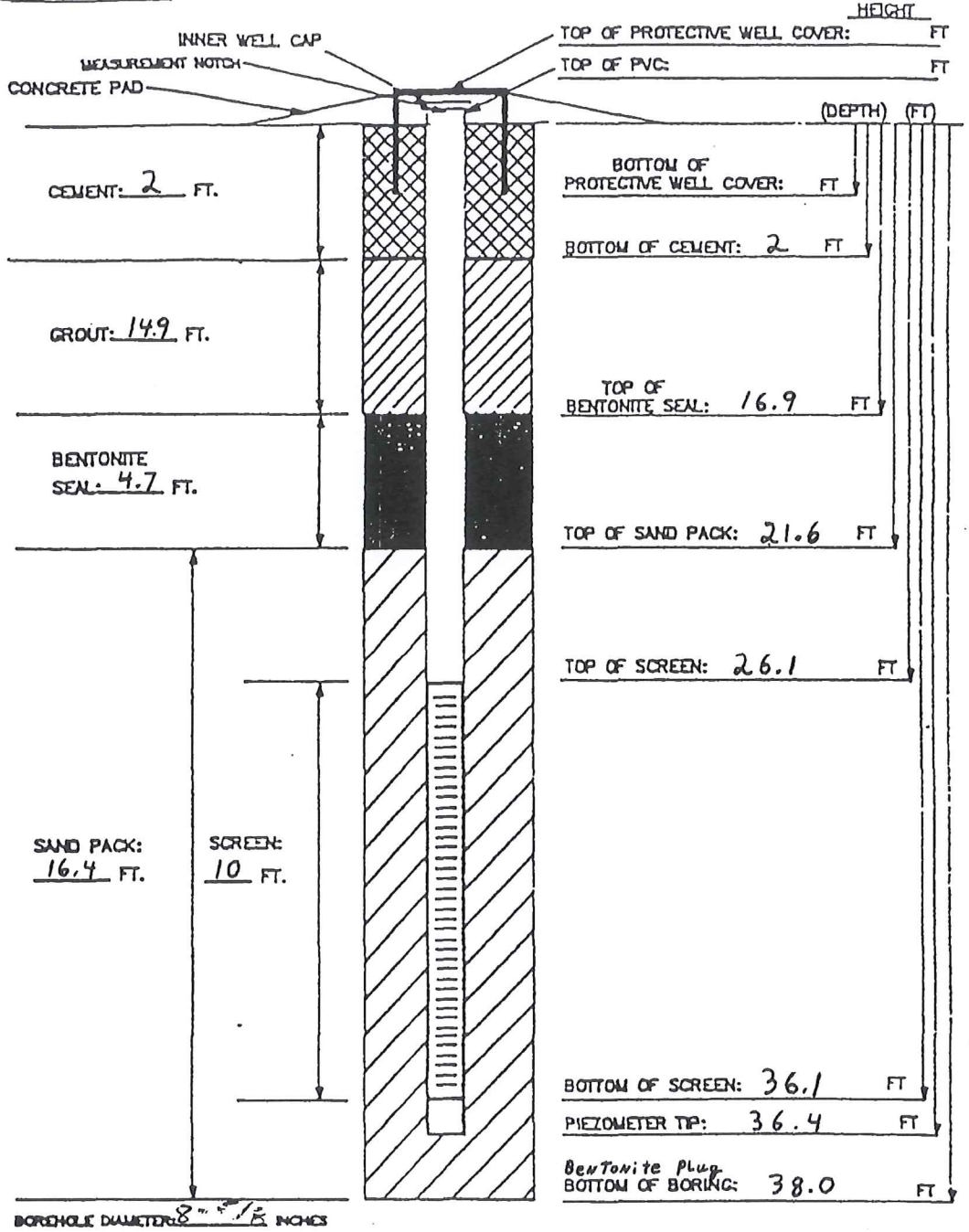
DEPTH	PLOT	SAMPLE	SAMPLE	MATERIAL CHARACTERISTICS (MOISTURE,CONDITION,COLOR,GRAINSIZE,ETC.)	PID (ppm)
23.6-24.2	***OO****		C	Sand, coarse, some fine gravel, saturated but does not appear water bearing, brown	1000
	OO*	24	C	dense, hydrocarbon odor	
24.2-25.5	/////////		C	Clay, wet, not water bearing, brown, stiff, hydrocarbon odor	1060
	/////////	25	C		
25.5-27.1	***///***		C	Sand, clayey, water bearing, brown, odor	610
	///		C		
	///		C		
27.1-28.5	/////////	27	C	Clay, some sand @ 28'-28.5', wet, brown, soft, slightly blocky, hydrocarbon odor	
	/////////		C	saturated but not water bearing	
	/////////	28	C		
28.5-30.9	///***///		C	Clay, sandy, some laminations, wet, brown, stiff	60
	///***///		C		
	///***///		C		
	///***///		C		
	///***///		C		
30.9-32.9	000**0000	31	C	Gravel, some sand, silica rock, water bearing, brown, dense, rounded to subrounded	1030
	000**0000		C		
	000**0000		C		
	000**0000		C		
32.9-35.0	----------	33	C	CHINLE FORMATION	
	----------		C	Shale, weathered, wet to moist, some green mottling, red brown overall, stiff	20
	----------		C	weak odor	
	----------		C		
35.0-38.0	----*-----	35	C	Shale, as above, slightly more sand, blocky, dark red brown, wet to moist	57
	----*-----		C	suspect contamination by water flowing from gravel above--gravel produces more	
	----*-----		C	water at this location than previous drilling	
	----*-----		C		
	----*-----		C		
	----*-----		C		
	----*-----	38	C		
TD				stop drilling 11:25a	
				completed 4" well - see attached well completion diagram	
				24'-3" to water	
				2" product on water	

LOGGED BY: WHK

SIZE AND TYPE OF BORING: 4'-1/4" HSA

INSTALLATION DATE: 032995

INSTALLATION DIAGRAM
MONITORING WELL NO.
B-2



MATERIALS USED:

SAND TYPE AND QUANTITY: 20-40
BENTONITE PELLETS (5-GALLON BUCKETS): 2
BAGS OF GROUT:
AMOUNT OF CEMENT: 8 - 94# Bags + 75# Gel
AMOUNT OF WATER USED: 8 Gal
OTHER:

Bottom Cap Used? YES
Screen Lengths: 10'
Riser Used: 30'
Top Cap Used?
Well Size: 4" Dia.

J-Plug Used? YES
Flush Mount Vault
Avove Ground Vault YES
Bollards, No.& Size:

TASK: Tank 569 GEOLOGIST/ENGINEER: WHK

Appendix B

Investigation Derived Waste Management Plan

Investigation Derived Waste (IDW) Management Plan

All IDW will be properly characterized and disposed of in accordance with all federal, State, and local rules and regulations for storage, labeling, handling, transport, and disposal of waste. The IDW may be characterized for disposal based on the known or suspected contaminants potentially present in the waste.

A dedicated decontamination area will be setup prior to any sample collection activities. The decontamination pad will be constructed so as to capture and contain all decontamination fluids (e.g., wash water and rinse water) and foreign materials washed off the sampling equipment. The fluids will be pumped directly into suitable storage containers (e.g., labeled 55-gallon drums), which will be located at satellite accumulation areas until the fluids are disposed in the refinery wastewater treatment system upstream of the API separator. The solids captured in the decontamination pad will be shoveled into 55-gallon drums and stored at the designated satellite accumulation area pending proper waste characterization for off-site disposal.

Drill cuttings generated during installation of soil borings will be placed directly into 55-gallon drums and staged in the satellite accumulation area pending results of the waste characterization sampling. The portion of soil cores, which are not retained for analytical testing, will be placed into the same 55-gallon drums used to store the associated drill cuttings.

The solids (e.g., drill cuttings and used soil cores) will be characterized by testing to determine if there are any hazardous characteristics in accordance with 40 Code of Federal Regulations (CFR) Part 261. This includes tests for ignitability, corrosivity, reactivity, and toxicity. If the materials are not characteristically hazardous, then further testing will be performed pursuant to the requirements of the facility to which the materials will be transported. Depending upon the results of analyses for individual investigation soil samples, additional analyses may include VOCs, TPH and polynuclear aromatic hydrocarbons (PAHs).