Western Refining
GALLUP

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February 5, 2010

CERTIFIED MAIL No. 7008 2810 0000 4726 2069

Hope Monzeglio
Hazardous Waste Bureau
New Mexico Environmental Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303

RE: **INVESTIGATION WORK PLAN SWMU No. 14 Old API SEPARATOR, WESTERN REFINING SOUTHWEST INC., GALLUP REFINERY; EPA ID #NMD000333211**

Dear Ms. Monzeglio,

Enclosed please find the Investigation Work Plan prepared by RPS for the SWMU No. 14 Old API Separator (OAPIS). The purpose of the site investigation is to determine and evaluate the presence, nature, and extent of releases of contaminants in accordance with 20.4.1.500 NMAC incorporating 40 CFR Section 264.101. The investigation activities will be conducted in accordance with Section IV.B.5 of the Post-Closure Care Permit.

Please feel free to contact me at 505-722-0217 with any questions.

Sincerely,

Ed Riege
Environmental Manager

cc: Carl Chavez OCD

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INVESTIGATION WORK PLAN
SWMU No. 14 Old API Separator

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

EPA ID# NMD000333211

January 2010

MPH

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Table of Contents

List of Sections

Table of Contents *(continued)*

List of Tables

List of Figures

List of Appendices

Executive Summary

The Gallup Refinery, which is located 17 miles east of Gallup, New Mexico, has been in operation since the 1950s. Past inspections by State and federal environmental inspectors have identified locations where releases to the environment may have occurred. These locations are generally referred to as Solid Waste Management Units (SWMUs). Pursuant to the terms and conditions of the facility Post-Closure Care Permit and 20.4.1.500 New Mexico Administrative Code, this Investigation Work Plan has been prepared for the Old API Separator as directed by the New Mexico Environment Department (NMED) on April 15, 2009. Appendix A of the facility's Post-Closure Care Permit provides a list of designated SWMUs and the "API Separator" is listed as SWMU No. 14.

There are two API Separators, referred as "Old API Separator" and "New API Separator" to distinguish between the units. Additional discussion on the two separators is presented in Section 2.0 but this Investigation Work Plan is focused on the Old API Separator, which is planned to be removed from service after the new Wastewater Treatment Plant is demonstrated to be operational.

The planned investigation activities include collection of soil and ground water samples, which will be analyzed for potential site-related constituents. The analyses will include both volatile and semi-volatile organic constituents, petroleum hydrocarbons, Skinner List metals, and a few additional inorganic constituents as specified by NMED. Soil borings will be drilled around the perimeter of the Old API Separator with one of the borings completed as a permanent monitoring well. The specific sampling locations and sample collection procedures are discussed in more detail in Section 5.

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, which is characterized as high desert plain comprised primarily of public lands used for grazing by cattle and sheep.

The Gallup Refinery is a crude oil refinery currently owned by Western Refining Southwest, Inc. ("Western"), which is a wholly owned subsidiary of Western Refining Company. It is operated by Western Refining Southwest – Gallup Refinery. The refinery was most recently owned by Giant Refining Company. 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.

On August 17, 2000, the NMED issued a Post-Closure Care Permit ("Permit") to the former owner, Giant Refining Company. The Permit authorized the post-closure care at a hazardous waste land treatment unit and also includes corrective action provisions. Section IV.B.5.a. requires the Permitee to prepare and submit a RCRA Facility Investigation Work Plan after notice from the NMED that an RFI is required under Sections IV.B.4 or IV.b.2.d. On April 15, 2009, the NMED provided such notice to Western and requested a schedule for submittal of an investigation work plan to address releases from the Old API Separator.

This Investigation Work Plan has been prepared for the SWMU No. 14 Old API Separator (OAPIS). The location of the SWMU is shown on Figure 2, in the western portion of the refinery property. Photographs of the SWMU and the surrounding area are included in Appendix A.

The purpose of the site investigation is to determine and evaluate the presence, nature, and extent of releases of contaminants in accordance with 20.4.1.500 New Mexico Administrative Code (NMAC) incorporating 40 Code of Federal Regulations (CFR) Section 264.101. The investigation activities will be conducted in accordance with Section IV.B.5 of the Post-Closure Care Permit.

Section 2
Background

This section presents background information for the OAPIS, including a review of historical waste management activities to identify the following:

- Type and characteristics of all waste and all contaminants handled in the SWMU
- Known and possible sources of contamination
- History of releases and
- Known extent of contamination

The API Separator was not originally included as a SWMU in the 1988 Hazardous and Solid Waste Act (HSWA) permit or the subsequent 1990 RFI Work Plan. The "API Separator" was first added as a SWMU in the August 2000 Post-Closure Care Permit. There are two API Separators at the refinery as shown in Figure 2. The original separator, now referred to as the Old API Separator was put into service in 1957. The OAPIS initially only received process wastewater and in 1996 a stormwater sewer system was installed that also flowed to the OAPIS. A new API Separator was put into service in October 2004 and the process wastewater was redirected to the New API Separator. The intention was that only the stormwater sewer system would continue to be directed to the OAPIS.

After the wastewater flows were diverted to the New API Separator, all residual materials were removed from the OAPIS in October 2004. The material was removed using vacuum trucks and sent off-site for recycling at the NORCO refinery. The OAPIS was steam cleaned and sand blasted in preparation for inspection and repairs. The concrete was patched in numerous locations in both bays and the weir wall down-stream of the pipe skimmer was rebuilt on both bays. Stained soil (approx. 4,500 lbs) identified around the perimeter of the separator was removed and sent off-site for disposal as hazardous waste (K051).

In 2006, Western identified potential "dry weather" flows into the OAPIS and undertook an investigation of the sewer systems to determine if process wastewater was continuing to flow to the OAPIS. Flows from the OAPIS were directed to the New API Separator to ensure any potential process wastewaters entering the OAPIS were appropriately managed. A dye tracer study did not identify any cross-connections between the process wastewater and stormwater sewers. To help reduce the potential for process wastewater to flow to the OAPIS, numerous changes were made to both the stormwater drains and the process sewer drains in the summer of 2006.

The OAPIS is currently in service to handle stormwater flows but in spite of extensive efforts to eliminate dry weather flows, it appears that some dry weather flow still enters the unit. The discharge from the OAPIS is directed to the New API Separator to ensure appropriate treatment of any dry weather flow that may enter the OAPIS. A new wastewater treatment plant is planned for the Gallup Refinery and the OAPIS will no longer be required when the new treatment plant is put into operation.

The API Separator is the first step in the treatment process of the refinery's wastewater. Its purpose is to remove free oil and suspended solids from the wastewater prior to subsequent downstream treatment. An API Separator functions as a gravitational separation unit and is designed based on the difference in specific gravity of the oil to be separated and the wastewater. Three phases result in the separator, with oil at the top, wastewater in the middle and accumulated sediment in the bottom. The oil is constantly removed from the upper layer, wastewater flows through continuously, and the bottom sediment layer is periodically removed to ensure proper function of the separator. The material accumulating in the bottom of the OAPIS has been routinely removed once a year or more frequently, as necessary.

The material handled in the OAPIS has primarily been petroleum hydrocarbons, with a lesser potential for refinery catalyst and gasoline additives to enter the sewer systems. As the solids that accumulate in the bottom of the separator are routinely removed, the greatest potential for a release from the unit would be the liquid phase containing dissolved petroleum hydrocarbons. Liquids could leak from the unit along cracks in the below ground concrete structure or from piping that transfers liquids into and from the unit.

There have not been any documented historical releases from the OAPIS. As described above, some surface soils with hydrocarbon stains around the sides of the unit were removed but this was a limited volume of material that did not indicate a significant release.

There has not been an investigation of soils or ground water in the immediate vicinity of the OAPIS. There are existing monitoring wells in the general area, with two wells (GMW-1 and GWM-2) located along the down-gradient side of the aeration lagoons and also possibly down-gradient of the OAPIS and four monitoring wells near the New API Separator (NAPIS 1, NAPIS 2, NAPIS 3, and KA-3), which are cross-gradient to the OAPIS (Figure 2). Analyses of ground water samples collected at GWM-1 and NAPIS 2 have indicated only very low concentrations of constituents such as BTEX and methyl tertiary butyl ether (MTBE) that would indicate a potential for historical releases in the area (Table 1). The fact that the well GMW-1 is located immediately adjacent to the aeration lagoons makes it impossible to determine if the impacts are from the lagoons or other possible up-gradient sources (e.g., the OAPIS) without additional ground water information.

It should be noted that a Corrective Measures Implementation Work Plan was recently submitted to the NMED for SWMU No. 1 Wastewater Aeration Lagoons, which includes a Scope of Work to conduct an investigation of environmental media around the aeration lagoons and the benzene strippers. The soil borings planned near the benzene strippers are shown on Figure 3. The results from these soils borings may also be useful in assessing any potential releases from the OAPIS.

Section 3
Site Conditions

The conditions at the site, including surface and subsurface conditions that could affect the fate and transport of any contaminants, are discussed below. This information is based on recent visual observations and historical subsurface investigations.

3.1 Surface Conditions

A topographic map of the area near the OAPIS is included as Figure 4. Local site topographic features include high ground in the southeast gradually decreasing to lowland fluvial plain in the northwest. Elevations on the refinery property range from 7,040 feet to 6,860 feet. The area of the site near the separator is at an approximate elevation of 6,920 feet above mean sea level (msl). The ground surface is nearly level with the top of the OAPIS on the south side of the unit with a drop of approximately three feet on the north side. The pictures in Appendix A show the land surface relative to the top of the OAPIS.

The soils in the immediate vicinity of the separator include two soil types. The McKinley County soil survey indicates that the soil type changes just north of the OAPIS. Surface soils to the north are primarily Rehobeth silty clay loam. The soils beneath the OAPIS are the Simitarq-Celavar sandy loams. Rehobeth soil properties include a pH ranging from 8 to 9 standard units and salinity typically measuring up to approximately 8 mmhos/cm. The Simitarq-Celevar soils are well drained with a conservative permeability of 0.20 in/hr 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 aeration lagoons and a number of small 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 Formation, which is Upper Triassic, crops out over a large area on the southern margin of the San Juan

Basin. The uppermost recognized local member is the Petrified Forest 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 gravely sands immediately overlying the Chinle Formation to 10^{-8} cm/sec in the clay soils located near the surface (Western Refining, 2009). Generally, shallow ground water at the refinery follows the upper contact of the Chinle Formation with prevailing flow from the southeast to the northwest.

Three monitoring wells (KA-1, KA-2, and KA-3) were installed near the New API Separator in 2007. Wells KA-1 and KA-2 were plugged in 2008 and three new wells (NAPIS 1, NAPIS 2, and NAPIS 3) were installed near the New API Separator. The predominantly lithology of the materials overlying the Chinle Formation was logged as a sandy lean clay. The boring log for GMW-1, which is located immediately west of AL-2, indicated that clay was present from the land surface to a depth of 21.5 feet, where a sandy gravel extend from 21.5 feet to 24 feet at the top of a mudstone bedrock (Petrified Forest Member of the Chinle Formation).

A copy of the boring/monitoring well completion logs for GWM-1, KA-1, KA-2, KA-3, NAPIS 1 (KA-1R), NAPIS 2 (KA-2R), and NAPIS 3 (KA-3R) are provided in Appendix B. The occurrence of shallow ground water in the area is sporadic and temporal, as indicated with the absence of ground water in GWM-2 and GWM-3 during quarterly ground water gauging events.

Figure 5 shows a cross-section of the shallow subsurface based on borings logs from on-site monitoring well completions and Figure 5A shows the locations of the wells used in the cross-section. The uppermost aquifer is under water table conditions and occurs sporadically within the sand and gravel deposits that overlie the Chinle Formation. The next deeper laterally persistent aquifer occurs within the Sonsela Formation, where ground water is present under artesian conditions. The potentiometric surface as measured in August 2009 is presented as Figure 6 and shows the ground water flowing to the west-northwest. The water level data used to prepare Figure 6 is included in Table 2.

Section 4
Scope of Services

4.1 Anticipated Activities

Pursuant to Section IV.B.5.a. of the Post-Closure Care Permit, a scope of services was developed to determine the nature and extent of contamination and the potential pathways of contaminant releases to the air, soil, surface water, and ground water. To accomplish this objective, soil and ground water samples will be collected at SWMU No. 14 – OAPIS. The following activities will be completed:

- Three soil borings will be installed to a minimum depth of ten feet and soil samples will be collected from the intervals shown below in accordance with the procedures discussed in Section 5.2:
  - 0-0.5' (all borings);
  - 1.5-2.0' (all borings);
  - from the 6" interval at the top of saturation, if encountered;
  - the sample from each boring with the greatest apparent degree of contamination, based on field observations and field screening; and
  - any additional intervals as determined based on field screening results.
- If evidence of impacts in soils extends below ten feet, then soil borings will be drilled to a depth of five feet below the deepest evidence of impacts. If ground water is encountered, then a ground water sample will be collected from a temporary well completion.
- One of the soil borings on the north side of the OAPIS will be completed as a permanent monitoring well (Figure 7). The installation of a monitoring well and collection of ground water samples is discussed in Section 5.3.
- Soil samples from depths of 0-0.5' and 1.5-2.0' will be collected from five additional locations using a hand auger due to limited access and/or the potential to encounter underground utilities (Figure 7).
- The soil and ground water samples will be analyzed for volatile and semi-volatile organic constituents, petroleum hydrocarbons, Skinner List metals, iron, and manganese.

4.2 Analysis Background Information Research

Documents containing the results of previous investigations that explored the subsurface geology and ground water monitoring data from monitoring wells in the general area of the

OAPIS were reviewed to facilitate development of this work plan. The previously collected data provides information on the overall subsurface conditions, including hydrogeology and contaminant distribution within ground water on a site-wide basis. The data collected under this scope of services will supplement the existing ground water information and provide site-specific information regarding contaminant occurrence and distribution within soils and ground water.

4.3 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 ground water and decontamination water will be characterized prior to disposal unless it is disposed in the refinery wastewater treatment system upstream of the New API Separator. An IDW management plan is included as Appendix C.

4.4 Surveys

The horizontal coordinates and elevation of the monitoring well casing, and the ground surface at the monitoring well location, and the locations of all other pertinent structures will be determined by a registered New Mexico professional land surveyor in accordance with the State Plane Coordinate System (NMSA 1978 47-1-49-56 (Repl. Pamp. 1993)). Alternate survey methods may be proposed in site-specific work plans. Any proposed survey method must be approved by the Department prior to implementation. The surveys will be conducted 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. Horizontal positions will be measured to the nearest 0.1-ft and vertical elevations will be measured to the nearest 0.01-ft.

Section 5
Investigation Methods

The purpose of the site investigation is to determine and evaluate the presence, nature, and extent of releases of contaminants. Guidance on selecting and developing sampling plans as provided in *Guidance for Choosing a Sampling Design for Environmental Data Collection* (EPA, 2000) was utilized to select the appropriate sampling strategy.

5.1 Drilling Activities

Soil and monitoring well borings will be drilled using either hollow-stem auger or if necessary, air rotary methods including ODEX. The preferred method will be hollow-stem auger to increase the ability to recover undisturbed samples and potential contaminants. The drilling equipment will be properly decontaminated before drilling each boring. Shallow soil samples (0 – 2') will be collected at some locations using a hand auger.

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. If contamination is detected at the water table, then the boring will be drilled five feet below the water table or to refusal. The boring to be completed as a permanent monitoring well will be drilled to the top of bedrock (Chinle Formation) and the anticipated completion depth ranges from 20 to 30 feet. Soil samples will be collected continuously and logged by a qualified geologist or engineer. Slotted (0.01 inch) PVC well screen will be placed at the bottom of the well and will extend for 10 feet to ensure that the well is screened across the water table. A 10/20 sand filter pack will be installed to two feet over the top of the well screen.

The drilling and sampling will be accomplished under the direction of a qualified engineer or geologist who will maintain a detailed log of the materials and conditions encountered in each boring. Both sample information and visual observations of the cuttings and core samples will be recorded on the boring log. Known site features and/or site survey grid markers will be used as references to locate each boring prior to surveying the location as described in Section 4.4. The boring locations will be measured to the nearest foot, and locations will be recorded on a scaled site map upon completion of each boring.

5.2 Soil Sampling

As the greatest potential for releases from the OAPIS is from either overflows, cracks in the concrete or penetrations of the unit (e.g., pipeline connections), the proposed soil borings are located close to the perimeter of the unit and near associated piping. As there are known locations at which to target sample collection, a judgmental sampling design was selected (EPA, 2000).

The soil borings completed with a drilling rig will be drilled to a minimum depth of ten feet, or five feet below the deepest detected impacted media or waste material, whichever is deeper. Borings installed using a hand auger will be completed to a depth of two feet. A decontaminated split-barrel sampler or continuous five-foot core barrel will be used to obtain samples during the drilling of each boring. Surface samples may be collected using decontaminated, hand-held stainless steel sampling device, shelby tube, or thin-wall sampler, or a pre-cleaned disposable sampling device. A portion of the sample will be placed in pre-cleaned, laboratory-prepared sample containers for laboratory chemical analysis. The use of an Encore® Sampler or other similar device will be used during collection of soil samples for VOC analysis. The remaining portions of the sample will be used for logging and field screening as discussed in Section 5.2.1. Sample handling and chain-of-custody procedures will be in accordance with the procedures presented below in Section 5.4.

Discrete soil samples will be collected for laboratory analyses at the following intervals:

- 0-0.5' (all borings and hand auger locations);
- 1.5-2.0' (all borings and hand auger locations);
- From the 6" interval at the top of saturation, if encountered;
- The sample from each boring with the greatest apparent degree of contamination, based on field observations and field screening; and
- Any additional intervals as determined based on field screening results.

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;
- Equipment blanks will be collected from all sampling apparatus at a frequency of 10 percent or one per day if disposable sampling equipment is used; and
- Field blanks will be collected at a frequency of one per day.

5.2.1 Soil Sample Field Screening and Logging

Samples obtained from the borings will be screened in the field on 2.5 foot intervals for evidence of impacts. Field screening results will be recorded on the exploratory boring logs. Field screening results will be used to aid in the selection of soil samples for laboratory analysis. 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 photo-ionization 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.

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.

5.3 Ground Water Monitoring

5.3.1 Ground Water Levels

Ground water level and SPH thickness measurements will be obtained at the new monitoring well prior to purging in preparation for a sampling event. Measurement data and the date and time of each measurement will be recorded on a site monitoring data sheet. The depth to ground water and SPH thickness level will be measured to the nearest 0.01 ft. The depth to ground water and SPH thickness will be recorded relative to the surveyed well casing rim or other surveyed datum. A corrected water table elevation will be provided if the well contains SPH by adding 0.8 times the measured SPH thickness to the measured water table elevation.

5.3.2 Ground Water Sampling

One new permanent monitoring well will be completed at the location shown on Figure 7. The location was chosen to evaluate ground water quality immediately down-gradient of potential releases at the OAPIS. The new monitoring well will be developed within one week of completion. Ground water samples will be obtained no later than five days after the completion of well development.

5.3.3 Well Purging

The well will be purged by removing ground water with a dedicated bailer, disposable bailer or peristaltic pump prior to sampling in order to ensure that formation water is being sampled. Purge volumes (a minimum of three well volumes including filter pack) will be determined by monitoring, at a minimum, ground water pH, specific conductance, dissolved oxygen concentrations, oxidation-reduction potential, and temperature after each well volume has been purged from the well. Purging will continue, as needed, until the specific conductance, pH, and temperature readings are within 10 percent between readings for three consecutive measurements. 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 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).

5.3.4 Ground Water Sample Collection

Ground water samples will be collected within 24 hours of the completion of well purging using dedicated bailers or 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 5.4.

Ground water samples intended for metals analysis will be submitted to the laboratory as total metals samples. QA/QC samples will be collected to monitor the validity of the ground water 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;

- Field blanks will be obtained at a minimum frequency of one per day. Field blanks will be generated by filling sample containers in the field with deionized water and submitting the samples, along with the ground water samples, to the analytical laboratory for the appropriate analyses.

- 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 ground water samples to the analytical laboratory for the appropriate analyses.

- 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 samples to be analyzed for VOCs.

5.4 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. At a minimum, all samples will be submitted to the laboratory within 48 hours after their collection.

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.

5.5 Decontamination Procedures

The objective of the decontamination procedures is to minimize the potential for cross-contamination. A designated decontamination area will be established for decontamination of drilling equipment, reusable sampling equipment and well materials. The drilling rig will be decontaminated prior to entering the site or unit. Drilling equipment or other exploration equipment that may come in contact with the borehole will be decontaminated by high pressure washing prior to drilling each new boring.

Sampling or measurement equipment, including but not limited to, stainless steel sampling tools, split-barrel or core samplers, non-dedicated well developing or purging equipment, ground water quality measurement instruments, and water level measurement instruments, will be decontaminated in accordance with the following procedures or other methods approved by the Department before each sampling attempt or measurement:

1. Brush equipment with a wire or other suitable brush, if necessary or practicable, to remove large particulate matter;
2. Rinse with potable tap water;
3. Wash with nonphosphate detergent or other detergent approved by the Department (examples include Fantastik™, Liqui-Nox®);
4. Rinse with potable tap water; and
5. Double rinse with deionized water.

All decontamination solutions will be collected and stored temporarily as described in Section 4.3. Decontamination procedures and the cleaning agents used will be documented in the daily field log.

5.6 Field Equipment Calibration Procedures

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.

5.7 Documentation Of Field Activities

Daily field activities, including observations and field procedures, will be recorded in a field log book. The original field forms will be maintained at the Facility. 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.

5.8 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.

Ground water and soil samples will be analyzed by the following methods:

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

Ground water and soil samples will also be analyzed for the following metals using the indicated 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

As discussed in section 5.3.3, field measurements will be obtained for pH, specific conductance, dissolved oxygen concentrations, oxidation-reduction potential, and temperature.

5.9 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 projects goals, including Quality Assurance/Quality Control (QA/QC) issues (EPA, 2006). The project goals are to determine and evaluate the presence, nature, and extent of releases of contaminants. The type of data required to meet the project goals includes chemical analyses of soil and ground water to determine if there has been a release of contaminants.

The quantity of data is based on the historical operations at the OAPIS. The quality of data that is required is consistent across samplings locations and in general, 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, as discussed in Section 5.2 for soils and 5.3.2 for ground water. In addition, sample collection techniques (e.g., purging of monitoring wells to collect formation water) will be utilized to help ensure representative results. An evaluation of on-going ground water monitoring results will be performed to assess representativeness.

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 base 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 6
Monitoring and Sampling Program

6.1 Ground Water Monitoring

After the initial investigation activities are completed, a second ground water sampling event will be conducted to confirm the initial ground water analyses for samples collected at the new permanent monitoring well. The ground water samples will be collected no sooner than 30 days after the initial sampling event and no later than 120 days after the initial sampling event. The samples will be analyzed for the same constituents for which the first samples were analyzed.

Any subsequent sampling events will be based on the results of the first two analyses and will be approved by the NMED prior to implementation.

Section 7
Schedule

This investigation Work Plan will be implemented within 90 days of demonstrating that the upgraded wastewater treatment system is achieving treatment criteria as specified in an approved Process Design Report for Wastewater Treatment Plant Workplan. The estimated timeframes for each of the planned activities is as shown below:

- Field work (inclusive of all soil and initial ground water sampling) -- four weeks;
- Laboratory analyses for initial sampling event – four weeks;
- Data reduction and validation (soils and initial ground water event) – three weeks;
- Second ground water sampling event – one week;
- Laboratory analyses for second ground water sampling event – three weeks;
- Data reduction and validation (second ground water event) – two weeks; and
- Data gap analysis – three weeks.

Completion of the data gap analysis will complete all activities conducted under this investigation Work Plan. Western will then prepare an Investigation Report that details the field collection procedures and presents the information collected during the investigation, including subsurface stratigraphy and results of chemical analyses. The analytical results will be presented in tables with applicable screening levels. The identification of data gaps will be discussed with recommendations for subsequent investigation, as necessary. The Investigation Report will be submitted to the NMED within 120 calendar days of completion of the data gap analysis.

Section 8
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, 2000, Guidance on Choosing a Sampling Design for Environmental Data Collection, EPA/240/R-02/005, EPA QA/G-5S, 168 p.

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.

Western Refining, 2009, Facility Wide Groundwater Monitoring Work Plan, Western Refining Company Southwest, Inc., p. 78.

Tables

TABLE 2
WESTERN REFINING - GALLUP REFINERY
WATER LEVEL MEASUREMENTS

Well	Date	Top of Casing (ft-msl)	Depth to Bottom (ft)	Depth to Product (ft)	Depth to Water (ft)	Groundwater Elevation (ft-msl)	Product Thickness (ft)
GWM-1	8/10/2009	6912.65	NM	NPP	20.32	6892.33	0
GMW-2	8/10/2009	6913.17	19.07	NPP	DRY	--	0
GMW-3	8/10/2009	6912.65	18.05	NPP	DRY	--	0
NAPIS 1 (KA-1R)	8/31/2009	6918.43	13.76	NPP	9.06	6909.37	0
NAPIS 2 (KA-2R)	8/31/2009	6917.27	13.84	NPP	9.39	6907.88	0
NAPIS 3 (KA-3R)	8/31/2009	6917.31	30.7	NPP	8.39	6908.92	0
KA-3	8/31/2009	6917.17	25	NPP	9.36	6907.81	0
OW-1	8/10/2009	6868	NM	NPP	1.86	6866.14	0
OW-10	8/10/2009	6872	NM	NPP	2.67	6869.33	0

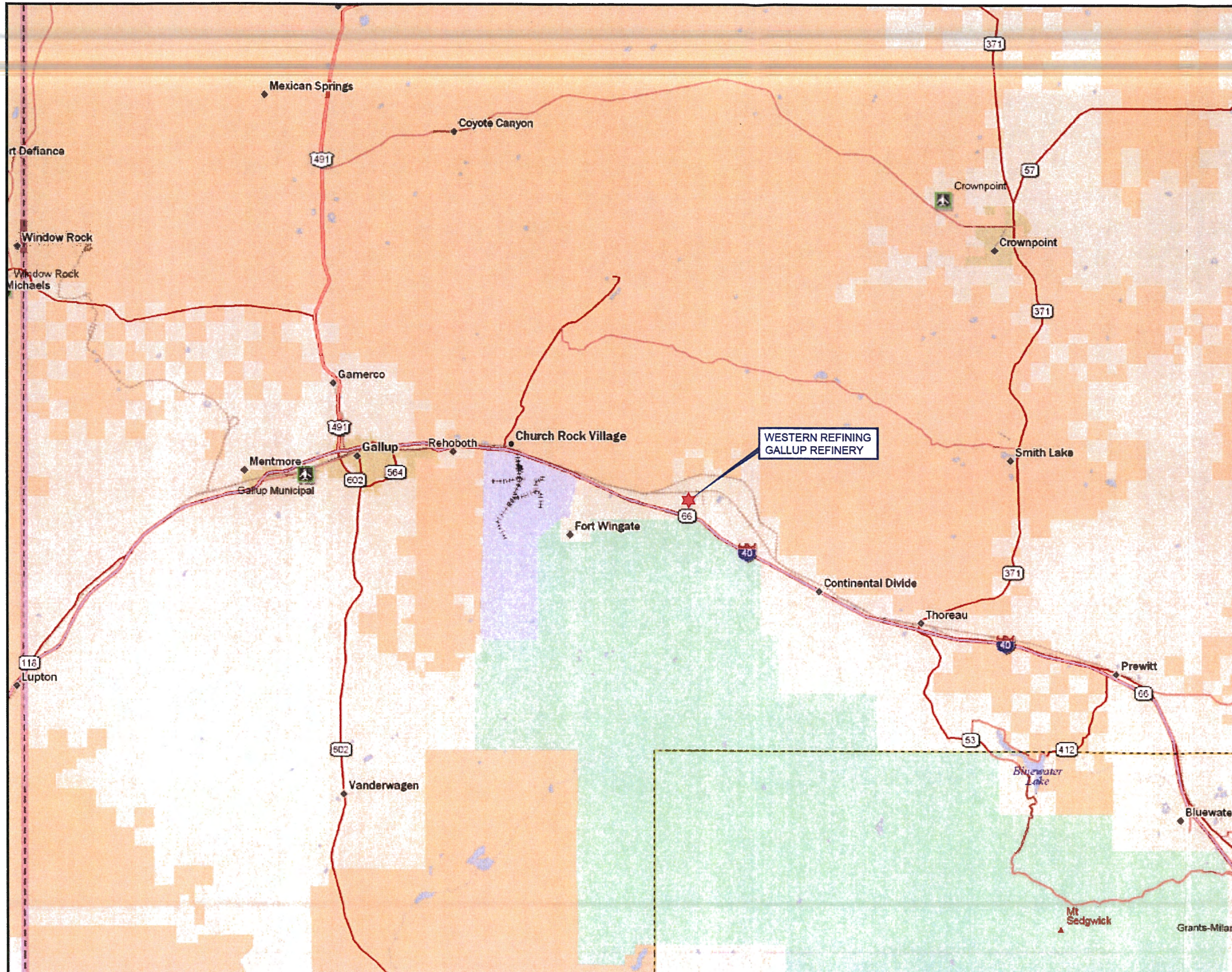
NPP - no product present
NM - not measured

TABLE 1
WESTERN REFINING - GALLUP REFINEY
HISTORICAL GROUND WATER MONITORING DATA

	Date Sampled	Benzene	Toluene	Ethylbenzene	Xylene	MTBE	Ba	Ca	Pb	Mg	K	Na	Fl	Cl	Nitrate + Nitrite as N	Orthophosphate (as P)	Sulfate	pH	Specific Conductance (umhos/cm)
GWM-1	7/27/2009	0.0089	0.002	0.0074	0.034	0.085	0.53	310	0.007	78	3.0	1300	2.1	1600	<4.0	<0.5	73	7.03	6200
	7/10/2008	0.011	0.0021	0.0039	0.019	0.12	0.45	350	0.01	3.6	3.3	1400	1.7	1800	<2.0	<0.5	110	6.92	7400
	5/24/2007	0.016	<0.001	<0.001	<0.0015	0.23	0.44	360	--	--	3.7	1300	1.9	1800	<2.0	<0.5	120	6.8	8100
	10/27/2006	0.012	<0.001	<0.001	<0.0015	0.16	0.53	380	--	--	4.2	1400	2	3700	<2.0	<2.5	120	6.87	--
NAPIS 1 (KA-1R)	8/11/2009	<0.001	<0.001	<0.001	<0.002	<0.001	0.11	56	<0.005	11	1.7	380	1.2	160	0.54	<0.5	93	7.67	1800
	5/28/2009	<0.001	<0.001	<0.001	<0.002	<0.0025	0.091	57	<0.005	11	<1.0	390	1.2	150	0.31	<0.5	71	7.82	1900
	3/24/2009	<0.001	<0.001	<0.001	<0.002	<0.0025	0.1	37	<0.005	12	<1.0	340	0.69	120	<1	<0.5	38	7.69	2000
	4/11/2008	<0.001	<0.001	<0.001	<0.002	<0.0025	--	72	--	13	1.5	370	0.79	170	0.55 <0.10	<0.50	80	7.26	2000
	7/9/2008	<0.001	<0.001	<0.001	<0.002	<0.0025	--	70	--	12	2.1	430	1.4	180	<1.0	<0.50	98	7.27	1900
	9/30/2008	<0.001	<0.001	<0.001	<0.002	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	11/10/2008	<0.001	<0.001	<0.001	<0.002	<0.0025	0.13	51		14	1.2	390	0.73	160	1.6 <0.10	<0.50	63	7.3	1900
NAPIS 2 (KA-2R)	8/11/2009	0.057	<0.01	0.022	<0.02	0.089	0.94	57	<0.005	11	<1.0	300	1.7	250	<0.1	<0.5	17	7.56	1500
	5/28/2009	0.028	<0.005	0.0053	<0.01	0.13	0.65	57	<0.005	9.9	<1.0	290	1.7	210	0.16	<0.5	22	7.51	1400
	3/24/2009	0.019	0.011	0.0081	<0.002	0.09	0.76	53	--	10	<1.0	280	1.5	240	<1	<0.5	23	7.47	1800
	4/11/2008	0.91	0.019	0.051	0.12	0.32	--	110	--	19	1.3	380	0.92	360	<0.10 <1.0	<0.50	42	7	2100
	7/9/2008	0.013	<0.001	0.011	0.0056	0.2	--	70	--	13	<0.001	360	1.1	270	<1.0	<0.50	33	7.18	2000
	9/30/2008	0.016	<0.001	0.0016	0.0041	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	11/10/2008	0.025	<0.001	0.011	<0.002	0.18	0.42	50	0.0065	9.7	--	330	1.4	200	<0.1	<0.50	32	7.21	1600
NAPIS 3 (KA-3R)	8/31/2009	<0.001	<0.001	<0.001	<0.002	<0.0025	0.092	39	<0.005	6.4	4	870	0.47	1000	14	<0.5	<10	8.07	4000
	6/15/2009	<0.001	<0.001	<0.001	<0.002	<0.0025	0.14	49	<0.005	6.8	4.2	840	0.46	1200	18	<0.5	330	8.23	4200
	3/25/2009	<0.001	<0.001	<0.001	<0.002	<0.0025	0.13	47	<0.005	6.5	3.9	880	0.43	1200	<1	<0.5	340	8.11	5200
	7/9/2008	<0.001	<0.001	<0.001	<0.002	<0.0025	--	65		7.8	4.1	910	0.46	1100	9.1	<0.50	270	8.29	4200
	9/30/2008	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	11/10/2008	<0.001	<0.001	<0.001	<0.002	<0.0025	0.13	41		6.6	4.4	960	1.1	1100	2.6 <1.0	<0.50	310	8.05	4300
KA-3	8/31/2009	<0.001	<0.001	<0.001	<0.002	0.17	0.22	53	<0.005	8.9	0.73	330	2.4	230	<2	<0.5	50	7.58	1500
	5/28/2009	0.0033	0.0012	<0.001	<0.002	0.13	0.29	71	<0.005	11	<1.0	330	1.6	260	0.22	<0.5	66	7.71	1700
	3/25/2009	<0.001	<0.001	<0.001	<0.002	0.11	0.22	67	0.0055	10	--	360	1.5	340	0.9	<0.5	76	7.64	2400
	11/10/2008	<0.001	<0.001	<0.001	<0.002	0.13	0.2	65	0.0095	11	1.8	570	0.46	590	11 2.0	<0.50	140	7.34	2700
EPA MCLS		0.005	1	0.7	10	--	2	--	0.015	--	--	--	4	--	Nitrate-10, Nitrite-1	--	--	--	--
NMED WQCC Standard		0.01	0.75	0.75	0.62	--	1	--	0.05	--	--	--	1.6	250	10	--	600	--	--

* - limited chemical analyses – not enough water in well for testing after purging.
-- No data or screening level available
All concentrations reported in units of mg/l except for pH and specific conductance

Figures



Map Source: DeLorme Street Atlas USA 2007 Plus.

N

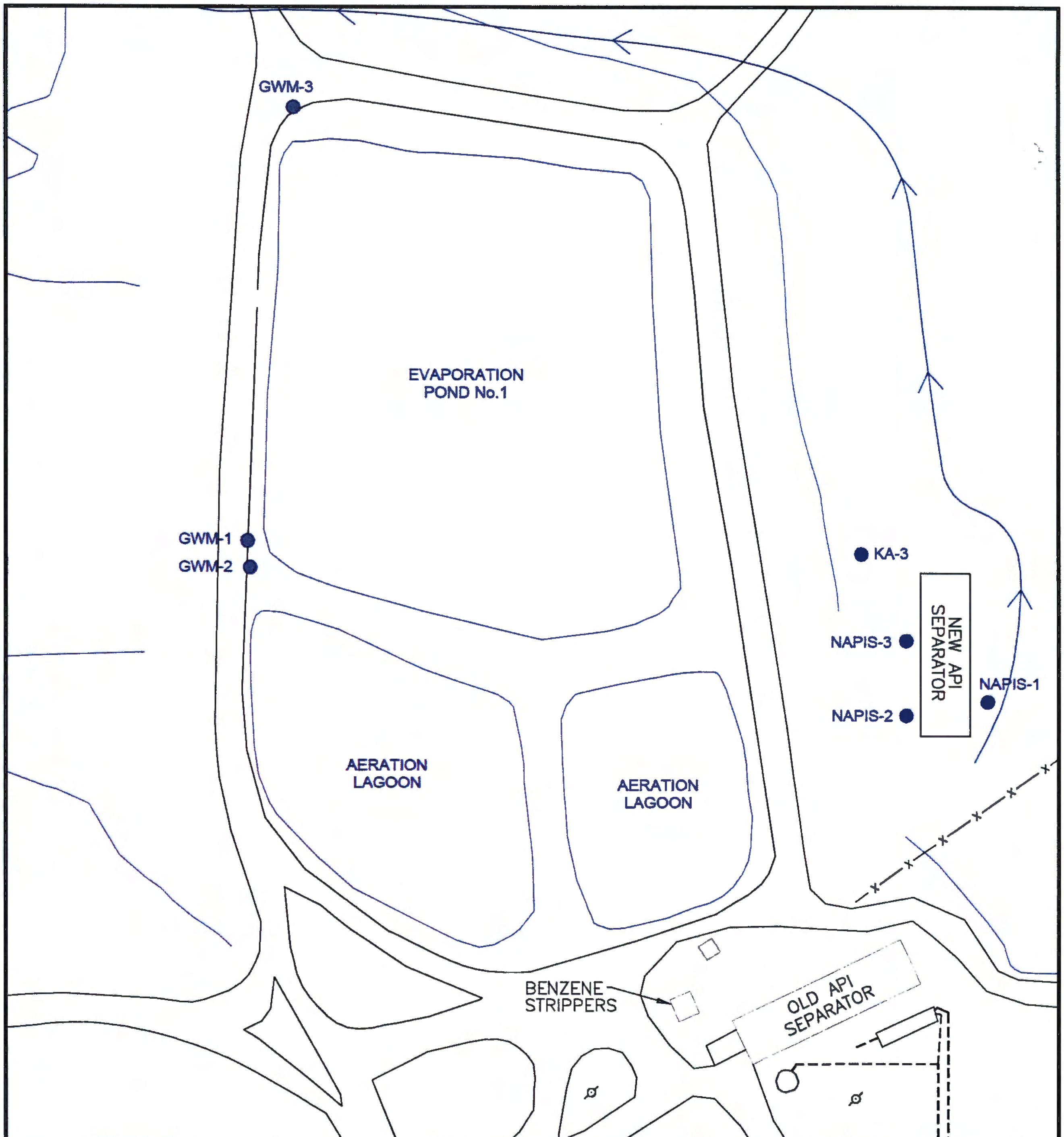
0 5
SCALE IN MILES

Western Refining
GALLUP REFINERY

PROJ. NO.: Western Refining	DATE: 11/10/09	FILE: WestRef–B47

FIGURE 1
SITE LOCATION MAP
GALLUP REFINERY

RPS
404 Camp Craft Road
Austin, Texas 78746

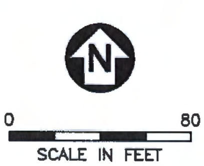


Map Source: Compiled by Photogrammetric Methods from Photography Acquired on March 1, 1998.

LEGEND

GWM-1 ● MONITORING WELL LOCATION

-------- PIPELINE



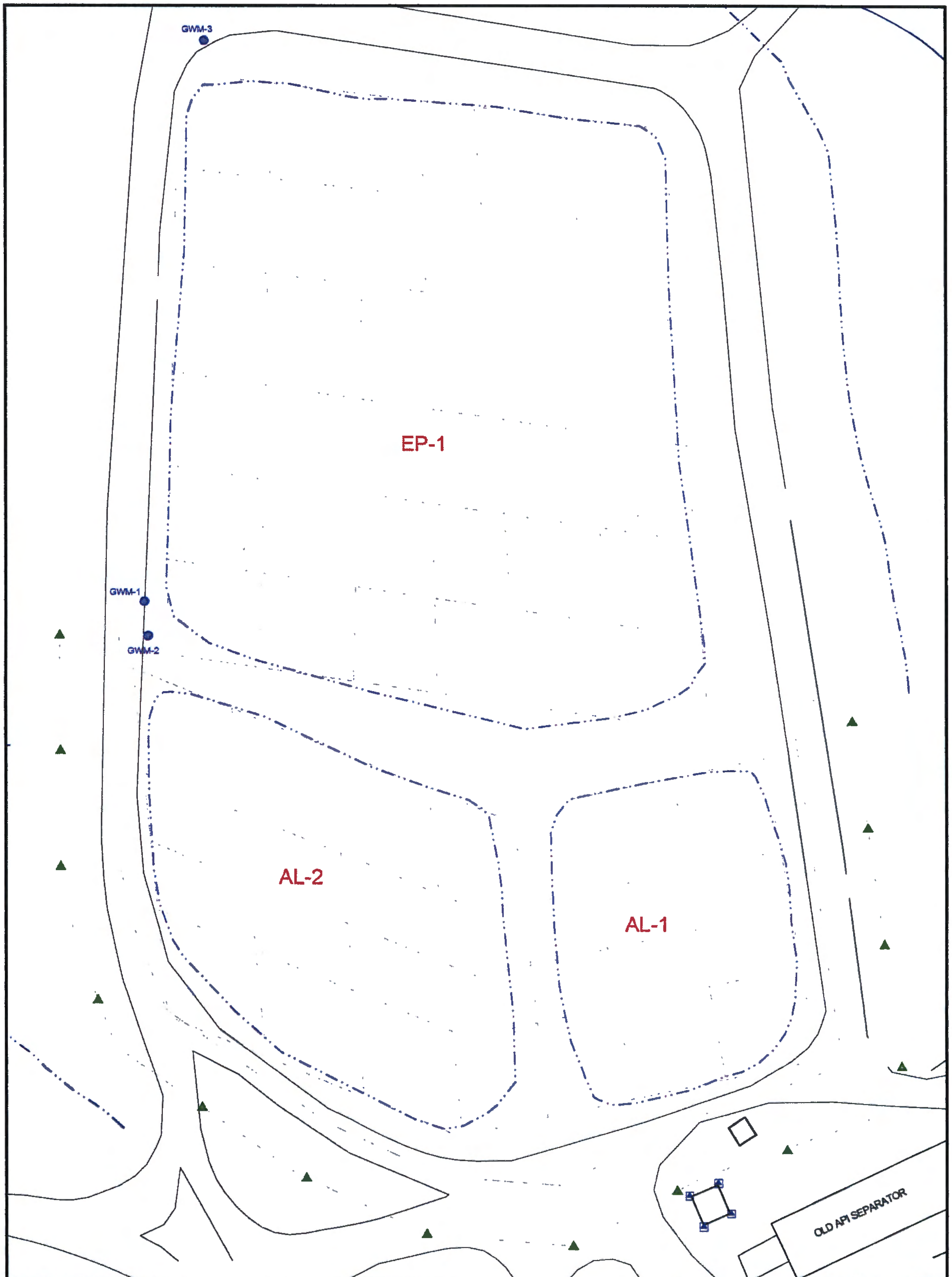
QUADRANGLE LOCATION

Western Refining
GALLUP REFINERY

PROJ. NO.: Western Refining	DATE: 11/10/09	FILE:WestRef–A36

FIGURE 2
SITE MAP
GALLUP REFINERY

RPS
404 Camp Craft Road
Austin, Texas 78746



Western Refining
GALLUP REFINERY

PROJ. NO.: Western Refining | DATE: 11/10/09 | FILE: WestRef-B46

FIGURE 3
PROPOSED SAMPLE LOCATIONS
FROM CMI WORK PLAN
GALLUP REFINERY

RPS
404 Camp Craft Road
Austin, Texas 78746

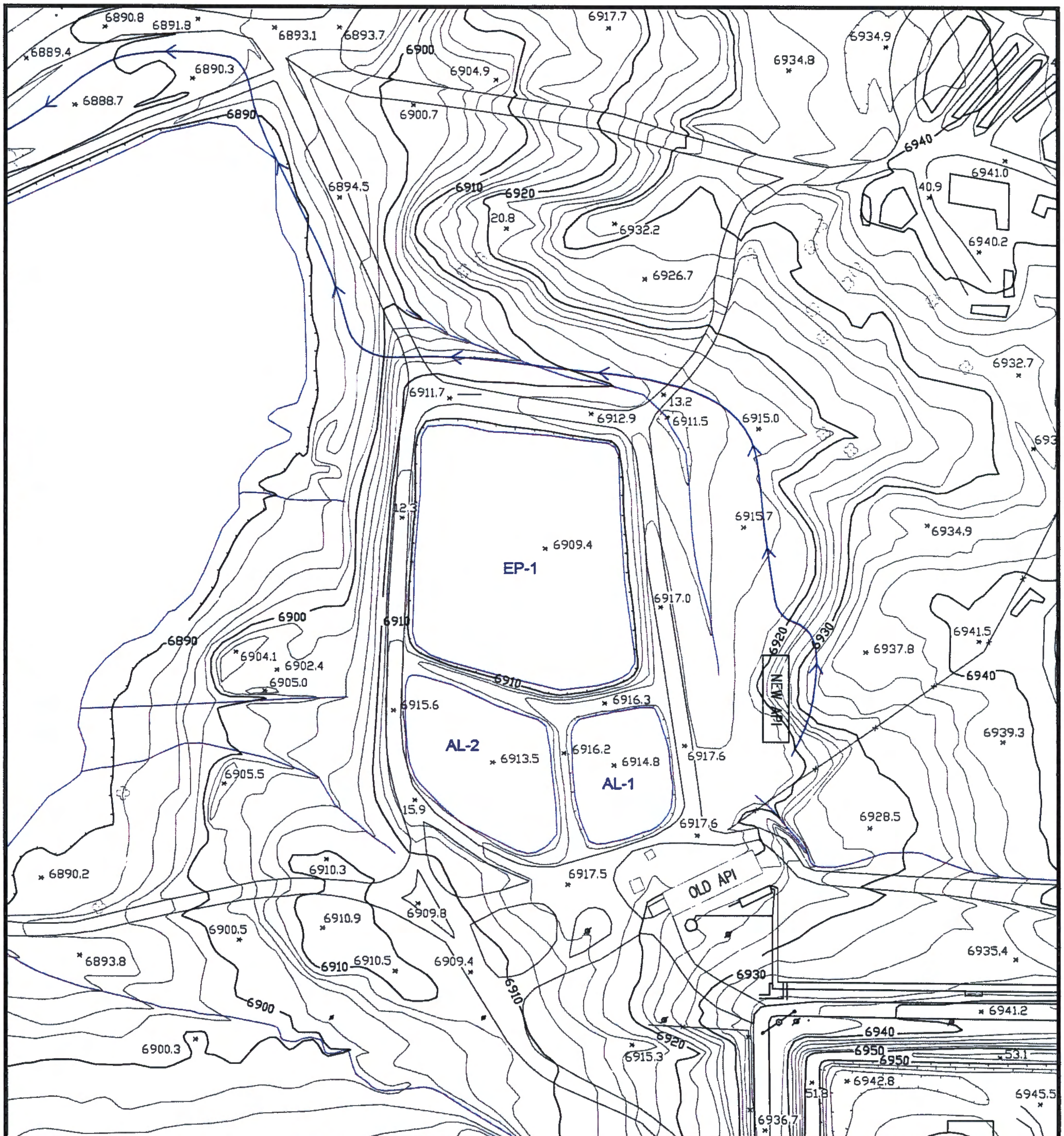
0 40
SCALE IN FEET

LEGEND

▲ SURROUNDING SOIL SAMPLE LOCATION [SURFACE (0-6"), SUBSURFACE (18-24")]

BENZENE STRIPPER UNIT SOIL SAMPLE LOCATION [SURFACE (0-6"), SUBSURFACE (18-24")]

GWM-1 ● GROUNDWATER WELL LOCATION

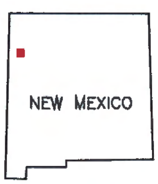


Map Source: Compiled by Photogrammetric Methods from Photography Acquired on March 1, 1998.

N

0 150

SCALE IN FEET



QUADRANGLE LOCATION

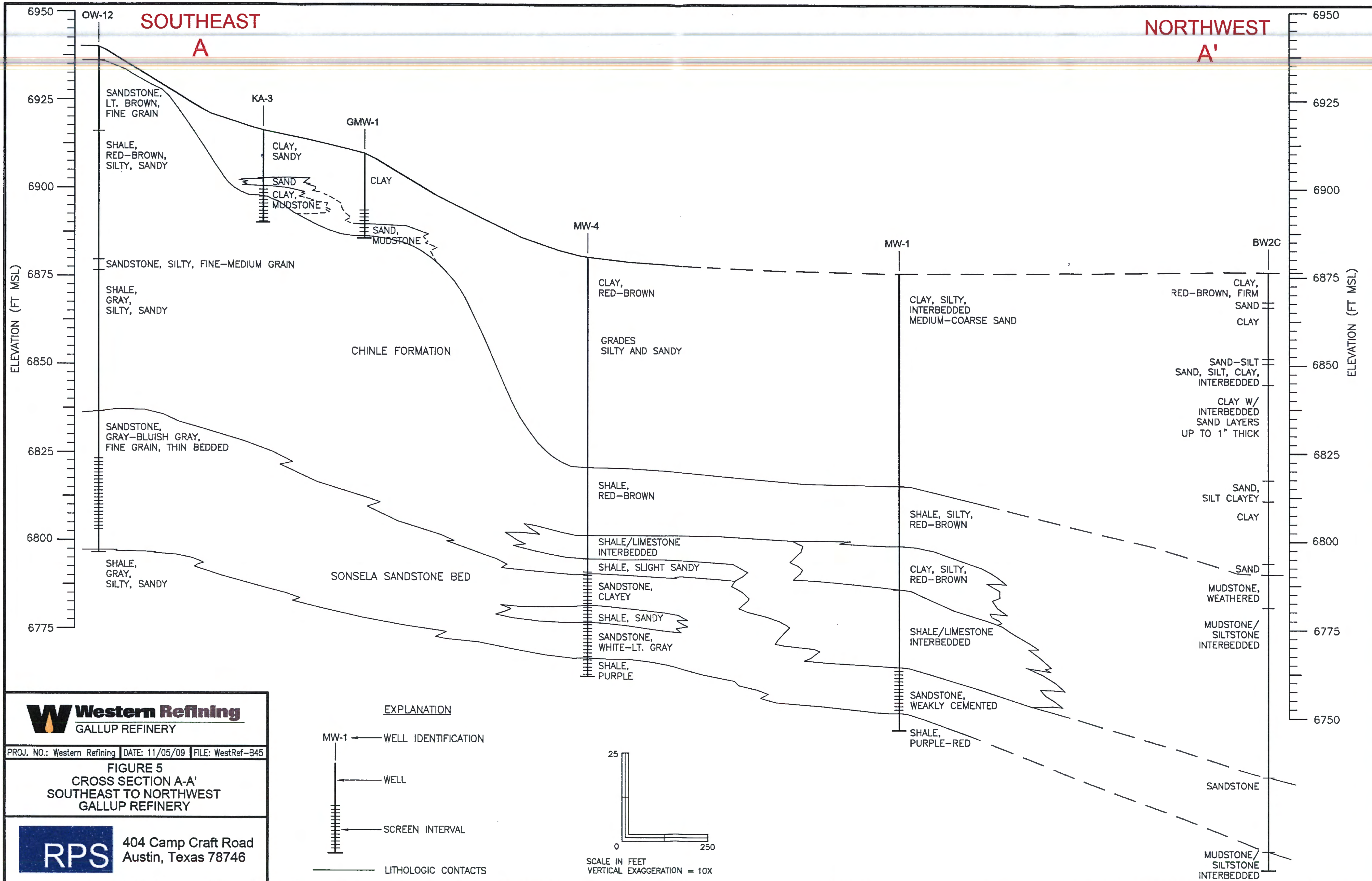
Western Refining
GALLUP REFINERY

PROJ. NO.: Western Refining	DATE: 11/10/09	FILE:WestRef-A35

FIGURE 4
TOPOGRAPHIC MAP
GALLUP REFINERY

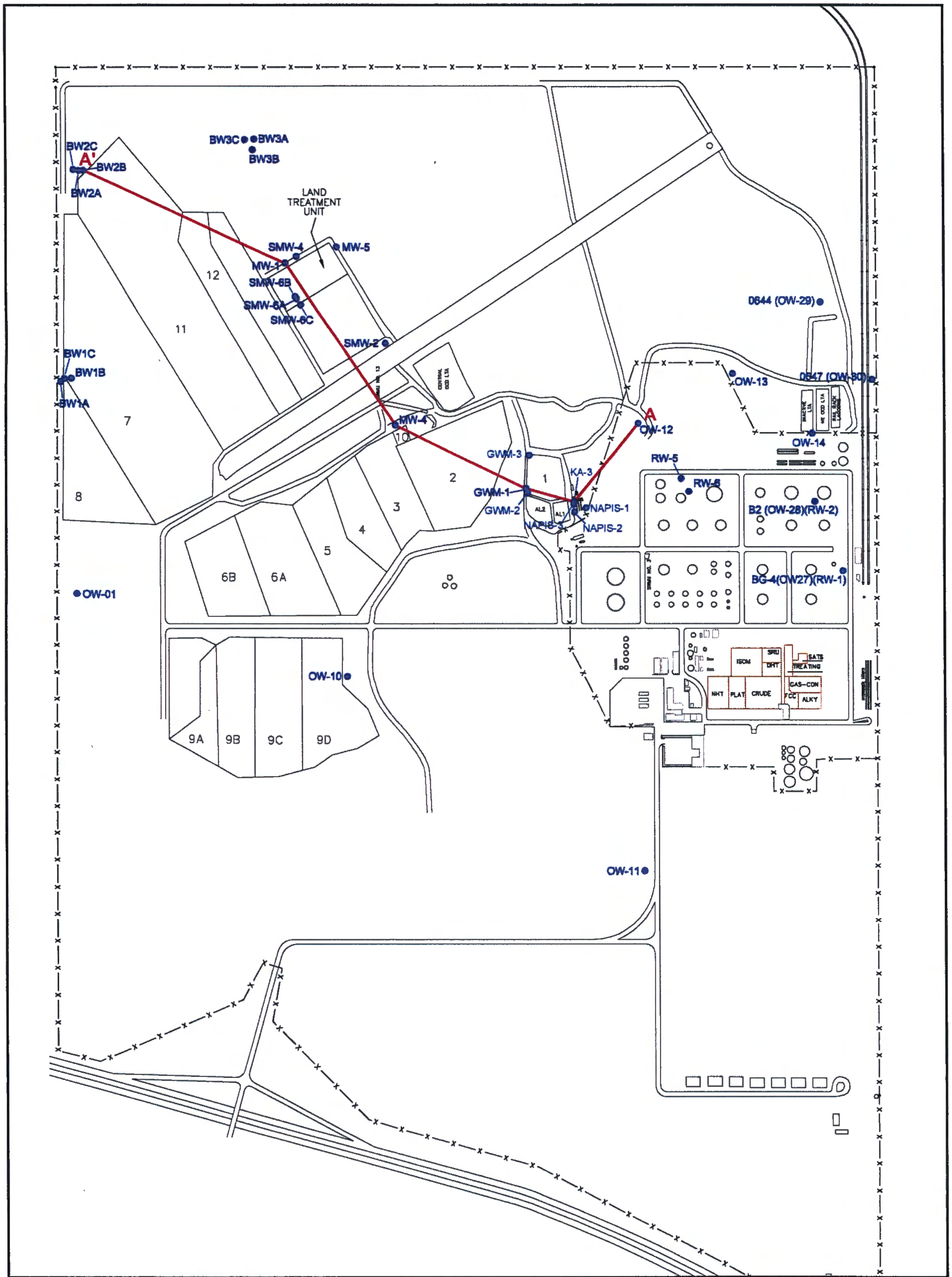
RPS

404 Camp Craft Road
Austin, Texas 78746



PROJ. NO.: Western Refining | DATE: 11/05/09 | FILE: WestRef-B45

FIGURE 5
CROSS SECTION A-A'
SOUTHEAST TO NORTHWEST
GALLUP REFINERY



LEGEND

GWM-1 ● MONITORING WELL LOCATION

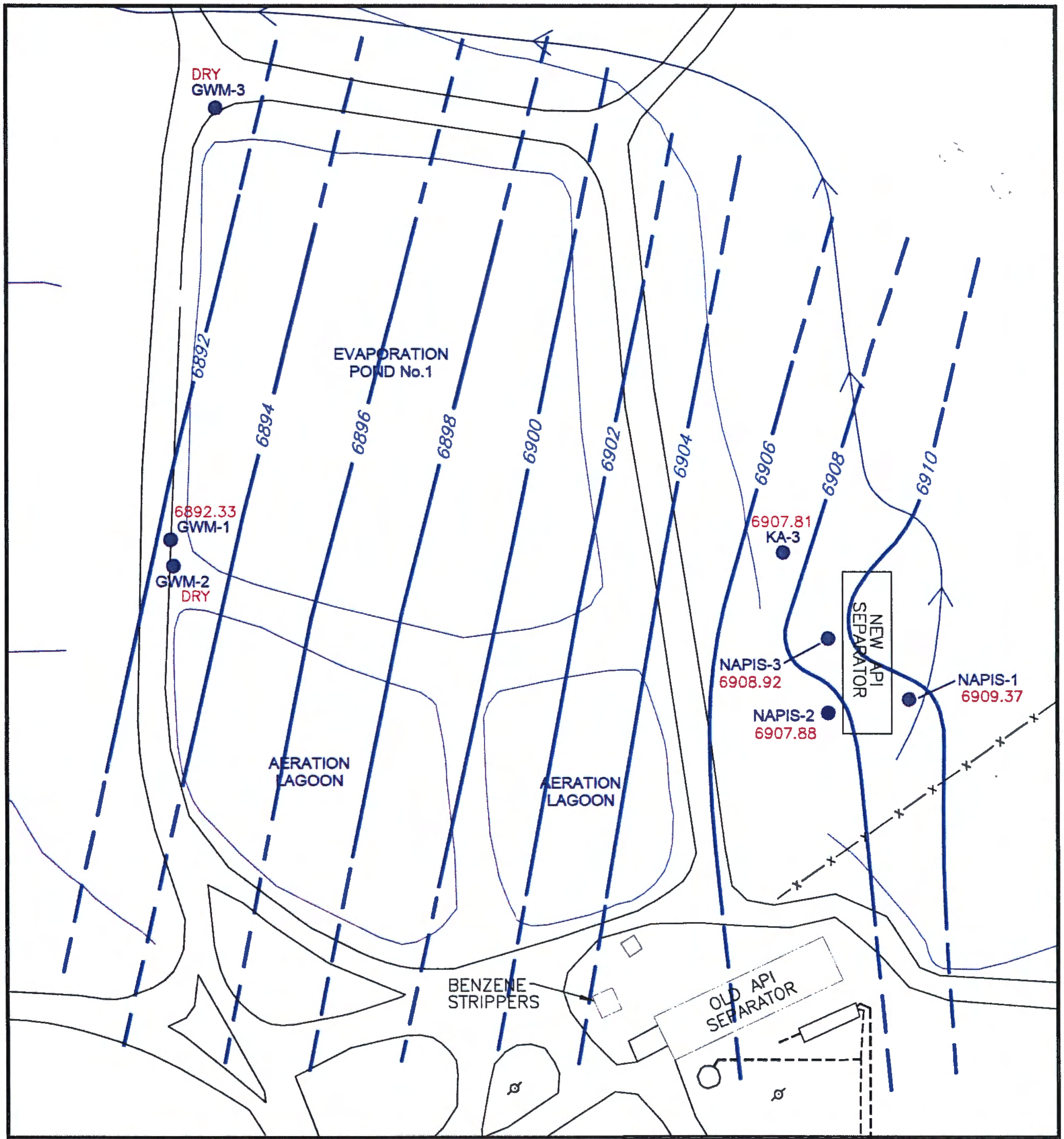
A ——— A' LINE OF CROSS SECTION

Western Refining
GALLUP REFINERY

PROJ. NO.: Western Refining	DATE: 12/14/09	FILE: WestRef-B50

FIGURE 5A
CROSS SECTION LOCATION MAP
GALLUP REFINERY

RPS
404 Camp Craft Road
Austin, Texas 78746



Map Source: Compiled by Photogrammetric Methods from Photography Acquired on March 1, 1998.

Western Refining
GALLUP REFINERY

PROJ. NO.: Western Refining	DATE: 12/12/09	FILE:WestRef–A40

FIGURE 6
POTENTIOMETRIC SURFACE MAP
GALLUP REFINERY

LEGEND

GWM-1 ● MONITORING WELL LOCATION

—6894— POTENTIOMETRIC SURFACE CONTOUR (ABOVE MSL)

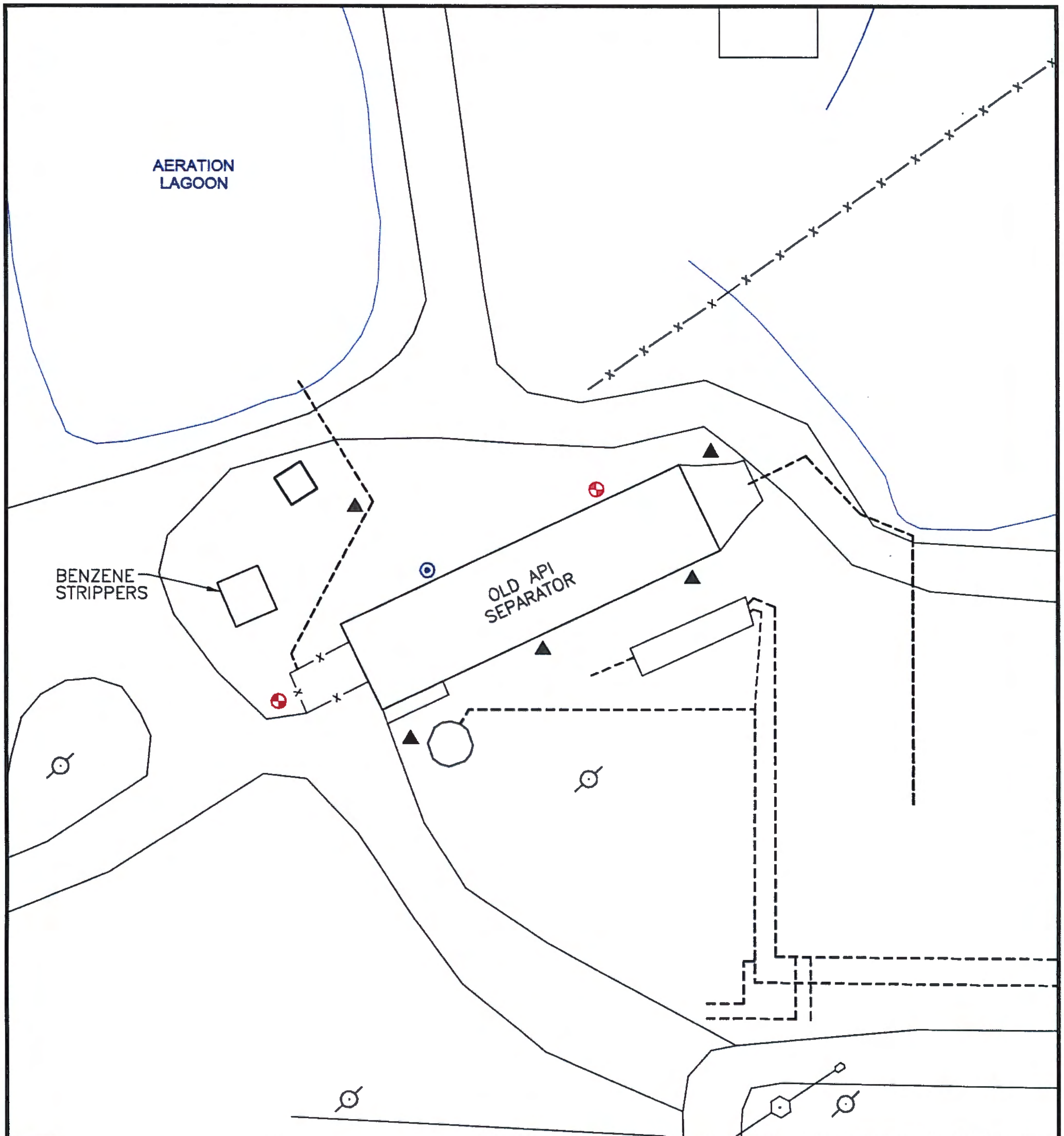
6907.81 POTENTIOMETRIC SURFACE (MEASURED AUGUST 2009, ABOVE MSL)

-------- PIPELINE

N

0 80
SCALE IN FEET

RPS
404 Camp Craft Road
Austin, Texas 78746



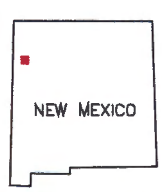
Map Source: Compiled by Photogrammetric Methods from Photography Acquired on March 1, 1998.

LEGEND

- PROPOSED MONITORING WELL LOCATION
- PROPOSED SOIL BORING LOCATION
- HAND AUGER LOCATION
- PIPELINE

N

0 40
SCALE IN FEET



QUADRANGLE LOCATION

Western Refining
GALLUP REFINERY

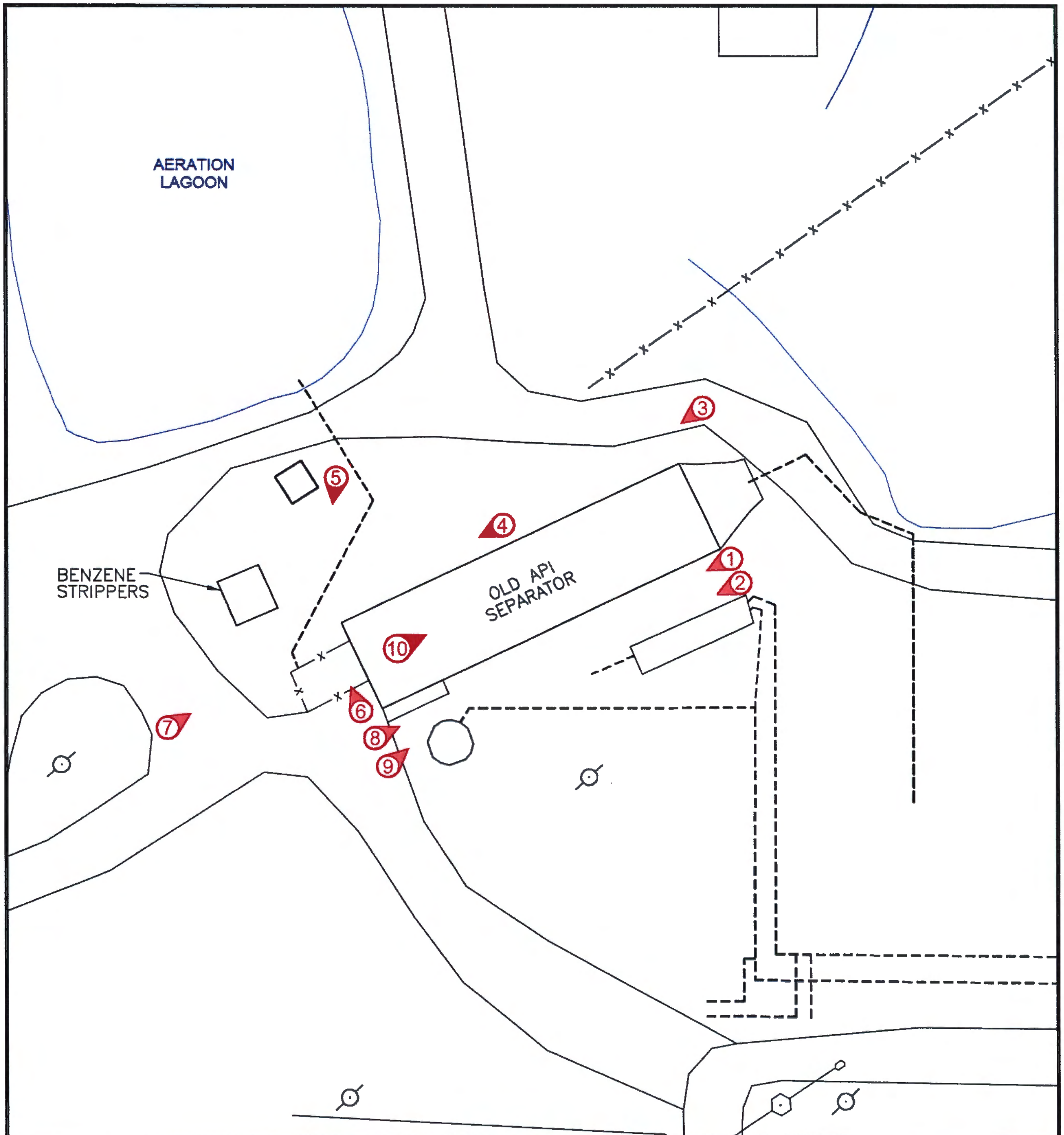
PROJ. NO.: Western Refining	DATE: 11/10/09	FILE: WestRef–A37

FIGURE 7
PROPOSED SAMPLE LOCATIONS
GALLUP REFINERY

RPS
404 Camp Craft Road
Austin, Texas 78746

Appendix A

Photographs



Map Source: Compiled by Photogrammetric Methods from Photography Acquired on March 1, 1998.

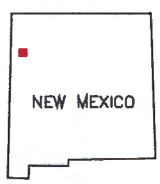
LEGEND

① PHOTO LOCATION AND DIRECTION

- - - - - - - PIPELINE

N

0 — 40
SCALE IN FEET



QUADRANGLE LOCATION

Western Refining
GALLUP REFINERY

PROJ. NO.: Western Refining	DATE: 12/12/09	FILE: WestRef–A39

PHOTO LOCATIONS
GALLUP REFINERY

RPS
404 Camp Craft Road
Austin, Texas 78746

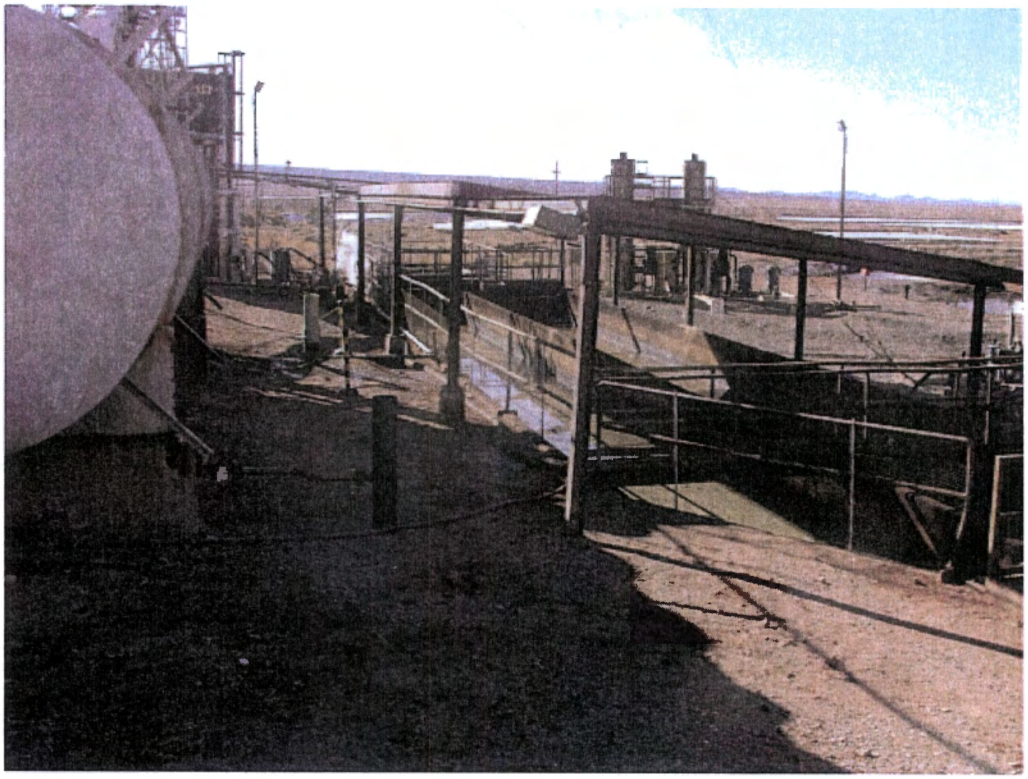


Photo 1
Looking west at south side of OAPIS.

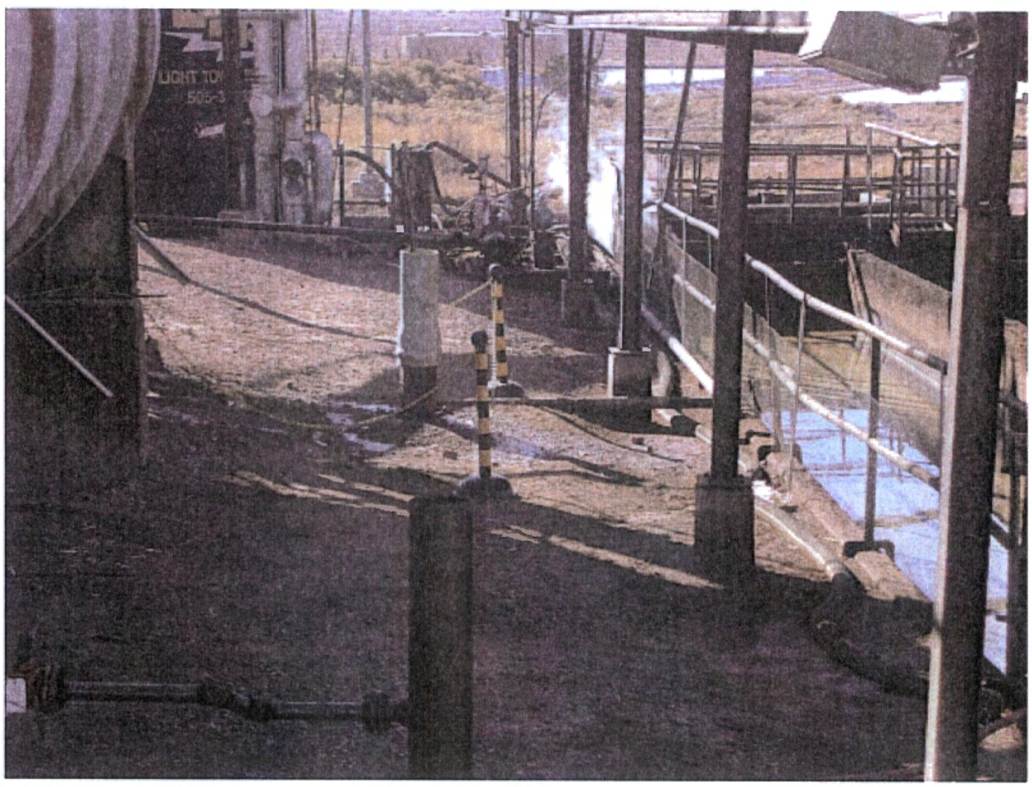


Photo 2
Close-up of the south side of OAPIS, looking west.

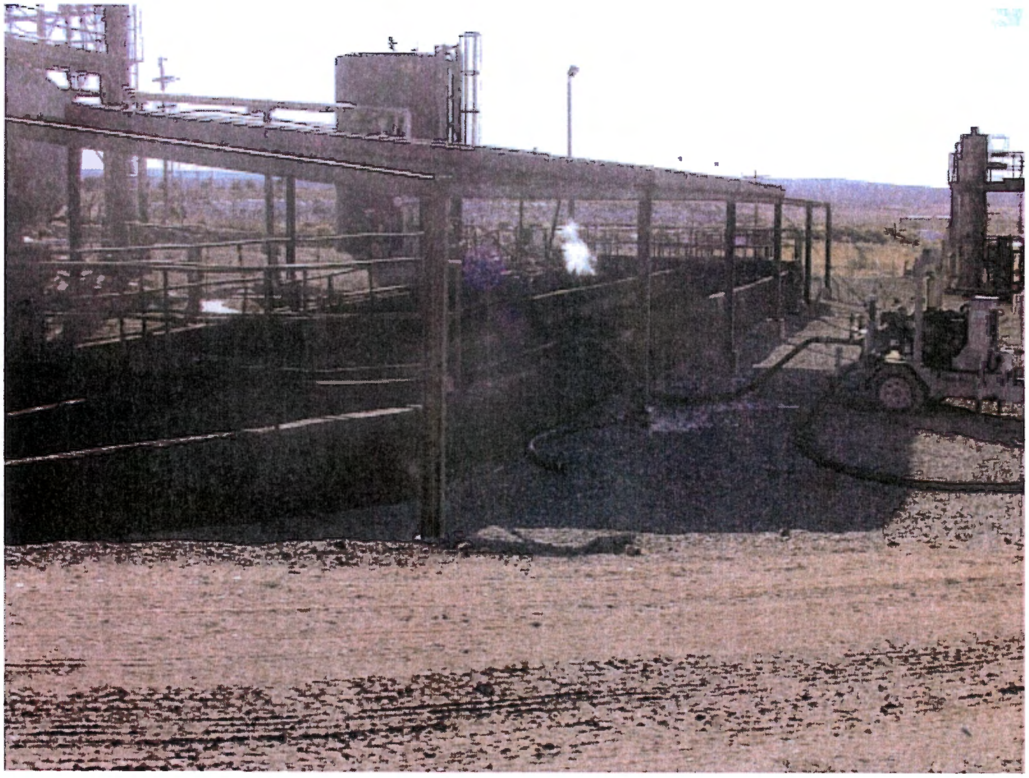


Photo 3
From northwest of OAPIS, looking west.

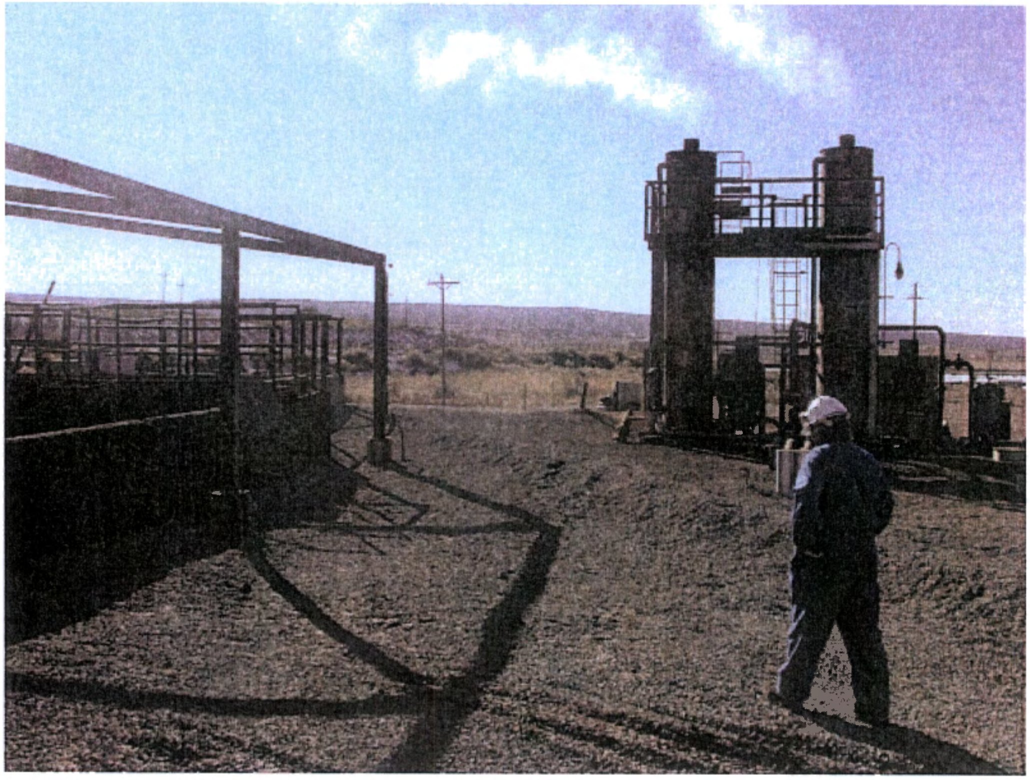


Photo 4
From north side of OAPIS, looking west at benzene strippers.

Photo 5
From north side of OAPIS, looking southwest along pipeline from OAPIS to aeration lagoon AL-1.

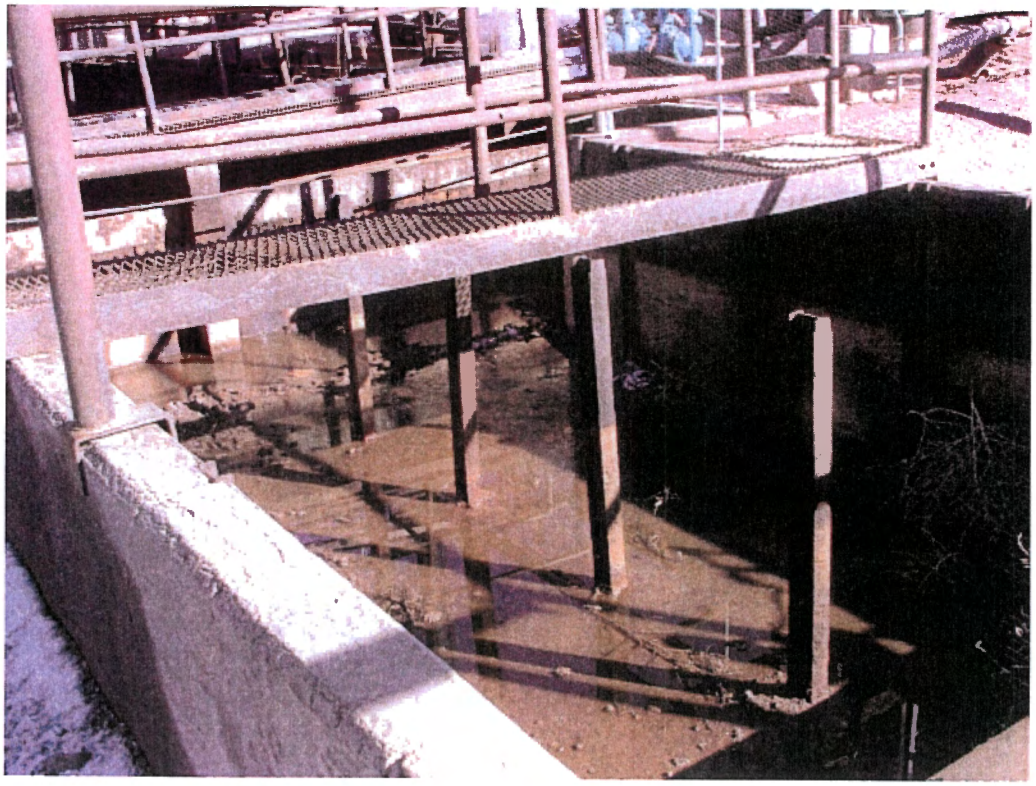


Photo 6
Looking inside western portion of OAPIS.

Photo 7
Looking east from west side of OAPIS,
benzene strippers on left.

Photo 8
Looking to the east, at southwest corner of OAPIS.

Photo 9
Looking east along south side of OAPIS.

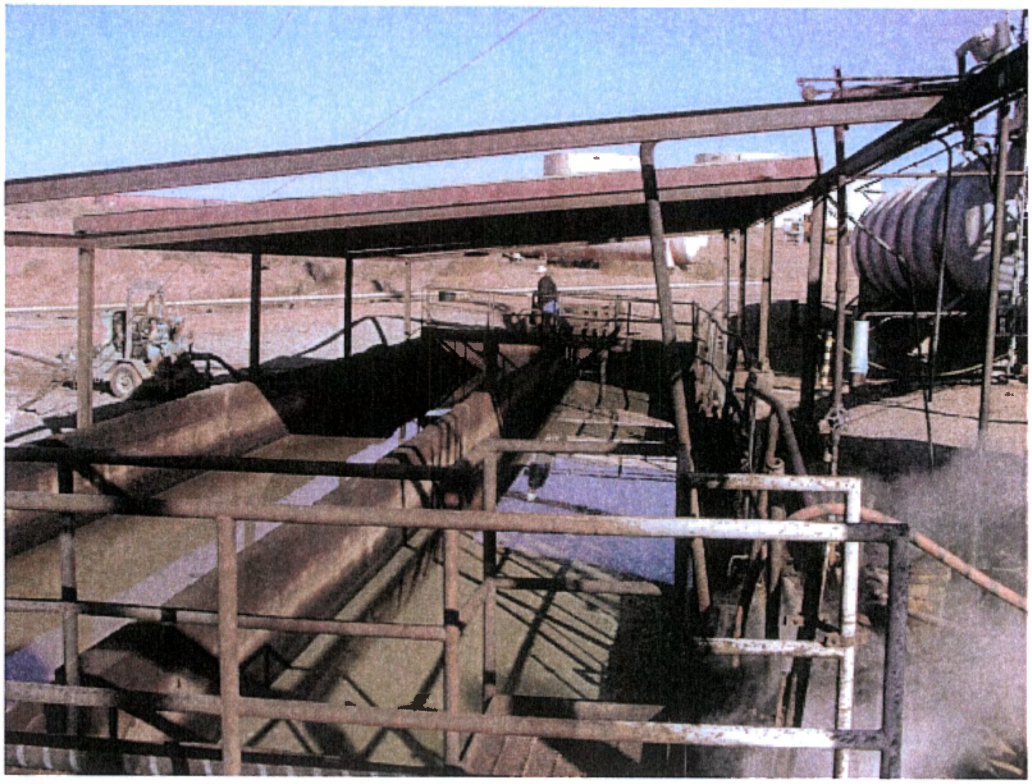


Photo 10
Looking to the east inside the OAPIS.

Sheet: 1 OF 2
Bore Point: SW corner of Pond 1

Precision Engineering, Inc.
P.O. Box 422
Las Cruces, NM 88004
505-523-7674

File #: 03-118
Site: Ciniza
Boundry Wells

Water Elevation: Not Encountered
Boring No.: GWM-1

Log of Test Borings

Elevation: TBD
Date: 7/8/2004

LAB #	DEPTH	BLOW COUNT	PLOT	SCALE	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR,ETC.)	%M	LL	PI	CLASS.
	0-1.5		o/o/o/o/		Clay, gravelly, red-brown, wet				
			o/o/o/o/						
			o/o/o/o/						
	1.5-20.0		/////////		Clay, red-brown, wet				
			/////////	2.5					
			/////////						
			/////////						
			/////////						
			/////////						
			/////////	5.0					
			/////////						
			/////////						
			/////////						
			/////////						
			/////////	7.5					
			/////////						
			/////////						
			/////////						
			/////////						
			/////////	10.0					
			/////////						
			/////////						
			/////////						
			/////////						
			/////////						
			/////////						
			/////////						
			/////////						
			/////////						
			/////////	15.0					
			/////////						
			/////////						
			/////////						
			/////////						
			/////////						
			/////////						
			/////////						
			/////////						
			/////////						
			/////////	20.0					
	20-21.5		/////////		Clay, black, wet,				
			/////////						
			/////////						

SIZE & TYPE OF BORING: 4-1/4" ID Hollow Stemmed Auger **LOGGED BY:** NS

Appendix B

Soil Boring/Monitoring Well Completion Logs

Sheet: 2 OF 2
Bore Point: SW corner of Pond 1

Water Elevation: Not Encountered
Boring No.: GWM-1

Precision Engineering, Inc.
P.O. Box 422
Las Cruces, NM 88004
505-523-7674

Log of Test Borings

File #: 03-118
Site: Ciniza
Boundry Wells

Elevation: TBD
Date: 7/8/2004

LAB #	DEPTH	BLOW COUNT	PLOT	SCALE	MATERIAL CHARACTERISTICS (MOISTURE, CONDITION, COLOR,ETC.)	%M	LL	PI	CLASS.
	21.5-24.0		////////// //////////	22.0	**Sand**, gravelly				
	22.5-24.0		////////// ////////// //////////		**Petrified Forest Formation, Painted Desert Member, Mudstone**, weathered, red-purple, reduction spots, hard, moist, blocky/crumbly				
	24.0			25.0	T.D. Screened interval 18-24'				
				30.0					
				35.0					
				40.0	**Clay**, black, wet,				

SIZE & TYPE OF BORING: 4-1/4" ID Hollow Stemmed Auger LOGGED BY: NS

KLEINFELDER

Monitoring Well Log

Date		Project Number	Project	Well No.
	Started: 6/12/2007	84679	Ciniza Refinery Monitor Well Install	KA-1
	Completed: 6/12/2007			
	Backfilled: 6/12/2007	Rig Type: CME 75	Elevation:	Logged By: B. Lucero
Latitude:		Longitude:	Location:	

Sample Type
- CS - 3.5" I.D. Continuous Sampler
- D - Disturbed Sample
- G - Grab Sample
- SPT - 2" O.D. 1.38" I.D. Tube Sample
- ST - 3" O.D. Thin-Walled Shelby Tube
- U - 3" O.D. 2.42" I.D. Ring Sample

Groundwater

Depth (ft)	Hour	Date
9.5	11:10:00 AM	6/12/2007
8.22	9:21:00 AM	6/21/2007

Groundwater Depth (ft.) / Depth (ft.)	Sample Type	PID Heated Headspace Reading, ppm	Analytical Sample Number	Visual Classification	Well Const.
0–5	G	0.6 ppm	KA1@1	CLAYEY SAND (SC) - fine to medium grained, subangular to subrounded, red brown to dark red, dry to moist, poorly cemented, sand content decreasing with depth, no hydrocarbon odor Note: Borehole was hand augered from ground surface to 5 ft bgs.	Vault Bentonite cement grout 2" Sch. 40 PVC casing
5.0'		1.9 ppm	KA1@5	SANDY LEAN CLAY (CL) - fine to medium grained, subangular to subrounded sand, red brown to dark red, moist, poorly cemented, 30-35% sand, no staining or hydrocarbon odor	10/20 Sand
7.0'	CS			SANDY LEAN CLAY (CL) - fine to medium grained, subangular to subrounded sand, dark red, moist, poorly cemented, 10-20% sand, sand content decreasing with depth, no hydrocarbon odor	0.010" Slot Screen (4.5-9.5') End Cap 3/8" Bent. chips
10.0'		1.2 ppm	KA1@10		

Total Depth 10.0'

Additional Groundwater Measurements

Depth (ft)	Hour	Date

Depth (ft)	Hour	Date

Depth (ft)	Hour	Date

KLEINFELDER

Monitoring Well Log

Started: 6/11/2007 Completed: 6/11/2007	Project Number 84679	Project Ciniza Refinery Monitor Well Install	Well No. KA-2
Backfilled: 6/11/2007	Rig Type: CME 75	Elevation:	Logged By: B. Lucero
Latitude:	Longitude:	Location:	

Sample Type:
- CS - 3.5" I.D. Continuous Sampler
- D - Disturbed Sample
- G - Grab Sample
- SPT - 2" O.D. 1.38" I.D. Tube Sample
- ST - 3" O.D. Thin-Walled Shelby Tube
- U - 3" O.D. 2.42" I.D. Ring Sample

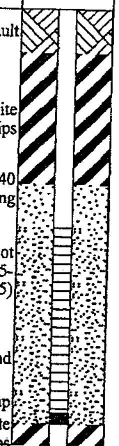
Groundwater

Depth (ft)	Hour	Date
9.5	11:10:00 AM	6/12/2007
8.54	9:18:00 AM	6/21/2007

Depth (ft.)	Sample Type	PID Heated Headspace Reading, ppm	Analytical Sample Number	Visual Classification
0–5.0'	G	2.5 ppm		SANDY LEAN CLAY (CL) - fine to coarse grained, subangular to subrounded sand, reddish gray, dry to moist, poorly cemented, 30-35% sand, no hydrocarbon odor Note: Borehole was hand augered from ground surface to 5 ft bgs.
5.0'		8.4 ppm	KA2@5	
5.0'–6.0'	CS			SANDY LEAN CLAY (CL) - fine to coarse grained, subangular to subrounded, reddish gray, dry to moist, poorly cemented, 25-30% sand decreasing with depth, no hydrocarbon odor
6.0'–10.0'	CS	79.1 ppm	KA2@9	SANDY LEAN CLAY (CL) - dark red, moist to very moist, poorly cemented, 5-15% fine to medium grained sand, substantial hydrocarbon staining at 9 feet bgs, noticable hydrocarbon odor
10.0'		137.4 ppm	KA2@10	

Total Depth 10.0'

WELL CONST.



Additional Groundwater Measurements

Depth (ft)	Hour	Date	Depth (ft)	Hour	Date	Depth (ft)	Hour	Date

Appendix E

KLEINFELDER

Monitoring W[illegible] Log

Date	Project Number	Project	Well No.
Started: 6/11/2007 Completed: 6/11/2007 Backfilled: 6/11/2007	84679	Ciniza Refinery Monitor Well Install	KA-3
	Rig Type: CME 75	Elevation:	Logged By: B. Lucero
Latitude:	Longitude:	Location:	

Sample Type:
CS - 3.5" I.D. Continuous Sampler
D - Disturbed Sample
G - Grab Sample
SPT - 2" O.D. 1.38" I.D. Tube Sample
ST - 3" O.D. Thin-Walled Shelby Tube
U - 3" O.D. 2.42" I.D. Ring Sample

Groundwater

Depth (ft)	Hour	Date
12.5	10:15:00 AM	6/12/2007
8.5	9:15:00 AM	6/21/2007

Depth (ft.)	Sample Type	PID Heated Headspace Reading, ppm	Analytical Sample Number	Visual Classification
0–3.0'	G	3.2 ppm (approx. 1')		SANDY LEAN CLAY (CL) - fine to coarse grained, subangular to subrounded sand, redish tan to tan, dry to moist, poorly cemented, 30-35% sand, no hydrocarbon odor Note: Borehole was hand augered from ground surface to 5 ft bgs.
3.0'–6.0'		14.9 ppm (5')		SANDY LEAN CLAY (CL) - fine to coarse grained, subangular to subrounded sand, dark red, dry to moist, poorly cemented, 20-25% sand decreasing with depth, no hydrocarbon odor
6.0'–12.5'	CS	14.9 ppm (10')	KA3@10	SANDY LEAN CLAY (CL) - fine to medium grained, subangular to subrounded sand, red brown to dark brown with gray hydrocarbon staining, moist, poorly cemented, 10-15% sand, grey hydrocarbon staining at 9 feet bgs, at 9-10 ft bgs noticable hydrocarbon odor
12.5'–14.0'	CS	37.6 ppm (12.5')	KA3@12.5	POORLY GRADED SAND WITH CLAY (SP-SC) - fine to medium grained, red brown to dark red, wet, poorly cemented, 10-15% clay and silt, no noticable hydrocarbon odor
15.0'		13.6 ppm (15')		SANDY LEAN CLAY (CL) - fine to medium grained sand, subangular to subrounded, dark red, moist, poorly cemented, 25-30% sand, no hydrocarbon odor
18.0'	CS			SANDY LEAN CLAY (CL) - with intervals of poorly graded sand with clay (SP-SC) at 16 ft bgs and 17.5 ft bgs fine to medium grained sand, red brown to dark red, wet, poorly cemented, 10-15% clay and silt, no hydrocarbon odor
18.0'–22.0'		3.2 ppm (20')		MUDSTONE (CHINLE FORMATION) - weathered, highly fractured dark red to reddish gray with light gray reduction spots, wet in fractures, moderately to well cemented, no noticable hydrocarbon odor
22.0'–25.0'	CS	1.9 ppm (22.5') 1.2 ppm (25')	KA3@22.5 KA3@25	MUDSTONE (CHINLE FORMATION) - minor to trace fractures dark red to reddish gray with light gray reduction spots, dry to moist, moderately to well cemented, no noticable hydrocarbon odor

Total Depth 25.0'

WELL CONST.: Vault; Bentonite cement grout; 2" Sch 40 PVC Casing; 3/8" Bentonite chips; 0.010" Slot Screen (15-25ft); 10/20 Sand; End Cap

Additional Groundwater Measurements

Depth (ft)	Hour	Date

Depth (ft)	Hour	Date

Depth (ft)	Hour	Date

KLEINFELDER

Soil Boring/Monitoring Well Log

Date				
Started: 3/14/2008	Rig Type: CME 75	Project Ciniza Refinery Monitor Well Install		Well No. KA-1R
Completed: 3/14/2008	Driller: J. Aguirre, Rodgers			
Backfilled: 3/14/2008	Weather: Sunny, Windy	Top of Casing El.: 6918.43'	Logged By: E. Shannon	NAPIS 1
Northing: 1634587.51	Easting: 2545700.49	Location: East of New API Separator		

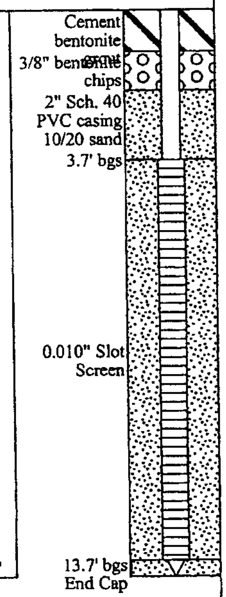
Sample Type
- G - Grab Sample
- CS - 3.5" I.D. Continuous Sampler
- SPT - 2" O.D. 1.38" I.D. Tube Sample
- U - 3" O.D. 2.42" I.D. Ring Sample
- ST - 3" O.D. Thin-Walled Shelby Tube
- NR - No Recovery

Groundwater

Depth (ft)	Hour	Date
8.20	12:19:00 PM	3/15/2008
9.50	9:38:00 AM	3/20/2008

Groundwater Depth (ft.)	Depth (ft.)	Graphical Log	Sample Taken	Sample Type	Penetration Resistance (Blows per foot)	PID Heated Headspace Reading, ppm	Analytical Sample Number	Visual Classification
	0							SANDY LEAN CLAY (CL) - reddish brown, dry grading to moist, 35 - 50% fine to medium grained sand Note: Boring drilled with hollow stem auger. Soil visually classified from auger cuttings.
	5							
▽ 8.2 / ▼ 9.5	10							
								Wet with increasing sand content from 11.5 ft bgs.
	14.0'							El. 6904.4'

WELL CONSTRUCTION



Total Depth 14.0'

Additional Groundwater Measurements

Depth (ft)	Hour	Date	Depth (ft)	Hour	Date	Depth (ft)	Hour	Date

KLEINFELDER

Date			Project	Well No.
	Started: 3/14/2008	Rig Type: CME 75	Ciniza Refinery Mo r Well Install	KA-2R
	Completed: 3/14/2008	Driller: J. uirre, Rodgers		
	Backfilled: 3/14/2008	Weather: Sunny, Windy	Top of Casing El.: 6917.27'	Logged By: E. Shannon NAPIS 2
	Northing: 1634565.05	Easting: 2545647.32	Location: West of New API Separator	

Sample Type:
- G - Grab Sample
- CS - 3.5" I.D. Continuous Sampler
- SPT - 2" O.D. 1.38" I.D. Tube Sample
- U - 3 " O.D. 2.42" I.D. Ring Sample
- ST - 3" O.D. Thin-Walled Shelby Tube
- NR - No Recovery

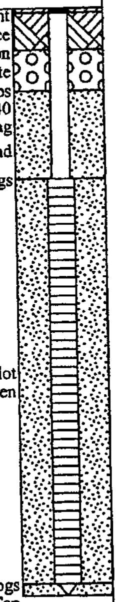
Groundwater

Depth (ft)	Hour	Date
8.61	9:28:00 AM	3/15/2008
8.77	9:42:00 AM	3/20/2008

Groundwater Depth (ft.) / Depth (ft.)	Graphical Log	Sample Taken	Sample Type	Penetration Resistance (Blows per foot)	PID Heated Headspace Reading, ppm	Analytical Sample Number	Visual Classification
0							SANDY LEAN CLAY (CL) - grayish brown, dry to moist, 25 - 30% coarse to fine grained sand
5							Grades to reddish-brown in color at 5 ft bgs.
							Note: Boring drilled with hollow stem auger. Soil visually classified from auger cuttings.
10							
14.5'							El. 6902.8'

Total Depth 14.5'

WELL CONSTRUCTION



Additional Groundwater Measurements

Depth (ft)	Hour	Date	Depth (ft)	Hour	Date	Depth (ft)	Hour	Date

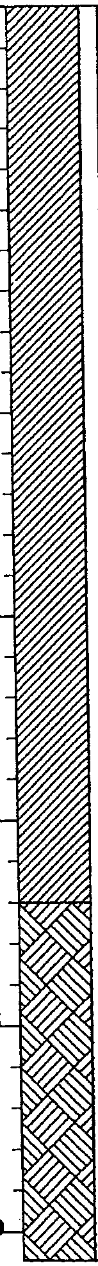
Date		Rig Type: CME 75	Project Ciniza Refinery Mor · Well Install	Well No. KA-3R
	Started: 3/13/2008	Driller: J. . .rre, Rodgers		
	Completed: 3/14/2008	Weather: Sunny, Windy	Top of Casing El.: 6917.31' / Logged By: E. Shannon	NAPIS 3
	Backfilled: 3/14/2008			
Northing: 1634589.8		Easting: 2545645.1	Location: West of New API Separator	

Sample Type:
- G - Grab Sample
- CS - 3.5" I.D. Continuous Sampler
- SPT - 2" O.D. 1.38" I.D. Tube Sample
- U - 3" O.D. 2.42" I.D. Ring Sample
- ST - 3" O.D. Thin-Walled Shelby Tube
- NR - No Recovery

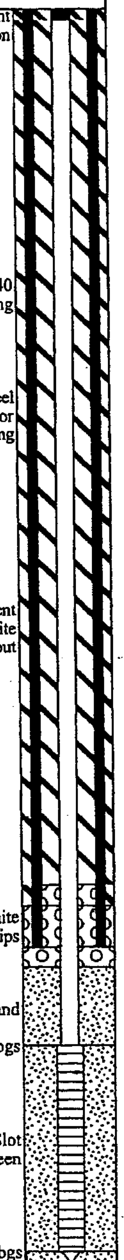
Groundwater

Depth (ft)	Hour	Date
Dry	9:40:00 AM	3/14/2008
Dry	11:15:00 AM	3/14/2008

Columns: Groundwater Depth (ft.) / Depth (ft.) | Graphical Log | Sample Taken | Sample Type | Penetration Resistance (Blows per foot) | PID Heated Headspace Reading, ppm | Analytical Sample Number | Visual Classification | WELL CONSTRUCTION



Depth (ft)	Visual Classification
0	SANDY LEAN CLAY (CL) - red, dry to moist, coarse to fine grained sand Note: Boring drilled with hollow stem auger. Soil visually classified from auger cuttings.
5	Driller noted easier drilling at 6.5 ft bgs. Soil grades to darker brown in color.
10	
15	Driller noted change in drilling at 12.5 ft bgs. Auger cuttings increased in sand content and graded moist to wet. Wet at 17 ft bgs.
20	22.0' El. 6895.3'
	BEDROCK - driller noted hard drilling at 22 ft bgs, set conductor casing at 23 ft bgs.
25	
30	30.7' El. 6886.6'



Total Depth 30.7'

Additional Groundwater Measurements

Depth (ft)	Hour	Date
30.68	9:54:00 AM	3/15/2008
30.68	12:08:00 PM	3/15/2008

Depth (ft)	Hour	Date
30.70	9:40:00 AM	3/20/2008

Depth (ft)	Hour	Date