

**GW - 001**

**INVESTIGATION  
REPORT  
BACKGROUND  
CONCENTRATION**

**2013**

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2013 JUL 31 P 2: 11

July 30, 2013

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

**UPS Tracker#: 1Z 881 839 02 5432 2806 (delivery to NMED)**  
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RE: Response to Disapproval  
Investigation Report  
Background Concentrations (July 2012)  
Western Refining Southwest, Inc., Bloomfield Refinery  
EPA ID# NMD089416416  
HWB-WRB-12-005

Dear Mr. Kieling:

Western Refining Southwest, Inc., Bloomfield Refinery (Western) has prepared the following responses to your comments (dated May 8, 2013) received on the above referenced investigation report.

**NMED Comment 1**

*In NMED's November 19, 2010 Notice of Disapproval (NOD) letter for the Investigation Work Plan for Determination of Background Concentrations, Western was required to collect additional background samples to provide sufficient representation of the variability of the soils across the site because the initial proposed sampling grid was too small. In the Report, Western expanded their proposed sampling grid and collected additional soil samples in the vicinity of the background monitoring wells; one monitoring well was located directly adjacent to the proposed background sampling grid and the location of the other monitoring well is in the far eastern portion of the refinery property. Western states that the lithology and soil type are similar across the entire site; however, it is still not clear as to whether the background samples are capturing natural variation in background metal concentrations across the site. In addition, the sampling locations may not have yielded independent samples due to their close proximity. Failure to characterize the full extent of soil variability is conservative from a regulatory standpoint but may ultimately cause Western to retain metals as potential contaminants that may be reflective of natural background. This potential failure to capture the full range of background concentrations does not prevent Western from moving forward with field work and analyses, but Western may be required to expand upon the background dataset at some time in the future.*

**Western Response 1: None required.**

**NMED Comment 2**

*In Section 3.1 (Soil Boring, Monitoring Well Installation and Sample Calculation), page 7, paragraph 2, Western states that "other soil samples collected at the background monitoring well locations [i.e., BCK-9 (54-56'), BCK-10 (5-6'), and BCK-10 (40-42')] were inadvertently not analyzed for [total petroleum hydrocarbons (TPH)]." Western must ensure all required analytes and chemical parameters are analyzed for each sampling investigation and reported in all future reports. In addition, all field personnel involved in future investigations must be aware of analytical requirements proposed in approved work plans and directions provided in NMED's letters. No response required.*

**Western Response 2:** None required.

**NMED Comment 3**

*In Section 4.1 (Exploratory Drilling Investigations, Soil Sampling and Boring Abandonment), BCK-9, page 12, paragraph 2, Western states, "[a] stiff clay was logged from 54 feet to 59 feet bgs, with gravel in the sample from 58 to 59 feet. The gravel interval continued from 59 feet to 73.5 where a clay/shale was encountered that continued to the termination depth of 79 feet." All numerical values must be defined with units of measure in this Report and all future reports and work plans.*

**Western Response 3:** The text in Sections 2.3.2, 3.1, 3.4, 4.1, and 4.2 has been revised to include units each time a depth appears and units of measure will be included in all future reports.

**NMED Comment 4**

*In Section 5.1 (Soil Background Concentrations), page 18, paragraph 2, Western replaced arsenic and fluoride non-detect results with one-half the sample quantitation limit (SQL) which is depicted in Table 3 (Soil Analytical Results and Statistical Summary), and substituted these values in the 95% upper tolerance limit (UTL) calculations. The report indicates that this methodology is consistent with EPA's most recent guidance (EPA, 2009); however, this is not an acceptable method for processing non-detects. The most current EPA guidance (EPA, 2010) states "that the detection limit (DL)/2 method (with non-detects replaced by DL/2) does not perform well (e.g., Singh, Maichle, and Lee (EPA 2006)) even when the percentage of non-detects is only 5% - 10%. It is strongly suggested to avoid the use of DL/2 method for estimation and hypothesis testing approaches used in various environmental applications." NMED recommends regression on order statistics (ROS), where "a regression line is fit to the normal scores of the order statistics for the uncensored observations and then to fill in values extrapolated from the straight line for the observations below the detection limit." In addition, NMED does not recommend using the DL/2 method for risk assessments. Revise Table 3 by utilizing the ROS method to calculate the 95% UTL. Discuss the revised results in the appropriate sections of the revised Report.*

*References:*

*EPA 2010, Singh, A, Maichle, R.W. and N. Armbya. ProUCL Version 4.1 User Guide Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations. EPA/600/R-07/041.*

*EPA 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance. EPA/530/R-09/007.*

*EPA 2006, Singh, A., Maichle, R.W. and S. Lee 2006. On the Computation of a 95% Upper Confidence Limit of the Unknown Population Mean Based Upon Data Sets with Below Detection Limit Observations. EPA/600/R-06/022.*

**Western Response 4:** The non-detect results were substituted with values produced with the ROS method and the UTLs recalculated with the revised values. The results are presented in a revised Table 3 and Section 5 was revised to discuss the use the ROS methodology instead of ½ of the SQL. Revised ProUCL output sheets are included in Appendix H.

**NMED Comment 5**

*In Section 5.1 (Soil Background Concentrations), page 19, paragraph 2 describes how the "j- flagged" data was not utilized to calculate the 95% UTL. Data which are qualified as "J" are estimated values with an undetermined bias. The impact of a "J" validation code has minimal impact on data usability. These estimated values (estimated high or low) must be treated for statistical purposes as valid measurements. Revise Table 3 (Soil Analytical Results and Statistical Summary) to calculate the 95% UTL for mercury and molybdenum and discuss the results in the appropriate sections of the Report. J-qualified data must be considered valuable measurements for all future reports and assessments.*

**Western Response 5:** The statistical evaluation was revised to include the use of J-qualified data for mercury and molybdenum as directed by NMED. As a point of clarification, J-qualified data was used to the calculated the 95% UTL for arsenic, beryllium, boron, and fluoride in the initial submittal. As was explained in Section 5.1, a UTL was not initially calculated for mercury and molybdenum because almost all of the results were estimated values, thus potentially decreasing the validity of any calculated background concentration.

**NMED Comment 6**

*In Section 5.1 (Soil Background Concentrations), page 19, paragraph 3, Western stated that the software program ProUCL Version 4.00.05 was used to calculate the 95% UTL. Since the Report was submitted in July 2012, ProUCL Version 4.1 (2010) should have been utilized. ProUCL Version 4.1 has had several updates and additions that may affect the UTL calculations, although it is unlikely that use of the most current version would significantly affect the results of the UTL calculations. Use ProUCL Version 4.1 to recalculate the 95% UTL in Table 3 (Soil Analytical Results and Statistical Summary) and*

*resubmit the revised table. In addition, discuss the results in the appropriate sections of the Report and in future reports, utilize the most currently available version of ProUCL.*

**Western Response 6:** As directed by NMED, Western has redone all of the calculations using ProUCL version 4.1. As anticipated by both Western and NMED, substituting the ProUCL 4.00.05 version with version 4.1 resulted in no changes to any of the report results.

A revised Table 3 is provided; however no revisions were necessary based on the actions taken in response to this comment.

### **NMED Comment 7**

*The following comments are for Table 3 (Soil Analytical Results and Statistical Summary).*

- a. In Table 3, the maximum SQL for arsenic (5.0 milligrams per kilogram, mg/kg) is fairly elevated compared to the NMED residential risk-based screening level (3.9 mg/kg). In future sampling events, NMED recommends that the selected analytical laboratory's methods be reviewed to ensure that the method chosen will be sufficient to detect concentrations below the screening levels.*
- b. In Table 3, the 95% UTLs are higher than the maximum detected concentrations for many analytes (e.g., aluminum, arsenic, chromium, cobalt, copper, fluoride, iron, manganese, nickel, vanadium, and zinc). While it is statistically possible for UTLs to be greater than the maximum detected concentrations, the values used for background comparison must not be greater than the maximum detected concentrations. In instances where the statistically-based UTL is greater than the maximum detected concentration, the maximum concentration must be used as the background reference value. Revise the table accordingly.*
- c. In Table 3, there were eight detected observations greater than the SQL out of eighteen samples collected for chloride but summary statistics and the 95% UTL were not calculated. There are sufficient numbers of detected observations to calculate a background comparison value. Revise the table and Appendix H (Statistical Evaluation) to include a 95% UTL for chloride.*
- d. In Table 3, the SQL does not match the reporting limit or the detection limit. Explain why either limit is used as the SQL and include a footnote summarizing the reasoning in the revised table.*
- e. In Table 3, the column labeled "Boron," in the row labeled "Minimum SQL" the value 0.1 mg/kg is reported. In the SQL column, the minimum SQL reported is 0.14 mg/kg. Review the table to ensure that all values are reported correctly.*
- f. A separate table was not provided in the Report to summarize the final background comparison values that were used for point-by-point comparisons. While Table 3 displays the summary statistics and calculated 95% UTLs, there is no listing of the final values chosen as the background comparison values. Include an additional table in the Report that summarizes the final background comparison values that were selected and utilized for site-to-background comparisons.*

**Western Response 7:**

- a. As noted by NMED, the maximum SQL for arsenic in Table 3 is 5.0 mg/kg, which is higher than the NMED residential risk-based screening level of 3.9 mg/kg. NMED recommended that in future sampling events “the selected analytical laboratory’s methods be reviewed to ensure that the method chosen will be sufficient to detect concentrations below the screening levels.” A review of the laboratory data for this sampling event indicates that the detection limits for arsenic were actually much lower [e.g., 0.31 mg/kg for sample BK-10 (5-6’)] than the residential risk-based screening level of 3.9 mg/kg. Sample quantitation limits (SQLs) are most always higher than the associated detection limits. The SQL values were included in Table 3, as this is required pursuant to Section VIII.H. of the July 27, 2007 NMED Order.
- b. Table 3 has been revised to include a new row that shows the “site background concentration” that is based on the lower of the maximum detected concentration and the 95% UTL. A footnote is included to explain whether a particular value is based on the maximum detected concentration or the 95% UTL. In fact, all of the values are based on maximum detected concentrations. There are a few constituents for which outliers were identified and for these constituents the background concentration is based on the maximum detected value after removal of the outlier values.
- c. Pursuant to NMED’s direction, a 95% UTL was calculated for chloride. However, it should be noted that the ProUCL software (Version 4.1) issued several warnings that the resulting value may not be reliable due to the low number of detected results. The ROS substitution method was used for the non-detect values. The results are presented in the revised Table 3 and Appendix H.
- d. The SQL as presented in Table 3 is based on the laboratory’s reporting detection limit as it is shown in the laboratory analytical reports. The RL acronym is shown in the laboratory Qualifiers as the “Reporting Detection Limit” but this is not the analytical method detection limit. In fact, the Reporting Detection Limit is actually the sample specific quantitation limit, thus this value is shown in Table 3 as the sample quantitation limit (SQL).

A review of the SQLs provided in the original Table 3 indicates that the reported SQL values for a number of the constituents (e.g., barium, beryllium, boron, chromium, and cobalt) does not match the Reporting Detection Limit shown in the associated laboratory analytical reports. It appears that the incorrect values are analytical method detection limits and these have been replaced by the laboratory Reporting Detection Limits or SQLs.

- e. This was a rounding error in the table and the formatting has been revised to address this comment.
- f. Because all of the information used to select the “final background comparison values” is already included in Table 3, a new row was added to Table 3 to indicate the “Site Background Concentration” instead of creating a new table. We believe this will facilitate understanding the data and process used to select the final background comparison values.

**NMED Comment 8**

*Figures 3 (Background Monitoring Well Locations) and 9 (Background Soil Sample Locations) depict the sample locations for the background monitoring wells and background sample grid for eight of the ten background soil sample locations. Revise Figure 9 to include the background soil sample grid and background sample location BCK-9 (MW-BCK1).*

**Western Response 8:** Figure 9 has been revised as directed; the location of BK-9 (MW-BCK-1) has been added to this figure.

**NMED Comment 9**

*In Appendix B (Survey Data), Exhibit "B", Point 5117, the "Descriptor" column describes "3-8 APPROX". Explain why "APPROX" is listed with 3-8.*

**Western Response 9:** Soil boring 3-8 as shown on Figure 9 is associated with SWMU No. 3 Underground Piping Currently in Use, and thus was a part of the Group 8 investigation activities. This boring was located within a well traveled roadway by Operations and facility maintenance personnel. The field marker for the boring location was off-set following the sampling activities so that the roadway could be restored quickly. Field measurements from the off-set marking allowed the boring to be surveyed correctly. The use of "APPROX" was an acronym used by the surveyor to indicate that the survey point was based on the off-set measurements from the marker placed in the field. Western personnel accompanied the surveyors during all surveying activities to ensure that the exact sample locations were located correctly. Therefore, the use of "APPROX" is for no reason intended to reflect any variance of accuracy of the surveyed sample locations.

**NMED Comment 10**

*In Appendix D (Boring Logs), Sheet 4 of 4 is missing for Well BK-10 (MW-BCK-2). Provide the missing page with the revised Report.*

**Western Response 10:** The missing page as been added to the revised report.

**NMED Comment 11**

*The following comments are for Appendix F (Quality Assurance/Quality Control Review).*

- a. *In Table A-2 (Qualified Data) in the Comments column, "Qualified" is misspelled in several of the comments.*
- b. *In Table A-3 (Field Duplicate Summary), the table summarizes the inorganic sample results and relative percent difference (RPD) calculations. Explain why RPD calculations are reported for chloride, fluoride, and sulfate when the BK-7 (0-0.5') sample and field duplicate results are reported as non-detect.*

**Western Response 11:** The following responses are for Appendix F (Quality Assurance/Quality Control Review).

- a. A revised Table A-2 with corrected spelling is included in the updated report.
- b. This is obviously a typographical error and the values reported for chloride, fluoride, and sulfate have been replaced by "NC." The revised Table A-3 is included in the revised report.

**NMED Comment 12**

*The Investigation Report Background Concentrations does not include the proposed methodology that will be applied during the site-to-background comparisons. For future assessments, ensure that the site-to-background comparisons and statistical tests that will be utilized during the site-attribution analyses are consistent with the methodologies outlined in the most current NMED guidance "Risk Assessment Guidance for Site Investigations and Remediation."*

**Western Response 12:** None required.

You will please find enclosed two hard copies and one CD of the revised report. In addition, an electronic version of the revised report (redline strikeout format) is enclosed that identifies where changes to the body of the report. As discussed above, changes were also made to Table 3, Figure 9, and Appendices F and H. If you have questions regarding the above responses or the enclosures, please contact me at (505) 632-4171.

Sincerely,



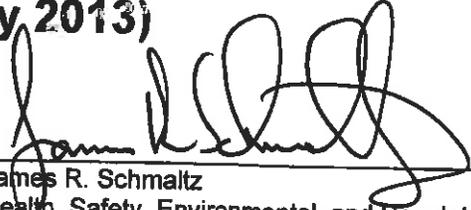
James R. Schmaltz  
Health, Safety, Environmental, and Regulatory Director  
Western Refining Southwest, Inc., Bloomfield Terminal

cc: Neelam Dhawan – NMED HWB  
Leona Tsinnajinnie – NMED HWB  
Carl Chavez - NMOCD  
Allen Hains – Western Refining El Paso  
Kelly Robinson – Western Refining Bloomfield

## INVESTIGATION REPORT BACKGROUND CONCENTRATIONS

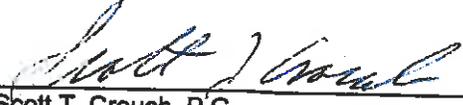
**Bloomfield Refinery  
Western Refining Southwest, Inc.  
#50 Rd 4990  
Bloomfield, New Mexico 87413**

**July 2012  
(Revised July 2013)**



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# List of Acronyms

American Petroleum Institute (API)  
areas of concern (AOCs)  
benzene, toluene, ethylbenzene, and xylene (BTEX)  
below ground surface (bgs)  
Code of Federal Regulations (CFR)  
Environmental Protection Agency (EPA)  
global positioning system (GPS)  
hollow-stem auguring (HSA)  
investigation derived waste (IDW)  
liquefied petroleum gas (LPG).  
maximum contaminant level (MCL)  
monitoring well (MW)  
New Mexico Administrative Code (NMAC)  
New Mexico Environment Department (NMED)  
Resource Conservation and Recovery Act (RCRA)  
overburden drilling with excentric drilling (ODEX)  
photoionization detector (PID)  
polyvinyl chloride (PVC)  
recovery well (RW)  
separate phase hydrocarbon (SPH)  
Solid Waste Management Units (SWMUs)  
total petroleum hydrocarbon (TPH)  
unified soil classification system (USCS)  
United States Department of Agriculture (USDA)  
volatile organic constituent (VOC)  
upper tolerance limit (UTL)  
Water Quality Control Commission (WQCC)  
Western Regional Climate Center (WRCC)

## Executive Summary

The Bloomfield Refinery, which is located in the Four Corners Area of New Mexico, has been in operation since the late 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) or Areas of Concern (AOCs).

Pursuant to the terms and conditions of an Order issued on July 27, 2007 by the New Mexico Environment Department (NMED) to San Juan Refining Company and Giant Industries Arizona, Inc. for the Bloomfield Refinery, this environmental site investigation was completed to support development of site-specific background concentrations for inorganic constituents.

The investigation activities included collection and analysis of soil and groundwater samples for inorganic constituents beginning on January 24, 2012 and continuing through June 14, 2012. This included the completion of eight shallow soil borings and two deep soil borings, which were completed as permanent background monitoring wells. Twenty soil samples and two groundwater samples (excluding additional quality assurance samples) were collected for analysis of inorganic constituents. One soil sample was analyzed for organic constituents to confirm the selected background locations were not in areas with historical impacts.

Constituents were detected at sufficient concentrations and frequencies in soil to support development of site-specific background concentrations based on the 95<sup>th</sup> upper tolerance limit (UTL) for aluminum, arsenic, barium, beryllium, boron, chloride, chromium, cobalt, copper, fluoride, iron, lead, manganese, mercury, molybdenum, nickel, vanadium, and zinc. Either all or the vast majority of soil samples analyzed for antimony, cadmium, cyanide, selenium, silver, thallium, and uranium did not contain these constituents at concentrations above the detection limit and thus background concentrations were not developed for these constituents. Only summary statistics are presented for sulfate because the analytical results are highly varied with many low estimated concentrations reported while other results are very high and outside the laboratory calibration range.

Groundwater results for the first sampling event are presented, but no statistical evaluation is possible at this time. After a sufficient number of samples have been collected, the results will be evaluated pursuant to Section VIII.H. of the Order.



# Section 1

## Introduction

The Bloomfield Refinery is located immediately south of Bloomfield, New Mexico in San Juan County (Figure 1). The physical address is #50 Road 4990, Bloomfield, New Mexico 87413. The Bloomfield Refinery is located on approximately 263 acres. Bordering the facility is a combination of federal and private properties. Public property managed by the Bureau of Land Management lies to the south. The majority of undeveloped land in the vicinity of the facility is used extensively for oil and gas production and, in some instances, grazing. U.S. Highway 44 is located approximately one-half mile west of the facility. The topography of the main portion of the site is generally flat with steep bluffs to the north where the San Juan River intersects Tertiary terrace deposits.

The Bloomfield Refinery is currently owned by San Juan Refining Company, a New Mexico corporation, and operated by Western Refining Southwest, Inc. formerly known as Giant Industries Arizona, Inc., an Arizona corporation. The Bloomfield Refinery had an approximate refining capacity of 18,000 barrels per day. Various process units operated at the facility, included crude distillation, reforming, fluidized catalytic cracking, sulfur recovery, merox treater, catalytic polymerization, and diesel hydrotreating. Products produced at the refinery included gasoline, diesel fuels, jet fuels, kerosene, propane, butane, naphtha, residual fuel, fuel oils, and liquefied petroleum gas (LPG).

On July 27, 2007, the New Mexico Environment Department (NMED) issued an Order to San Juan Refining Company and Giant Industries Arizona, Inc. (“Western”) requiring investigation and corrective action at the Bloomfield Refinery. The purpose of this background investigation is to establish site-specific background concentrations for inorganic constituents that are naturally occurring in soils and groundwater. This Investigation Report has been prepared to describe the sample collection and analyses methods that were used to support development of site-specific background concentrations pursuant to Section VIII.H. of the Order. The evaluation of the analytical data, which has been completed in accordance with the Order, is presented, including the calculation of UTLs where appropriate.

## **Section 2 Background**

This section presents background information for the areas chosen from which to collect background samples, including a review of historical waste management activities.

### **2.1 Soil Sample Locations**

The area targeted for collection of soil samples to establish background concentrations is located on the far southeastern portion of the refinery property so as to avoid any potential for current or historical impacts from refinery operations. The selected area is located south of the Regional Transportation office, which is located south the County Rd 4990 and east of Wooten Rd. (Figure 2). There is no current commercial or industrial activity in this area and no historical commercial or industrial activities are known to have occurred in this area. The proposed sample collection area is located on a separate tract of land owned by Western, just south of the Refinery property.

### **2.2 Groundwater Sample Locations**

The areas targeted for collection of groundwater samples to establish background concentrations are located at the far eastern portion of the refinery property and south of the refinery property on a separate tract of land owned by San Juan Refining Company. This separate tract covers approximately 32.4 acres and is located approximately 200 feet south of the southernmost evaporation pond (Figure 3). These areas were selected because they are anticipated to be up-gradient of the refinery operations and as such groundwater samples collected from these areas will not be affected by any current or historical refinery operations. There is no current commercial or industrial activity in this area and no known historical commercial or industrial activities are known to have occurred in these areas with the exception of a single gas well. The southernmost location for a background monitoring well is approximately 700 feet southwest of the gas well, which should place it beyond any potential impacts from operations near the gas well.

### **2.3 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.

### **2.3.1 Surface Conditions**

Regionally, the surface topography slopes toward the floodplain of the San Juan River, which runs along the northern boundary of the refinery complex. To the south of the refinery, the drainage is generally to the northwest. North of the refinery complex, across the San Juan River, surface water flows in a southeasterly direction toward the San Juan River. The active portion of the refinery property, where the process units and storage tanks are located, is generally of low relief with an overall northwest gradient of approximately 0.02 ft/ft. The refinery sits on an alluvial floodplain terrace deposit and there is a steep bluff (approx. drop of 90 feet) at the northern boundary of the refinery where the San Juan River intersects the floodplain terrace.

There are two locally significant arroyos, one immediately east and another immediately west of the refinery, which collect most of the surface water flows in the area, thus significantly reducing surface water flows across the refinery and background soil sample collection area. A minor drainage feature is located on the eastern portion of the refinery, where the Landfill Pond (SWMU No. 9) was located and there are several steep arroyos along the northern refinery boundary that primarily capture only local surface water flows and minor groundwater discharges. The southernmost proposed location for a background monitoring well is situated along a northwest/southeast trending topographic high, which is higher in elevation than any of the other refinery property. Moving off this topographic high toward the refinery, the slope is predominantly to the northeast where surface runoff would feed the arroyo than runs along the eastern portion of the refinery property. The proposed location for the background monitoring well to the east is near an arroyo that runs along the eastern portion of the refinery property. The land surface at the proposed location for collection of background soil samples slopes north/northeast and feeds into the larger arroyo that runs along the east portion of the refinery property.

The land surface is characterized by sparse shrubby vegetation, which is adapted to the arid conditions. Bare soil is exposed in many areas, consisting of a loam in the upper five inches and a clay loam to a depth of 60 inches (USDA, 2010).

The prevailing wind direction for the area is from the east as measured at the nearby Farmington, New Mexico airport (WRCC, 2011). The Farmington airport is located approximately 17 miles west of the refinery and both locations are along the east-west trending San Juan River Valley. The soil sample collection locations discussed in Sections 3.1 and 4.1

are located southeast of the refinery process area and thus are in a generally upwind location from potential on-site air emission sources.

### **2.3.2 Subsurface Conditions**

Numerous soil borings and monitoring wells have been completed across the refinery property during previous site investigations and installation of the slurry wall, which runs along the northern and western refinery boundary. Based on the available site-specific and regional subsurface information, the site is underlain by the Quaternary Jackson Lake terrace deposits, which unconformably overlie the Tertiary Nacimiento Formation. The Recent eolian deposits are predominantly silt and fine to medium grained sand that is poorly sorted. The thickness of the eolian deposits has not been determined as the underlying Jackson Lake deposits similarly are composed of silt and fine grained sand and there is no clear demarcation between the two deposits. The Jackson Lake deposits consist of fine grained sand, silt and clay that grades to coarse sand, gravel and cobble size material closer to the contact with the Nacimiento Formation. The Jackson Lake Formation is over 40 feet thick near the southeast portion of the refinery operations area and generally thins to the northwest toward the San Juan River. In the locations of background wells, which are on the far eastern margins of the refinery property and on the separate tract to the south, the Jackson Lake deposits are over 70 feet thick. The Nacimiento Formation is primarily composed of fine grained materials (e.g., carbonaceous mudstone/claystone with interbedded sandstones) with a reported local thickness of approximately 570 feet (Groundwater Technology Inc., 1994).

A review of the vadose zone materials as examined in the numerous soil borings located across the refinery property indicates a similar lithology (e.g., color, mineralogical composition, and grain size) above the horizon within the Jackson Lake Formation where there is a marked increase in grain size with the introduction of gravel and cobble sized material. The vadose zone above the gravel and cobble is composed predominantly of silt and fine to medium grained sand with minor portions of clay sized material. Across the site, there are minor variations in the percentages of the various sized fractions but it is commonly a difficult field judgment whether to classify a particular sample as sandy silt or silty sand, with some minor portion of clay present in most samples. The sand and silt sized grains are predominantly composed of quartz.

Within the deeper interval that includes the gravel and cobble sized material, the matrix is similar to the finer grained material discussed above. While the gravel and cobble materials are composed of both quartz and igneous rocks of various compositions, the finer grained matrix

material will have the dominant influence on contaminant fate and transport through this interval. Also, the finer grained matrix material would represent the potential exposure medium in this deeper interval and not the gravel and cobble sized fraction, thus any evaluation of background constituent concentrations should be performed on the finer grained matrix material.

A review of the soil survey information (see Appendix A) also shows similar lithology within the upper five feet (USDA, 2010). The Doak soil map unit is described as a loam from 0 feet – 0.5 feet and a clay loam from 0.5 feet – 5.0 feet. The Avalon soil map unit is described as a loam from 0.5 feet – 5.0 feet and a gravelly loam from 5.0 feet – 5.33 feet. As shown on the soil survey map included in Appendix A, the same soil map unit (Doak-Avalon association) occurs across most of the refinery complex (USDA, 2010). The area from which the background samples were collected is within this same soil association (i.e., DN). Based on the actual soils samples observed in the soil borings completed the areas represented by the Doak-Avalon association (DN) and Haplargids-Blackston-Torriorthents complex (HA), there are not sufficient differences to denote distinct lithologic units in the vadose zone in these areas and the background soil samples collected from the “DN” area should also be representative of the areas shown on page 8 of Appendix A as HA. The two sample depths as discussed in Section 4.1 were selected based on the chemical soil properties reported in Appendix A, which show a slight variation with depth for the Doak-Avalon association soils. The slight difference appears to be related to leaching of soluble constituents (e.g., calcium carbonate) from the surface soils (e.g., 0 feet - 0.5 feet) and precipitation in deeper intervals (e.g., 18-24”).

Figures 4 and 5 present cross-sections of the shallow subsurface based on borings logs from on-site monitoring well completions with the addition of the new background wells. The uppermost aquifer is under water table conditions and occurs within the sand and gravel deposits of the Jackson Lake Formation. The Nacimiento Formation functions as an aquitard at the site and prevents site related contaminants from migrating to deeper aquifers. The potentiometric surface as measured in April 2012 is presented as Figure 6 and shows the groundwater predominantly flowing to the northwest. The saturated thickness of the shallow aquifer within the Jackson Lake Formation is greatest near and along the Hammond Irrigation Ditch and other potential sources of recharge (e.g., the raw water ponds), and decreases to the southeast in the up-gradient portions of the refinery property.

Previous site investigations have identified and delineated on-site impacts to groundwater from historical site operations, which are down-gradient of the locations selected for the two new

background monitoring wells. Figure 7 shows the distribution of SPH in the subsurface based on the apparent thickness of SPH measured in on-site monitoring wells. Dissolved-phase impacts are depicted on Figure 8.

## **Section 3**

### **Scope of Activities**

#### **3.1 Soil Boring, Monitoring Well Installation and Sample Collection**

Pursuant to Section VIII. H. of the Order, an investigation of soils and groundwater was conducted to determine the concentration of naturally occurring constituents (i.e., background concentrations). To accomplish this objective, soil borings and monitoring wells were installed at areas that have not been affected by on-site operations or any other commercial/industrial operations (Figures 2 and 3).

Eight two-foot soil borings (BK-1 through BK-8) were completed with samples collected from depths of 0 feet - 0.5 feet and 1.5 feet - 2.0 feet (Figure 9). In addition, soil samples were collected from depths of five feet below ground surface (bgs) and at the top of saturation in the two soil borings (BK-9 and BK-10) drilled for the background monitoring wells to verify the monitoring wells were drilled at locations without evidence of historical impacts (Figure 3). The soil samples were all analyzed for inorganic constituents and the 5 feet - 5.5 feet sample collected at BK-9 was also analyzed for total petroleum hydrocarbons (TPH). The other soil samples collected at the background monitoring well locations [i.e., BCK-9 (54-56'), BCK-10 (5-6'), and BCK-10 (40-42')] were inadvertently not analyzed for TPH and this is the only instance of a deviation from the approved Investigation Work Plan.

Two monitoring wells (MW-BCK1 and MW-BCK2) were drilled and completed as background monitoring wells to the south and east of the refinery. Groundwater samples were collected and analyzed for inorganic constituents, which may be naturally occurring.

#### **3.2 Background Information Research**

Documents containing the results of previous investigations and subsequent routine groundwater monitoring data from monitoring wells were reviewed to facilitate development of the Background Concentrations Investigation Work Plan (Western, 2010). The previously collected data provides valuable information on the overall subsurface conditions, including hydrogeology and contaminant distribution within groundwater.

### **3.3 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 and monitoring wells were contained and characterized. Because the soils were all collected from within areas that were purposely selected to not have any impacts, the characterization is based on the actual soil sample analyses.

The sample analyses for the background soil samples indicate that the samples were collected from locations without any historical environmental impacts and thus the soils are “clean” and suitable to reuse on-site. All purged groundwater and decontamination water (approximately 17 gallons) was disposed in the refinery wastewater treatment system upstream of the American Petroleum Institute (API) Separator.

### **3.4 Surveys**

Known site features and/or site survey grid markers were used as references to locate each boring as part of the field documentation prior to surveying the location. The boring locations were measured to the nearest foot and locations were placed on a scaled map. In addition, a hand held global positioning system (GPS) receiver was used to record the coordinates of each soil boring. These coordinates were recorded on the field boring logs. The soil boring locations were subsequently surveyed by a registered surveyor.

The horizontal coordinates and elevation of each boring, the top of each monitoring well casing (north side), and the ground surface at each monitoring well location; and the locations of all other pertinent structures were 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)). The surveys were 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 were measured to the nearest 0.1-foot, and vertical elevations were measured to the nearest 0.01-foot. The survey data is included in Appendix B.

## Section 4

# Field Investigation Results

This section provides a summary the installation of soil borings, field screening of soils, and collection of soil samples for analysis. This is followed by a description of the installation of permanent monitoring wells, collection of groundwater samples, and a description of groundwater conditions.

### 4.1 Exploratory Drilling Investigations, Soil Sampling and Boring Abandonment

This subsection provides a description of background soil investigation. This includes soil field screening results, soil sampling intervals and methods for collection of soil samples in background sampling locations.

The shallow two-foot soil borings were completed with a hand auger. The two deep soil borings were drilled using the hollow-stem auguring (HSA) method and it was necessary to switch to the overburden drilling-excentric drilling (ODEX) drilling method to complete MW-BCK1. The drilling equipment was decontaminated between each borehole, as described in Appendix C.

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

- 0 feet - 0.5 feet (all two-foot borings);
- 1.5 feet – 2 feet (all two-foot borings);
- From five feet bgs (the two deep borings);
- A discrete lithologic interval (BK-9 54 feet – 56 feet); and
- The interval just above saturation (the two deep borings).

The installation of soil borings and collection of soil samples is discussed below in numerical order. A description of the field screening and soil sampling procedures are presented in Appendix C – Field Methods. Copies of the boring logs are provided in Appendix D. In addition to being included on the soil boring logs, the soil vapor (i.e., headspace) screening results are summarized in Table 1. The locations of the soil borings appear on Figures 3 and 9.

#### BCK-1

On January 27, 2012, a hand auger was used to complete a soil boring to a depth of two feet bgs. Soil samples were collected from 0 feet - 0.5 feet and 1.5 feet – 2 feet. There were no indications of impacts based on the field screening results nor was there any visual or olfactory evidence of impacts from the surface to a depth of 2 feet bgs. The lithology is described as silt,

some minor very fine sand, loose to compact. The borehole was backfilled to the surface on January 27, 2012 using bentonite chips.

#### BCK-2

On January 27, 2012, a hand auger was used to complete a soil boring to a depth of two feet bgs. Soil samples were collected from 0 feet - 0.5 feet and 1.5 feet – 2 feet. The lithology is described as silt, some minor very fine sand, loose to compact. There were no indications of impacts based on the field screening results nor was there any visual or olfactory evidence of impacts from the surface to a depth of 2 feet bgs. The borehole was backfilled to the surface on January 27, 2012 using bentonite chips.

#### BCK-3

On January 27, 2012, a hand auger was used to complete a soil boring to a depth of two feet bgs. Soil samples were collected from 0 feet - 0.5 feet and 1.5 feet – 2 feet. There were no indications of impacts based on the field screening results nor was there any visual or olfactory evidence of impacts from the surface to a depth of 2 feet bgs. The lithology is described as silt, some minor very fine sand, loose to compact. The borehole was backfilled to the surface on January 27, 2012 using bentonite chips.

#### BCK-4

On January 27, 2012, a hand auger was used to complete a soil boring to a depth of two feet bgs. Soil samples were collected from 0 feet - 0.5 feet and 1.5 feet – 2 feet. The lithology is described as clayey silt from 0 feet - 0.5 feet that grades to silt, with some minor very fine sand, loose to compact below 0.5 feet. There were no indications of impacts based on the field screening results nor was there any visual or olfactory evidence of impacts from the surface to a depth of 2 feet bgs. The borehole was backfilled to the surface on January 27, 2012 using bentonite chips.

#### BCK-5

On January 27, 2012, a hand auger was used to complete a soil boring to a depth of two feet bgs. Soil samples were collected from 0 feet - 0.5 feet and 1.5 feet – 2 feet. There were no indications of impacts based on the field screening results nor was there any visual or olfactory evidence of impacts from the surface to a depth of 2 feet bgs. The lithology is described as silt,

some minor very fine sand, loose. The borehole was backfilled to the surface on January 27, 2012 using bentonite chips.

#### BCK-6

On January 27, 2012, a hand auger was used to complete a soil boring to a depth of two feet bgs. Soil samples were collected from 0 feet - 0.5 feet and 1.5 feet – 2 feet. The lithology is described as silt, some minor very fine sand, loose. There were no indications of impacts based on the field screening results nor was there any visual or olfactory evidence of impacts from the surface to a depth of 2 feet bgs. The borehole was backfilled to the surface on January 27, 2012 using bentonite chips.

#### BCK-7

On January 27, 2012, a hand auger was used to complete a soil boring to a depth of two feet bgs. Soil samples were collected from 0 feet - 0.5 feet and 1.5 feet – 2 feet. There were no indications of impacts based on the field screening results nor was there any visual or olfactory evidence of impacts from the surface to a depth of 2 feet bgs. The lithology is described as silt, some minor very fine sand, loose. The borehole was backfilled to the surface on January 27, 2012 using bentonite chips.

#### BCK-8

On January 27, 2012, a hand auger was used to complete a soil boring to a depth of two feet bgs. Soil samples were collected from 0 feet - 0.5 feet and 1.5 feet – 2 feet. The lithology is described as silt, some minor very fine sand, loose. There were no indications of impacts based on the field screening results nor was there any visual or olfactory evidence of impacts from the surface to a depth of 2 feet bgs. The borehole was backfilled to the surface on January 27, 2012 using bentonite chips.

#### BCK-9

On January 24, 2012 the drilling rig was set up on location BCK-9 and drilled to a depth of 59 feet using hollow stem augers. A soil sample was collected using split-spoon samplers at a pre-determined depth of 5 feet - 5.5 feet. A second sample was collected from a depth of 54 feet - 56 feet as the sample representative of the zone just above saturation. This interval was at the top of a damp clay. Drilling stopped for the day at a depth of 70.5 feet. On January 25<sup>th</sup> drilling continued to a depth of 72 feet where drilling conditions became difficult and it was determined

that the rig would be required to switch over to air rotary/ODEX. On January 31st, ODEX casing was ran to 70 feet. On February 1, 2012, the drilling resumed using air rotary/ODEX. The borehole was drilled to the termination depth of 79 feet, where it was completed as a permanent monitoring well, as discussed below in Section 4.2.

No odors were observed and no elevated readings with a photoionization detector (PID) were recorded throughout the entire boring. The lithology near the land surface was recorded as silty very fine grained sand, which continued to a depth of six feet, where a fine sand was encountered from six to seven feet. A one foot interval of sandy clay extended from seven feet to eight feet. Fine sand was encountered from eight feet to 27.75 feet bgs. A silty clay layer was logged from 27.75 feet to 30 feet bgs, where it graded to a clayey silt. The clayey silt extended from 30 feet to 34 feet and then graded to a silty sand that continued until 54 feet bgs. A stiff clay was logged from 54 feet to 59 feet bgs, with gravel in the sample from 58 feet to 59 feet. The gravel interval continued from 59 feet to 73.5 feet where a clay/shale was encountered that continued to the termination depth of 79 feet. The top of the Nacimiento Formation was logged at 73.5 feet bgs. The interval just above the top of the Nacimiento Formation (73 feet - 73.5 feet) was described as moist to saturated.

#### BCK-10

On February 7, 2012 the drilling rig was set up on location BCK-10 and drilled to a depth of 42 feet using hollow stem augers before there was a mechanical failure on the rig. The rig was repaired and drilling resumed the next day. Drilling continued to a depth of 45 feet where the boring was temporarily halted to determine if water was present at this depth. No groundwater was measured at the bottom of the boring and drilling resumed on February 13, 2012. The drilling continued to a depth of 60 feet, where the boring was completed as a permanent monitoring well, as discussed below in Section 4.2.

No odors were observed and no elevated readings with a PID were recorded throughout the entire boring. The lithology near the land surface was recorded as silt with very fine grained sand, which continued to a depth of six feet, where a sandy gravel was encountered from six feet to ten feet. A soil sample was collected from a pre-determined depth of 5 feet - 6 feet. No sample was recovered for the depth interval of ten feet to 12 feet. A silty sandy clay was logged from 12 feet to 14 feet, which graded to a silty clay that extended to 18 feet. A four foot thick clayey silt was present from 18 feet to 22 feet and then graded back to a silty clay that

continued to 26 feet. A compact/cemented silty sand was logged from 26 feet to 32 feet. Clayey silt extended from 32 feet to 42 feet, where the sand content increased and water appeared to be present. A soil sample was collected from a depth of 40 feet - 42 feet as the depth interval representative of the zone just above saturation. The clayey silt/sand continued to a depth of 45 feet and then graded to a silty sand, which continued to the termination depth of 60 feet. No distinct zone of saturation was logged in the well during drilling; however, the outside of the core from the 42 feet - 44 feet interval appeared to be wet. The Nacimiento Formation was not encountered before reaching the termination depth of 60 feet.

#### **4.2 Monitoring Well Construction and Groundwater Sampling**

This section describes the methods and details of monitoring well construction and the collection of groundwater samples. The description includes the dates of well construction. The wells and groundwater samples are discussed in numerical order of the associated soil borings. Copies of the boring and well construction logs are provided in Appendix D. The well development and purging procedures and groundwater sample collection procedures are discussed in Appendix C. The locations of the monitoring wells and borings from which groundwater samples were collected appear on Figure 3.

##### MW-BCK1 (BK-9)

On January 24, 2012 the drilling rig was set up on location BCK-9 and drilled to a depth of 59 feet using hollow stem augers. Drilling stopped for the day at a depth of 70.5 feet. On January 25<sup>th</sup> drilling continued to a depth of 72 feet where drilling conditions became difficult and it was determined that the rig would be required to be switched over to air rotary/ODEX. On January 31<sup>st</sup>, ODEX casing was ran to 70 feet. On February 1, 2012, the drilling resumed using air rotary/ODEX. The borehole was drilled to the termination depth of 79 feet, where it was completed as a permanent monitoring well. There were no indications of any impacts throughout the depth of the boring and no distinct zones of saturation were observed. As shown on the well construction log for MW-BCK1, the Nacimiento Formation was encountered at 73.5 feet bgs and consists of very dense clay/shale.

In order to accommodate the screen placement the borehole was advanced to a depth of 79 feet bgs. On February 1, 2012, slotted (0.01 inch) 2-inch rigid PVC well screen was placed near the bottom of the boring and extended for 15 feet (75 feet to 60 feet) to ensure that the well would be open to any saturated intervals above the Nacimiento. The 10/20 sand filter pack was

installed to 58 feet bgs. As the sand was installed in the well bore the ODEX casing was removed. Approximately five feet of bentonite was placed over the filter pack and hydrated. On February 2, 2012 an annular grout was installed to within two feet of the ground surface and allowed to cure for a minimum of 24 hours. On February 7, 2012, the surface pad and protective aluminum cover were installed. The surface completion consists of stickup completion, which includes a protective aluminum enclosure with cap that was secured in a concrete pad measuring 4-feet by 4-feet wide by 6-inches thick. The concrete pad was wire reinforced. The aluminum protective casing extended 4 feet above the top surface of the concrete pad.

Four-inch diameter steel bollards were installed 6 inches from each corner of the concrete pad. The bollards were installed two feet below grade and extended three feet above grade. The bollards were installed vertically level and extend the same height. The holes for the bollards were dug by hand with the diameter of the borehole measured a minimum of 6-inches. Each bollard was cemented into the ground with the cement extending from the bottom of the hole to the surface. The bollard was filled with cement. Each bollard was pretreated to remove rust, primed, and painted with two coats of safety-yellow paint.

Groundwater samples were collected at MW-BCK1 on June 14, 2012. The water samples were collected following the procedures discussed in Appendix C.

#### MW-BCK2 (BCK-10)

On February 7, 2012 the drilling rig was set up on location BCK-10 and drilled to a depth of 42 feet using hollow stem augers before there was a mechanical failure on the rig. The rig was repaired and drilling resumed the next day. Drilling continued to a depth of 45 feet where the boring was temporarily halt to determine if water was present at this depth. No groundwater was measured at the bottom of the boring and drilling resumed on February 13, 2012. The drilling continued to a depth of 60 feet, where the boring was completed as a permanent monitoring well. The Nacimiento Formation was not encountered at the termination depth of 60 feet and no obvious zones of saturation were observed.

On February 13, 2012, a two-inch diameter, slotted (0.01 inch) rigid PVC well screen was placed at the bottom of the well and extended for 20 feet (60 feet to 40 feet) to help ensure that any possible zones of saturation would be in communication with the well. Rigid Schedule 40 PVC with threads was utilized for the well casing. A 8-inch sand bed was placed at the bottom

of the well bore. The 10/20 sand filter pack was installed to three feet over the top of the well screen. As the sand was installed in the well bore the hollow stem augers were removed. Two feet of bentonite was placed over the filter pack and hydrated. On February 14, 2012 an annular grout was installed to within two feet of the ground surface and allowed to cure for a minimum of 24 hours. Subsequently, the surface pad and protective aluminum cover were installed. The surface completion consists of stickup completion, which includes a protective aluminum enclosure with cap that was secured in a concrete pad measuring 4-feet by 4-feet wide by 6-inches thick. The concrete pad was wire reinforced. The aluminum protective casing extended 4 feet above the top surface of the concrete pad.

Four-inch diameter steel bollards were installed 6 inches from each corner of the concrete pad. The bollards were installed two feet below grade and extended three feet above grade. The bollards were installed vertically level and extend the same height. The holes for the bollards were dug by hand with the diameter of the borehole measured a minimum of 6-inches. Each bollard was cemented into the ground with the cement extending from the bottom of the hole to the surface. The bollard was filled with cement. Each bollard was pretreated to remove rust, primed, and painted with two coats of safety-yellow paint.

Groundwater samples were collected at MW-BCK2 on June 14, 2012. The well was first purged and the water samples collected following the procedures discussed in Appendix C.

### **4.3 Groundwater Conditions**

The uppermost aquifer is under water table conditions and occurs within the sand and gravel deposits of the Jackson Lake Formation. The Nacimiento Formation functions as an aquitard at the site and prevents site related contaminants from migrating to deeper aquifers. The potentiometric surface as measured in April 2012 is presented in Figure 6 and shows the groundwater predominantly flowing to the northwest. The potentiometric surface at the site is consistent with the regional gradient in that movement is toward to the San Juan River, which is a location of regional groundwater discharge. The installation of the slurry wall and collection wells/French drain along the western and northern boundary of the refinery controls the flow of groundwater in this area.

The depth to water measured in the area of the new background monitoring wells varies from approximately 77 feet near MW-BCK1 to 26 feet at MW-BCK2 (Table 2). There is also a significant difference between the top of casing elevations at the two locations (Table 2). The

saturated thickness in the water table aquifer as measured in on-site wells varies from zero feet in the southern and eastern portions of the refinery to a maximum of approximately eight feet along the northern portion of the refinery. The saturated thickness in the new background wells is estimated to be only one foot or less at MW-BCK1. The saturated thickness at MW-BCK2, where the top of Nacimiento Formation does not appear to have been encountered, is over 30 feet based on fluid level measurements. However, during the drilling of MW-BCK2 there was no indication of saturation in any of the sediments encountered and it is unlikely there is water movement throughout this 30 foot plus “saturated” interval. When purging water from MW-BCK2 for sample collection, water recovered very slowly to the well, which is not indicative of a fully saturated 30 foot plus interval.

## Section 5

# Background Analytical Results and Summary Statistics

The analytical results for the background soil and the initial round of background groundwater samples are discussed below. Pursuant to Section VIII.H of the Order the following summary statistics have been determined for each constituent for soils:

1. Number of detects;
2. Total number of samples;
3. Frequency of detection;
4. Minimum detected concentration;
5. Maximum detected concentration;
6. Minimum sample quantitation limit (SQL);
7. Maximum SQL;
8. Arithmetic mean;
9. Median;
10. Standard deviation; and
11. Coefficient of variation.

### 5.1 Soil Background Concentrations

As discussed above in Section 4.1, 16 soil samples were collected from the upper two feet and two additional samples were collected from a depth of five feet. A review of the soil boring information in Section 4.1 indicates that all of these soil samples are of similar lithology and that the analytical results can be evaluated together as a single population for purposes of establishing background concentrations for near surface soils at the Bloomfield refinery. The three deeper soil samples collected from borings BK-9 and BK-10, which were completed to facilitate installation of monitoring wells, appear to have different lithologies with a stiff clay present in BK-9 (54-56') and a clayey silt present in BK-10 (40-42'). The three deeper soil samples are not included the "background" data set discussed below. The analytical results are included in Table 3.

The soil samples were analyzed for the constituents listed below using the specified analytical methods.

Analyte	Analytical Method
Aluminum	SW-846 method 6010/6020
Antimony	SW-846 method 6010/6020
Arsenic	SW-846 method 6010/6020
Barium	SW-846 method 6010/6020

<b>Analyte</b>	<b>Analytical Method</b>
Beryllium	SW-846 method 6010/6020
Boron	SW-846 method 6010/6020
Cadmium	SW-846 method 6010/6020
Chromium	SW-846 method 6010/6020
Cobalt	SW-846 method 6010/6020
Copper	SW-846 method 6010/6020
Cyanide	SW-846 method 335.4/335.2 mod
Iron	SW-846 method 6010/6020
Lead	SW-846 method 6010/6020
Manganese	SW-846 method 6010/6020
Mercury	SW-846 method 7470/7471
Molybdenum	SW-846 method 6010/6020
Nickel	SW-846 method 6010/6020
Selenium	SW-846 method 6010/6020
Silver	SW-846 method 6010/6020
Thallium	SW846 method 6010/6020
Vanadium	SW-846 method 6010/6020
Uranium	SW-846 method 6020
Zinc	SW-846 method 6010/6020
Chloride	SW-846 method 300
Sulfate	SW-846 method 300
Fluoride	SW-846 method 300

In addition to the constituents list above, sample BK-9 (5-5.5') was analyzed for TPH by SW-846 method 8015. The results for all three fractions (gasoline range, diesel range, and motor oil range) were non-detect, indicating a lack of petroleum hydrocarbon impacts to soils in the vicinity of background monitoring well MW-BCK1.

The inorganic analytical results are summarized in Table 3 and the analytical data reports are provided in Appendix E. Data validation is included in Appendix F. The summary statistics as listed above are presented in Table 3, along with the 95% upper tolerance limit (UTL) for aluminum, arsenic, barium, beryllium, boron, chloride, chromium, cobalt, copper, fluoride, iron, lead, manganese, mercury, molybdenum, nickel, vanadium, and zinc. Arsenic had one result that was non-detect and this result was replaced with a value determined using the Regression on Order Statistic (ROS) methodology. Chloride had ten results that were non-detect and substitute values were developed using the ROS methodology. Fluoride and mercury each had two results that were non-detect and these sample results were replaced with values derived

with the ROS methodology. The ROS methodology uses an ordinary least squares regression line fit to the normal scores of the ordered statistics for the uncensored (detected results) observations and then values are extrapolated from the straight line for the observations below the detection limit (EPA, 2010).

Either all or the vast majority of soil samples analyzed for antimony, cadmium, cyanide, selenium, silver, thallium, and uranium did not contain these constituents at concentrations above the detection limit and thus background concentrations (i.e., 95% UTL) were not developed for these constituents. Only summary statistics are presented for sulfate because the analytical results are highly varied with many low estimated concentrations reported while other results are very high and outside the laboratory calibration range.

Prior to calculation of the 95% UTL, each data set was evaluated using EPA's statistical software program ProUCL Version 4.1.00 to determine if there are any potential outliers and to determine the distribution of the data (e.g., normal vs. lognormal). The check for outliers was performed using graphic methods (e.g., box plots and Q-Q plots) and Dixon's outlier test. An explanation of the Dixon's outlier test performed by the ProUCL software is provided in Appendix G. Barium, boron, mercury, and molybdenum were the only constituents found to potentially have any outliers and for which outliers were removed. The two upper values of 760 and 480 mg/kg were removed from the data set prior to evaluating the distribution of the data and calculating the 95% UTL for barium. The maximum value of 12 mg/kg was removed from the boron data set as a potential outlier. The highest value 0.12 mg/kg was removed from the mercury data set. The highest two values of 0.9 mg/kg and 0.7 mg/kg were removed from the molybdenum data set. Box plots and the results of the Dixon's outlier tests are included in Appendix H.

The distribution of the data was checked using histograms and normal probability plots, both of which are presented in Appendix H for each constituent. All of the data subject to a statistical evaluation is normally distributed as shown on the probability plots with the exception of barium, chloride and fluoride, which are lognormally distributed.

The 95% UTL ( $\alpha = .05$  & 95% coverage) was calculated using the ProUCL software (version 4.1.00) and the output data sheets for each constituent are included in Appendix H. For normally distributed data sets, an upper  $(1 - \alpha)$  % tolerance limit with tolerance or coverage

coefficient =  $p$  (that is providing coverage to at least  $p\%$  proportion of observations) is given by the following equation (EPA, 2010).

$$\text{UTL} = \text{mean} + (K \times \text{standard deviation})$$

Here,  $K = K(n, \alpha, p)$  is the tolerance factor and depends upon the sample size,  $n$ , confidence coefficient =  $(1 - \alpha)$ , and the coverage proportion =  $p$ . The UTL given by the above equation represents a  $(1 - \alpha)\%$  confidence interval for the  $p^{\text{th}}$  percentile of the underlying normal distributions. The values of the tolerance factor,  $K$ , have been tabulated extensively in the various statistical books (e.g., Hahn and Meeker 1991). Those  $K$  values are based upon non-central t-distributions. In the ProUCL 4.1 software package, the values of  $K$  for samples of sizes  $\leq 30$ , as given in Hahn and Meeker, have been directly programmed. For a 95% confidence coefficient, 95% coverage, and sample sizes of 18, 17, and 16 samples, the values for  $K$  are 2.453, 2.486, and 2.524, respectively.

The procedure to compute UTLs for lognormally distributed data sets is similar to that for normally distributed data sets (EPA, 2010). First, the sample mean,  $\bar{y}$ , and standard deviation ( $sd$ ),  $s_y$ , of the log-transformed data are computed. An upper  $(1 - \alpha)\%$  tolerance limit with tolerance or coverage coefficient =  $p$  (that is, providing coverage to at least  $p\%$  proportion of observations) is given by the following equation.

$$\text{UTL} = \exp(\bar{y} + K * s_y)$$

Note that, just as for the normal distribution, the UTL given by the above equation represents a  $(1 - \alpha)\%$  confidence interval for the  $p^{\text{th}}$  percentile of the lognormal distribution. The  $K$  factor used to compute the lognormal UTL is the same as the one used to compute the normal UTL. The resulting values for the 95% UTL, as calculated with the ProUCL software, are summarized in Table 3.

## 5.2 Groundwater Background Concentrations

As discussed above in Section 4.2, two groundwater samples were collected from new background monitoring wells MW-BCK1 and MW-BKC2 on June 14, 2012. The groundwater samples were analyzed for the constituents listed below using the specified analytical methods. Metals results analyzed by methods 200.7 and 200.8 are reported for both total and dissolved concentrations.

<b>Analyte</b>	<b>Analytical Method</b>
Aluminum	EPA method 200.7
Antimony	EPA method 200.8
Arsenic	EPA method 200.8
Barium	EPA method 200.7
Beryllium	EPA method 200.7
Boron	EPA method 200.7
Cadmium	EPA method 200.7
Chromium	EPA method 200.7
Cobalt	EPA method 200.7
Copper	EPA method 200.7
Cyanide	SW-846 method 335.4/335.2 mod
Iron	EPA method 200.7
Lead	EPA method 200.8
Manganese	EPA method 200.7
Mercury	EPA method 245.1
Molybdenum	EPA method 200.7
Nickel	EPA method 200.7
Selenium	EPA method 200.8
Silver	EPA method 200.7
Thallium	EPA method 200.8
Vanadium	EPA method 200.7
Uranium	EPA method 200.8
Zinc	EPA method 200.7
Chloride	SW-846 method 300
Sulfate	SW-846 method 300
Fluoride	SW-846 method 300
Total Dissolved Solids	SM-2540C
Bicarbonate	SM-2320B
Calcium	EPA method 200.7
Magnesium	EPA method 200.7
Sodium	EPA method 200.7
Potassium	EPA method 200.7
Nitrate/nitrite	EPA method 300.0

The analytical results are summarized in Table 4. The field measured parameters are presented in Table 5. As this is the first sampling event for background groundwater, no statistical analysis of the data is possible at this time. After a sufficient number of samples have been collected, then the groundwater data will be evaluated pursuant to Section VIII.H. of the Order.

## Section 6

### References

- Dixon, W.J. 1953. *Processing Data for Outliers*, *Biometrics* 9: pp. 74-89.
- EPA, 2009, Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance, EPA/530/R-09-007,
- EPA, 2010, ProUCL Version 4.1.00, EPA/600/R-07/038, p.237.
- Groundwater Technology Inc., 1994, RCRA Facility Investigation/Corrective Measures Study Report Bloomfield Refining Company #50 County Road 4990 Bloomfield, New Mexico, p.51.
- Rousseeuw, P.J. and Leroy, A.M. 1987. *Robust Regression and Outlier Detection*. John Wiley.
- Scout: *A Data Analysis Program*, Technology Support Project. EPA, NERL-LV, Las Vegas, NV 89193-3478.
- Singh, A. and Nocerino, J.M. 1995. *Robust Procedures for the Identification of Multiple Outliers*. Handbook of Environmental Chemistry, Statistical Methods, Vol. 2.G, pp. 229-277. Springer Verlag, Germany.
- USDA, 2010, Soil Resource Report for San Juan County, New Mexico, Eastern Part; Natural Resources Conservation Service, Web Soil Survey 2.0, <http://websoilsurvey.sc.egov.usda.gov/app/HomePage.htm>, p. 39.
- Western, 2010, Facility-Wide Groundwater Monitoring Report; Western Refining Southwest, Inc. – Bloomfield Refinery, Bloomfield, New Mexico.
- WRCC, 2011, Western Regional Climate Center; <http://www.wrcc.dri.edu/htmlfiles/westwinddir.html>

# Tables

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**TABLE 1**  
**Background Soil Boring Samples - Vapor Screening Results**  
**Bloomfield Refinery - Bloomfield, New Mexico**

<b>Sample Interval Depth</b>	<b>BK-1</b>	<b>BK-2</b>	<b>BK-3</b>	<b>BK-4</b>	<b>BK-5</b>	<b>BK-6</b>	<b>BK-7</b>	<b>BK-8</b>	<b>BK-9</b>	<b>BK-10</b>
0 - 2'	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2 - 4'									0.0	0.0
4 - 6'									0.0	0.0
6 - 8'									0.0	0.0
8 - 10'									0.0	NR
10 - 12'									0.0	0.0
12 - 14'									0.0	0.0
14 - 16'									0.0	0.0
16 - 18'									0.0	0.0
18 - 20'									0.0	0.0
20 - 22'									0.0	0.0
22 - 24'									0.0	0.0
24 - 26'									0.0	0.0
26 - 28'									0.0	0.0
28 - 30'									0.0	0.0
30 - 32'									0.0	0.0
32 - 34'									0.0	0.0
34 - 36'									0.0	0.0
36 - 38'									0.0	0.0
38 - 40'									0.0	0.0
40 - 42'									0.0	0.0
42 - 44'									0.0	0.0
44 - 46'									0.0	0.0
46 - 48'									0.0	0.0
48 - 50'									0.0	0.0
50 - 52'									0.0	0.0
52 - 54'									0.0	0.0
54 - 56'									0.0	0.0
56 - 58'									0.0	0.0
58 - 60'									0.0	0.0
60 - 62'									0.0	0.0
62 - 64'									0.0	
64 - 66'									0.0	
66 - 68'									0.0	
68 - 70'									0.0	
70 - 72'									NM	
72 - 74'									NM	
74 - 76'									NM	
76 - 78'									NM	
78 - 79'									NM	

UNITS - PPM

NM - not measured, switched to ODEX drilling

**TABLE 2**  
**Water Level Measurements**  
**Bloomfield Refinery - Bloomfield, New Mexico**

<b>Well ID</b>	<b>Date</b>	<b>Measuring Point Elevation (amsl)</b>	<b>Total Well Depth</b>	<b>Depth To Product (ft below TOC)</b>	<b>Depth To Water (ft below TOC)</b>	<b>Corrected Groundwater Elevation (ft amsl)</b>	<b>Separate Phase Hydrocarbon Thickness (ft)</b>
MW-BCK1	4/2/2012	5620.14	NM	NPP	77.07	5543.07	NPP
MW-BCK1	6/14/2012	5620.14	80.50	NPP	77.04	5543.10	NPP
MW-BCK2	4/2/2012	5517.80	46.97	NPP	25.81	5491.99	NPP
MW-BCK2	6/14/2012	5517.80	46.96	NPP	26.17	5491.63	NPP

NM = Not Measured

NPP = No Product Present

amsl = above mean sea level

ft = feet

TOC = top of casing

NWP = No Water Present

Table 3  
Soil Analytical Results and Statistical Summary  
Background Investigation  
Western Refining Southwest - Bloomfield Refinery

ClientSampID	Aluminum		Antimony			Arsenic				Barium			Beryllium			Boron				Cadmium			Chloride				
	Result	SQL	Result	Flag	SQL	Result	Flag	Result <sup>2</sup>	SQL	Result	nat. log	SQL	Result	Flag	SQL	Result	Flag	result <sup>1</sup>	SQL	Result	Flag	SQL	Result	Flag	Result <sup>2</sup>	nat. log	SQL
BK-1 (0-0.5')	20000	1500	< 2.5	U	2.5	2.8		2.8	2.50	160	5.1	0.50	0.55		0.15	6.7		6.7	4.0	0.034	J	0.1	<7.5	U	5.15	1.64	7.5
BK-1 (1.5-2.0')	17000	1500	< 5.0	U	5	1.9	J	1.9	5.00	260	5.6	1.00	0.56		0.30	8		8	4.0	< 0.20	U	0.2	14		14	2.64	7.5
BK-2 (0-0.5')	14000	1500	< 2.5	U	2.5	1.4	J	1.4	2.50	94	4.5	0.20	0.42		0.15	5.4		5.4	2.0	0.04	J	0.1	<7.5	U	7.58	2.03	7.5
BK-2 (1.5-2.0')	26000	3000	< 2.5	U	2.5	3		3	2.50	250	5.5	1.00	0.64		0.15	8.2		8.2	4.0	< 0.10	U	0.1	<7.5	U	0.05	-3.00	7.5
BK-3 (0-0.5')	23000	1500	< 2.5	U	2.5	3.1		3.1	2.50	93	4.5	0.20	0.61		0.15	8.2		8.2	4.0	< 0.10	U	0.1	17		17	2.83	7.5
BK-3 (1.5-2.0')	11000	1500	< 2.5	U	2.5	3		3	2.50	140	4.9	0.50	0.38		0.15	12	see footnote 1		2.0	< 0.10	U	0.1	420		420	6.04	30
BK-4 (0-0.5')	17000	1500	0.54	J	2.5	2.4	J	2.4	2.50	96	4.6	0.20	0.48		0.15	5		5	2.0	< 0.10	U	0.1	<7.5	U	0.15	-1.90	7.5
BK-4 (1.5-2.0')	17000	1500	< 2.5	U	2.5	2.6		2.6	2.50	160	5.1	0.50	0.42		0.15	5.1		5.1	2.0	< 0.10	U	0.1	13		13	2.56	7.5
BK-5 (0-0.5')	18000	1500	< 2.5	U	2.5	2.6		2.6	2.50	140	4.9	0.50	0.53		0.15	6.4		6.4	4.0	< 0.10	U	0.1	<7.5	U	0.31	-1.17	7.5
BK-5 (1.5-2.0')	15000	1500	< 2.5	U	2.5	2.2	J	2.2	2.50	390	6.0	1.00	0.52		0.15	7.4		7.4	4.0	< 0.10	U	0.1	170		170	5.14	7.5
BK-6 (0-0.5')	12000	1500	< 2.5	U	2.5	1.9	J	1.9	2.50	98	4.6	0.20	0.4		0.15	4.2		4.2	2.0	0.028	J	0.1	<7.5	U	0.57	-0.56	7.5
BK-6 (1.5-2.0')	15000	1500	< 2.5	U	2.5	2.7		2.7	2.50	150	5.0	0.50	0.47		0.15	5.5		5.5	2.0	< 0.10	U	0.1	<7.5	U	0.95	-0.05	7.5
BK-7 (0-0.5')	12000	1500	< 2.5	U	2.5	3.2		3.2	2.50	140	4.9	0.50	0.4		0.15	4.3		4.3	2.0	< 0.10	U	0.1	<7.5	U	1.51	0.41	7.5
BK-7 (1.5-2.0')	17000	1500	< 2.5	U	2.5	2.5		2.5	2.50	760	see footnote 1	2.00	0.51		0.15	6.4		6.4	4.0	< 0.10	U	0.1	<7.5	U	2.32	0.84	7.5
BK-8 (0-0.5')	9700	600	< 2.5	U	2.5	1.6	J	1.6	2.50	150	5.0	0.50	0.33		0.15	4		4	2.0	< 0.10	U	0.1	<7.5	U	3.48	1.25	7.5
BK-8 (1.5-2.0')	20000	1500	< 2.5	U	2.5	2.9		2.9	2.50	480	see footnote 1	1.00	0.67		0.15	9.9		9.9	2.0	< 0.10	U	0.1	540		540	6.29	30
BK-9 (5-5.5')	6600	600	< 2.5	U	2.5	1.5	J	1.5	2.50	250	5.5	1.00	0.24		0.15	4.1		4.1	2.0	< 0.10	U	0.1	260		260	5.56	30
BK-10 (5-6')	7900	1500	1.1	J	5	<5	U	2.4	5.00	150	5.0	0.50	0.25	J	0.30	3.8	J	3.8	4.0	0.065	J	0.2	210		210	5.35	30
Number of Detects	18		2			17				18			18			18		18		4			8				
Total Number of samples	18		18			18				18			18			18		18		18			18				
Frequency of Detection (%)	100		11			94				100			100			100		100		22			44				
Minimum Detected Conc.	6,600		0.54			1.4				93			0.24			3.8		3.8		0.028J			13.0				
Maximum Detected Conc.	26,000		1.1			3.2				760			0.67			12.0		9.9		0.065J			540.0				
Minimum SQL		600			2.5				2.5			0.20			0.15				2.0			0.1					7.5
Maximum SQL		3,000			5.0				5.0			2.00			0.30				4.0			0.2					30.0
Arithmetic Mean	15,456		NC			NC		2.4		NC	5.1		0.47			6.4		6.0		NC			NC			2.0	
Median	16,000		NC			NC		2.6		NC	5.0		0.48			6.0		5.5		NC			NC			1.8	
Standard Deviation	5,089		NC			NC		0.6		NC	0.4		0.12			2.3		1.8		NC			NC			2.8	
Coefficient of Variation (%)	33		NC			NC		23.2		NC	8.2		26.27			35.4		30.1		NC			NC			141.5	
95 % Upper Tolerance Limit (UTL)	27,940		NC			NC		3.8		NC	6.1		0.77			NC		10.5		NC			NC			8.9	
											442.9																7,500.0

Site Background Concentration	26,000 <sup>3</sup>	NC	3.2 <sup>3</sup>	390 <sup>4</sup>	0.67 <sup>3</sup>	9.9 <sup>4</sup>	NC	540 <sup>3</sup>
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Deep Soil Samples

BK-9 (73-73.5')	10,000	1500	2.1	J	2.5	< 2.5	U		2.50	720		2.00	0.23		0.15	< 2.0	U		2.0	0.10		0.1	NR				
BK-9 (54-56')	36,000	3000	< 5.0	U	5.0	2.7	J		5.00	52		0.20	1.2		0.30	3.8	J		4.0	< 0.20	U	0.2	2.5				1.5
BK-10 (40-42')	20,000	1500	< 13	U	13.0	< 13	U		13.00	24		0.50	0.96		0.75	< 10	U		10.0	< 0.50	U	0.5	<30				30

95 % UTL = mean + (K x standard deviation)  
K for sample size of 18 = 2.453  
K for sample size of 17 = 2.486  
K for sample size of 16 = 2.524  
units - milligrams per kilogram  
Sample Quantitation Limit (SQL)  
U - non-detect  
J - estimated concentration, concentration above method detection limit but less than SQL  
E - value above quantitation range  
Not applicable (NA)  
Not calculated (NC)  
Not reported (NR)  
1 - value removed as outlier  
2 - nondetect values replaced using regression on order statistics (ROS)  
3 - final background concentration based on maximum detected concentration  
4 - final background concentration based on maximum detected concentration with outliers removed

Table 3  
Soil Analytical Results and Statistical Summary  
Background Investigation  
Western Refining Southwest - Bloomfield Refinery

ClientSampleID	Chromium		Cobalt		Copper		Cyanide			Fluoride					Iron		Lead		Manganese		Mercury				Molybdenum				
	Result	SQL	Result	SQL	Result	SQL	Result	Flag	SQL	Result	Flag	Result <sup>2</sup>	nat. log	SQL	Result	SQL	Result	SQL	Result	SQL	Result	Flag	Result <sup>2</sup>	SQL	Result	Flag	result <sup>1</sup>	SQL	
BK-1 (0-0.5')	7.8	0.30	4.4	0.30	8.1	0.30	<0.3	U	0.3	0.94	J	0.94	-0.06	1.5	18000	500	2.9	0.25	260	0.98	0.012	J	0.012	0.033	0.36	J	0.36	0.4	
BK-1 (1.5-2.0')	8.4	0.60	5.3	0.60	8.7	0.60	<0.3	U	0.3	11		11	2.40	1.5	18000	500	3.2	0.50	280	1	0.018	J	0.018	0.033	0.7	J	see footnote 1	0.8	
BK-2 (0-0.5')	6.1	0.30	3.4	0.30	5.4	0.30	<0.3	U	0.3	< 1.5	U	0.65	-0.43	1.5	13000	500	2.8	0.25	270	0.97	0.0095	J	0.0095	0.033	0.28	J	0.28	0.4	
BK-2 (1.5-2.0')	9.3	0.30	4.8	0.30	8.8	0.30	<0.3	U	0.3	8.6		8.6	2.15	1.5	19000	500	2.4	0.25	290	1	0.016	J	0.016	0.033	0.37	J	0.37	0.4	
BK-3 (0-0.5')	8.5	0.30	4.1	0.30	6.7	0.30	<0.3	U	0.3	1.6		1.6	0.47	1.5	15,000	490	2.4	0.25	240	0.97	0.011	J	0.011	0.033	0.33	J	0.33	0.4	
BK-3 (1.5-2.0')	5.2	0.30	2.9	0.30	5.3	0.30	<0.3	U	0.3	7.5		7.5	2.01	6	8,400	200	1.2	0.25	130	0.98	0.12	J	see footnote 1	0.033	0.31	J	0.31	0.4	
BK-4 (0-0.5')	6.8	0.30	3.2	0.30	5.1	0.30	<0.3	U	0.3	0.73	J	0.73	-0.31	1.5	13,000	480	1.7	0.25	200	0.95	0.011	J	0.011	0.033	0.28	J	0.28	0.4	
BK-4 (1.5-2.0')	6.1	0.30	3.9	0.30	6.5	0.30	<0.3	U	0.3	6.5		6.5	1.87	1.5	14,000	480	2.2	0.25	280	0.96	0.014	J	0.014	0.033	0.24	J	0.24	0.4	
BK-5 (0-0.5')	7.5	0.30	4.1	0.30	6.5	0.30	<0.3	U	0.3	0.49	J	0.49	-0.71	1.5	18,000	500	2.4	0.25	290	1	0.013	J	0.013	0.033	0.25	J	0.25	0.4	
BK-5 (1.5-2.0')	7.9	0.30	4.8	0.30	7.8	0.30	<0.3	U	0.3	5		5	1.61	1.5	18,000	480	3.2	0.25	290	0.95	0.015	J	0.015	0.033	0.37	J	0.37	0.4	
BK-6 (0-0.5')	5.7	0.30	3.2	0.30	4.6	0.30	<0.3	U	0.3	0.79	J	0.79	-0.24	1.5	12,000	500	2.5	0.25	250	0.97	0.0078	J	0.0078	0.033	0.27	J	0.27	0.4	
BK-6 (1.5-2.0')	6.5	0.30	3.9	0.30	7.2	0.30	<0.3	U	0.3	5.7		5.7	1.74	1.5	13,000	480	2.2	0.25	210	0.97	0.0016	J	0.0016	0.033	0.28	J	0.28	0.4	
BK-7 (0-0.5')	5.8	0.30	3.2	0.30	5.5	0.30	<0.3	U	0.3	< 1.5	U	1.15	0.14	1.5	11,000	490	2.4	0.25	200	0.98	0.012	J	0.012	0.033	0.27	J	0.27	0.4	
BK-7 (1.5-2.0')	7.5	0.30	4.4	0.30	7.5	0.30	<0.3	U	0.3	2.9		2.9	1.06	1.5	16,000	490	2.8	0.25	260	0.99	0.013	J	0.013	0.033	0.31	J	0.31	0.4	
BK-8 (0-0.5')	4.6	0.30	2.7	0.30	4	0.30	<0.3	U	0.3	0.85	J	0.85	-0.16	1.5	8,700	200	2.3	0.25	180	1	0.0089	J	0.0089	0.033	0.22	J	0.22	0.4	
BK-8 (1.5-2.0')	8.3	0.30	4.1	0.30	5.2	0.30	<0.3	U	0.3	12		12	2.48	6	13,000	480	1.4	0.25	360	0.96	< 0.033	U	0.0093	0.033	0.9	see footnote 1	0.4		
BK-9 (5-5.5')	3.5	0.30	2.1	0.30	2.3	0.30	<0.3	U	0.3	3.7		3.7	1.31	0.3	6,500	200	1.7	0.25	160	1	0.0063	J	0.0063	0.033	0.42		0.42	0.4	
BK-10 (5-6')	4.6	0.60	2.6	0.60	3.5	0.60	<0.3	U	0.3	3		3	1.10	0.3	9,100	500	2.6	0.50	180	0.48	<0.033	U	0.013	0.033	0.33	J	0.33	0.8	
Number of Detects	18		18		18		0			16		16			18		18		18		16				18				
Total Number of samples	18		18		18		18			18		18			18		18		18		18				18				
Frequency of Detection (%)	100		100		100		0			89		89			100		100		100		89				100				
Minimum Detected Conc.	3.5		2.1		2.3		NA			0.5		0.5			6,500		1.2		130.0		0.0016				0.22				
Maximum Detected Conc.	9.3		5.3		8.8		NA			12.0		12.0			19,000		3.2		360.0		0.120				0.90				
Minimum SQL		0.300		0.3		0.3			0.3					0.3		200		0.2		0.5				0.033				0.400	
Maximum SQL		0.6		0.6		0.6			0.3					6.0		500		0.5		1.0				0.033				0.800	
Arithmetic Mean	6.7		3.7		6.0		NC			NC		0.91			13,539		2.4		240.6		NC		0.0113		NC		0.306		
Median	6.7		3.9		6.0		NC			NC		1.08			13,000		2.4		255.0		NC		0.0120		NC		0.295		
Standard Deviation	1.6		0.9		1.8		NC			NC		1.08			3,811		0.6		57.7		NC		0.0039		NC		0.05		
Coefficient of Variation (%)	23.9		23.2		30.0		NC			NC		118.52			28		23.9		24.0		NC		34.5498		NC		17.9		
95 % Upper Tolerance Limit (UTL)	10.6		5.9		10.5		NC			NC			35.4			22,887		3.7		382		NC		0.0208		NC		0.44	

Site Background Concentration	9.3 <sup>3</sup>	5.3 <sup>3</sup>	8.8 <sup>3</sup>	NC	12.0 <sup>3</sup>	19,000 <sup>3</sup>	3.2 <sup>3</sup>	360 <sup>3</sup>	0.018 <sup>4</sup>	0.42 <sup>4</sup>
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Deep Soil Samples

BK-9 (73-73.5)	49	0.30	6.1	0.3	19	0.30	< 0.30	U	0.3	0.85	J			1.5	NR		1.4	0.50	NR		< 0.033	U		0.033	4.0			0.4
BK-9 (54-56')	13	0.60	7.4	0.6	12	0.60	< 0.50	U	0.3	3.9				0.3	31,000	1000	3.2	0.50	350	1	0.0082	J		0.033	0.96			0.8
BK-10 (40-42')	11	1.50	4.5	1.5	8.8	1.50	< 0.30	U	0.3	< 6.0	U			6.0	14,000	500	2.4	0.98	90	0.5	< 0.033	U		0.033	< 2.0	U		2.0

95 % UTL = mean + (K x standard deviation)

K for sample size of 18 = 2.453

K for sample size of 17 = 2.486

K for sample size of 16 = 2.524

units - milligrams per kilogram

Sample Quantitation Limit (SQL)

U - non-detect

J - estimated concentration, concentration above method

detection limit but less than SQL

E - value above quantitation range

Not applicable (NA)

Not calculated (NC)

Not reported (NR)

1 - value removed as outlier

2 - nondetect values replaced using regression on order statistics (ROS)

3 - final background concentration based on maximum detected concentration

4 - final background concentration based on maximum detected concentration with outliers removed

Table 3  
Soil Analytical Results and Statistical Summary  
Background Investigation  
Western Refining Southwest - Bloomfield Refinery

ClientSampID	Nickel		Sulfate			Selenium			Silver			Thallium			Uranium			Vanadium		Zinc	
	Result	SQL	Result	Flag	SQL	Result	Flag	SQL	Result	Flag	SQL	Result	Flag	SQL	Result	Flag	SQL	Result	SQL	Result	SQL
BK-1 (0-0.5')	6.7	0.50	2.1	J	7.5	< 2.5	U	2.5	< 0.25	U	0.25	< 2.5	U	2.5	0.6	J	5	24	2.50	26	2.50
BK-1 (1.5-2.0')	7.4	1.00	17		7.5	< 5.0	U	5	< 0.50	U	0.5	< 5.0	U	5	< 10	U	10	30	5.00	28	5.00
BK-2 (0-0.5')	4.8	0.50	2.4	J	7.5	< 2.5	U	2.5	< 0.25	U	0.25	< 2.5	U	2.5	1	J	5	17	2.50	20	2.50
BK-2 (1.5-2.0')	7.6	0.50	17		7.5	< 2.5	U	2.5	< 0.25	U	0.25	< 2.5	U	2.5	< 5.0	U	5	29	2.50	30	2.50
BK-3 (0-0.5')	6	0.50	5.8	J	7.5	< 2.5	U	2.5	< 0.25	U	0.25	< 2.5	U	2.5	1.4	J	5	25	2.50	26	2.50
BK-3 (1.5-2.0')	4.2	0.50	7,600.0	E	30	< 2.5	U	2.5	< 0.25	U	0.25	< 2.5	U	2.5	< 5.0	U	5	17	2.50	14	2.50
BK-4 (0-0.5')	4.9	0.50	1.7	J	7.5	< 2.5	U	2.5	< 0.25	U	0.25	< 2.5	U	2.5	1.1	J	5	20	2.50	21	2.50
BK-4 (1.5-2.0')	5.2	0.50	3.6	J	7.5	< 2.5	U	2.5	< 0.25	U	0.25	< 2.5	U	2.5	< 5.0	U	5	23	2.50	20	2.50
BK-5 (0-0.5')	6.1	0.50	4.0	J	7.5	< 2.5	U	2.5	< 0.25	U	0.25	< 2.5	U	2.5	0.84	J	5	23	2.50	25	2.50
BK-5 (1.5-2.0')	6.8	0.50	28.0		7.5	< 2.5	U	2.5	< 0.25	U	0.25	< 2.5	U	2.5	< 5.0	U	5	27	2.50	29	2.50
BK-6 (0-0.5')	4.5	0.50	1.4	J	7.5	< 2.5	U	2.5	< 0.25	U	0.25	< 2.5	U	2.5	0.68	J	5	19	2.50	19	2.50
BK-6 (1.5-2.0')	5.9	0.50	7.4	J	7.5	< 2.5	U	2.5	< 0.25	U	0.25	< 2.5	U	2.5	< 5.0	U	5	22	2.50	21	2.50
BK-7 (0-0.5')	4.6	0.50	<7.5	U	7.5	< 2.5	U	2.5	< 0.25	U	0.25	< 2.5	U	2.5	0.48	J	5	19	2.50	19	2.50
BK-7 (1.5-2.0')	6.6	0.50	10.0		7.5	< 2.5	U	2.5	< 0.25	U	0.25	< 2.5	U	2.5	< 5.0	U	5	24	2.50	24	2.50
BK-8 (0-0.5')	3.7	0.50	4.0	J	7.5	< 2.5	U	2.5	< 0.25	U	0.25	< 2.5	U	2.5	< 5.0	U	5	15	2.50	15	2.50
BK-8 (1.5-2.0')	5.4	0.50	10,000.0	E	30	< 2.5	U	2.5	< 0.25	U	0.25	< 2.5	U	2.5	< 5.0	U	5	24	2.50	21	2.50
BK-9 (5-5.5')	3	0.50	330.0		30	< 2.5	U	2.5	< 0.25	U	0.25	< 2.5	U	2.5	< 5.0	U	5	11	2.50	12	2.50
BK-10 (5-6')	3.8	1.00	2,300.0		30	1.1	J	5	<0.5	U	0.5	<5	U	5	<10	U	10	15	5.00	16	5.00
Number of Detects	18		17.0			1			0			0			7			18		18	
Total Number of samples	18		18.0			18			18			18			18			18		18	
Frequency of Detection (%)	100		94.4			5.6			0.0			0.0			38.9			100		100	
Minimum Detected Conc.	3.0		1.4			NA			NA			NA			0.5			11.0		12.0	
Maximum Detected Conc.	7.6		10,000.0			NA			NA			NA			1.4			30.0		30.0	
Minimum SQL		0.5			7.5			2.5			0.3			2.5			5.0		2.5		2.5
Maximum SQL		1.0			30.0			5.0			0.5			5.0			10.0		5.0		5.0
Arithmetic Mean	5.4		1196.1			NC			NC			NC			NC			21.3		21.4	
Median	5.3		7.4			NC			NC			NC			NC			22.5		21.0	
Standard Deviation	1.3		2945.7			NC			NC			NC			NC			5.1		5.2	
Coefficient of Variation (%)	24.5		246.3			NC			NC			NC			NC			24.0		24.4	
95 % Upper Tolerance Limit (UTL)	8.6		NC			NC			NC			NC			NC			33.9		34.3	

Site Background Concentration	7.6 <sup>3</sup>	NC	NC	NC	NC	NC	30.0 <sup>3</sup>	30.0 <sup>3</sup>
-------------------------------	------------------	----	----	----	----	----	-------------------	-------------------

Deep Soil Samples

BK-9 (73-73.5')	12	0.5	NR			< 2.5	U	2.5	< 0.25	U	0.25	< 2.5	U	2.5	5.6		5	35	2.50	27	2.50
BK-9 (54-56')	8.5	1	250		30	< 5.0	U	5	< 0.50	U	0.5	< 5.0	U	5	< 25	U	25	33	5.00	46	5.00
BK-10 (40-42')	6.7	2.5	210		30	< 13	U	13.0	< 1.3	U	1.3	< 13	U	13.0	4	J	25	28	13.00	36	13.00

95 % UTL = mean + (K x standard deviation)

K for sample size of 18 = 2.453

K for sample size of 17 = 2.486

K for sample size of 16 = 2.524

units - milligrams per kilogram

Sample Quantitation Limit (SQL)

U - non-detect

J - estimated concentration, concentration above method

detection limit but less than SQL

E - value above quantitation range

Not applicable (NA)

Not calculated (NC)

Not reported (NR)

1 - value removed as outlier

2 - nondetect values replaced using regression on order statistics (ROS)

3 - final background concentration based on maximum detected concentration

4 - final background concentration based on maximum detected concentration with outliers removed

**TABLE 4**  
**Groundwater Analytical Results Summary**  
**Bloomfield Refinery - Bloomfield, New Mexico**

	MW-BCK1	MW-BCK2
<b>Sample Date --&gt;</b>	6/14/2012	6/14/2012
<b>General Water Quality Parameters (mg/l)</b>		
Bicarbonate (As CaCO <sub>3</sub> )	150	110
Carbonate (As CaCO <sub>3</sub> )	< 2.0	< 2.0
Chloride	35	21
Fluoride	0.25	< 2.0
Nitrate+Nitrite as N	< 1.0	< 2.0
Sulfate	4100	7900
Total Alkalinity (as CaCO <sub>3</sub> )	150	110
Total Dissolved Solids	4470	12700
<b>Dissolved Metals (mg/l)</b>		
Aluminum	0.11	3.8
Antimony	< 0.0010	< 0.0050
Arsenic	0.0014	0.0027
Barium	0.022	0.035
Beryllium	< 0.0020	< 0.0020
Boron	0.23	0.67
Cadmium	< 0.0020	< 0.0020
Calcium	420	390
Chromium	< 0.0060	< 0.0060
Cobalt	< 0.0060	0.0068
Copper	< 0.0060	< 0.0060
Iron	0.10	0.94
Lead	< 0.0010	< 0.0050
Magnesium	64	47
Manganese	0.39	1.1
Molybdenum	0.026	0.024
Nickel	< 0.010	< 0.010
Potassium	4.4	18
Selenium	0.0069	0.0079
Silver	< 0.0050	< 0.0050
Sodium	950	3700
Thallium	< 0.0010	< 0.0050
Uranium	0.012	< 0.0050
Vanadium	< 0.050	< 0.050
Zinc	0.012	0.030

**TABLE 4**  
**Groundwater Analytical Results Summary**  
**Bloomfield Refinery - Bloomfield, New Mexico**

	MW-BCK1	MW-BCK2
Sample Date -->	6/14/2012	6/14/2012
<b>Total Metals (mg/l)</b>		
Aluminum	31	33
Antimony	< 0.0025	< 0.0025
Arsenic	0.0084	0.0047
Barium	0.28	0.12
Beryllium	0.0020	0.0023
Boron	0.19	0.60
Cadmium	< 0.0020	< 0.0020
Chromium	0.032	0.025
Cobalt	0.029	0.019
Copper	0.050	0.010
Cyanide	<0.01	<0.01
Iron	41	29
Lead	0.033	0.025
Magnesium	67	52
Manganese	1.4	1.9
Mercury	< 0.0010	< 0.0010
Molybdenum	0.019	0.017
Nickel	0.032	0.015
Selenium	0.0060	0.0041
Silver	< 0.0050	< 0.0050
Thallium	< 0.0025	< 0.0025
Uranium	0.014	0.0040
Vanadium	< 0.050	< 0.050
Zinc	0.12	0.089

**TABLE 5**  
**Groundwater Field Measurements**  
**Bloomfield Refinery - Bloomfield, New Mexico**

Well	Date	Well Volume	Temp (degrees F)	Specific Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mV)	TDS (ppm)	Purge Volume (calculated / actual - gallons)
MW-BCK1	6/14/2012	0	61.1	5040	1.81	8.05	-67.4	3919.5	2.3 /3.0 *
		1	61.0	4766	3.07	7.66	-80.8	3724.5	
		2	60.5	4737	2.5	7.61	-73.2	3724.5	
MW-BCK2	6/14/2012	0	60.3	12492	2.39	8.09	13.4	9867	10.2/14 *
		1	59.8	12353	1.89	7.98	-41.2	9802	
		2	59.8	12354	2.15	7.97	-120.1	9815	
		3	59.9	12366	1.77	7.99	-128.1	9815	
		4	59.9	12325	1.85	7.97	-132.3	9776	

\* - very slow recovery, well purged dry for sampling

F = Fahrenheit

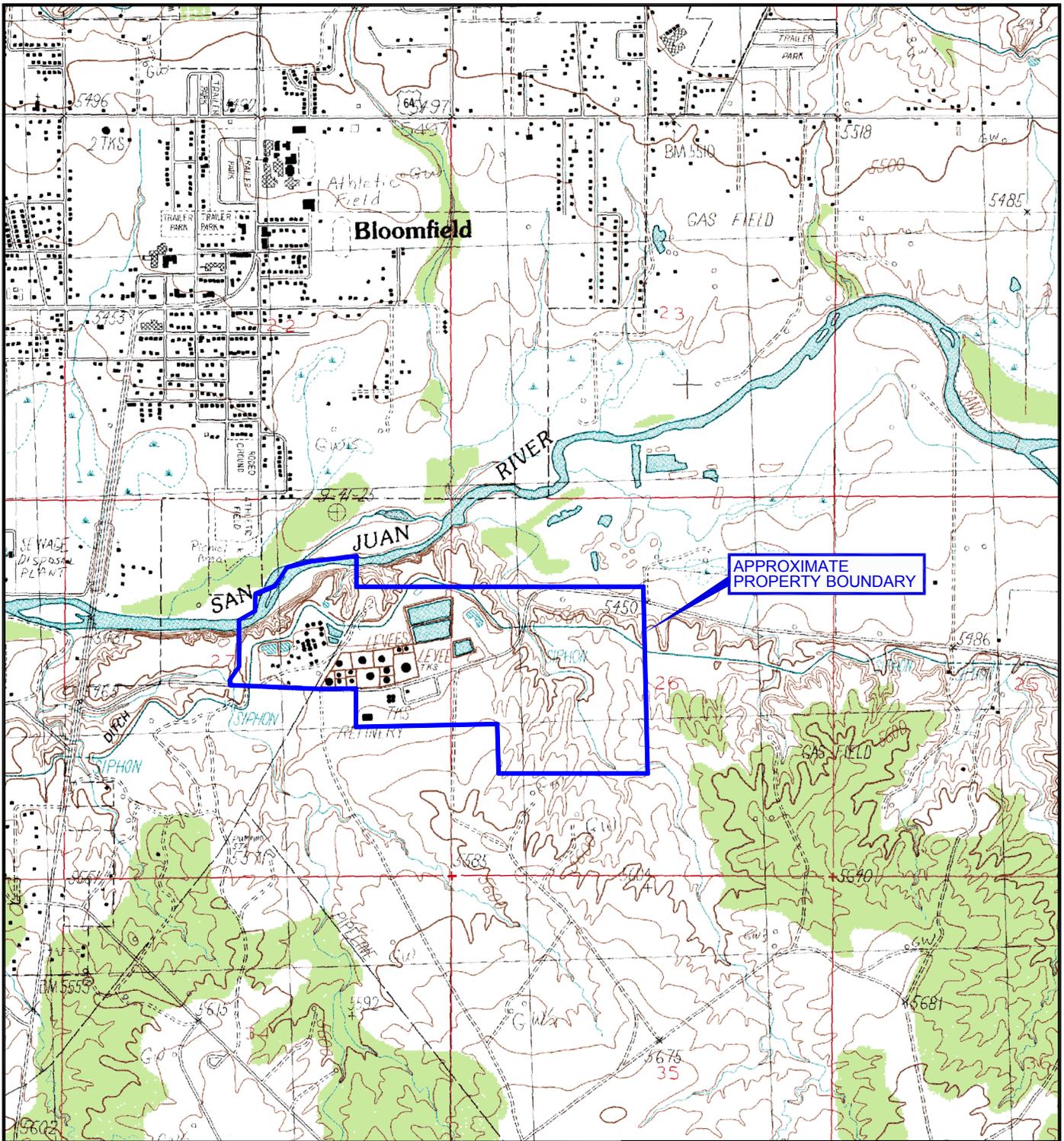
uS/cm = microsiemens per centimeter

mg/L = milligrams per liter

ppm = parts per million

# Figures

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Map Source: USGS 7.5 Min. Quad Sheet BLOOMFIELD, NM., 1985.



0 2000  
SCALE IN FEET



NEW MEXICO  
QUADRANGLE LOCATION



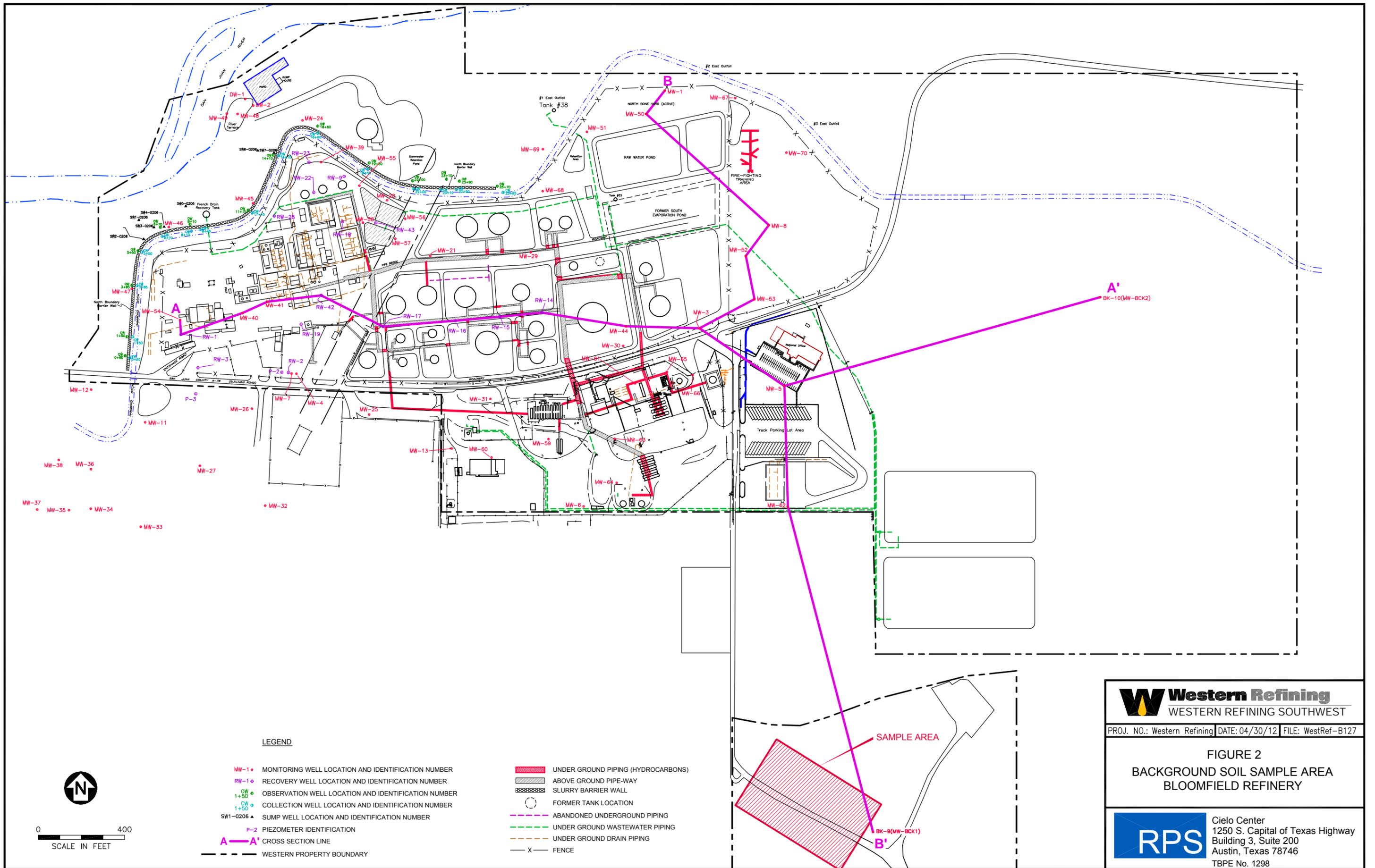
**Western Refining**  
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 04/01/10 | FILE: WestRef-A42

**FIGURE 1**  
**SITE LOCATION MAP**  
**BLOOMFIELD REFINERY**



Cielo Center,  
1250 S. Capital of Texas  
Highway, Bldg. 3, Suite 200  
Austin, Texas 78746



**LEGEND**

- |            |                                                     |  |                                    |
|------------|-----------------------------------------------------|--|------------------------------------|
| MW-1 •     | MONITORING WELL LOCATION AND IDENTIFICATION NUMBER  |  | UNDER GROUND PIPING (HYDROCARBONS) |
| RW-1 •     | RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER    |  | ABOVE GROUND PIPE-WAY              |
| OW 1+50 •  | OBSERVATION WELL LOCATION AND IDENTIFICATION NUMBER |  | SLURRY BARRIER WALL                |
| CW 1+50 •  | COLLECTION WELL LOCATION AND IDENTIFICATION NUMBER  |  | FORMER TANK LOCATION               |
| SW1-0206 ▲ | SUMP WELL LOCATION AND IDENTIFICATION NUMBER        |  | ABANDONED UNDERGROUND PIPING       |
| P-2        | PIEZOMETER IDENTIFICATION                           |  | UNDER GROUND WASTEWATER PIPING     |
| A-A'       | CROSS SECTION LINE                                  |  | UNDER GROUND DRAIN PIPING          |
| ---        | WESTERN PROPERTY BOUNDARY                           |  | FENCE                              |



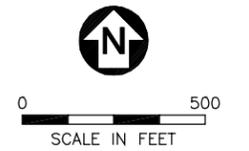
0 400  
SCALE IN FEET

**Western Refining**  
WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 04/30/12 | FILE: WestRef-B127

**FIGURE 2**  
BACKGROUND SOIL SAMPLE AREA  
BLOOMFIELD REFINERY

**RPS** Cielo Center  
1250 S. Capital of Texas Highway  
Building 3, Suite 200  
Austin, Texas 78746  
TBPE No. 1298



**LEGEND**

- ✕ BK-9 (MW-BCK1) ✕ PROPOSED BACKGROUND MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
- ★ GAS WELL LOCATION
- - - WESTERN PROPERTY BOUNDARY



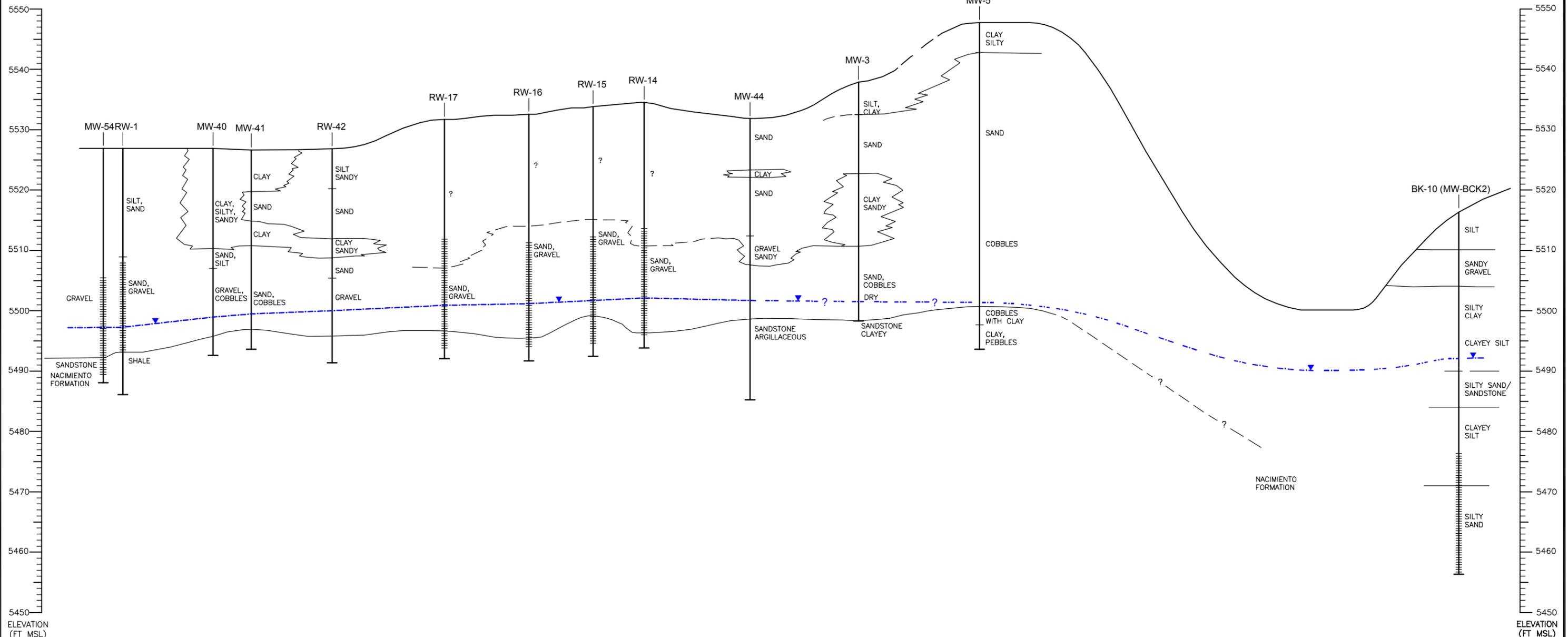
PROJ. NO.: Western Refining | DATE: 04/17/12 | FILE: WestRefB123

**FIGURE 3**  
BACKGROUND MONITORING WELL  
LOCATIONS  
BLOOMFIELD REFINERY

**RPS** Cielo Center  
1250 S. Capital of Texas Highway  
Building 3, Suite 200  
Austin, Texas 78746  
TBPE No. 1298

WEST  
A

EAST  
A'



EXPLANATION

- MW-54 ← WELL IDENTIFICATION
- WELL
- SCREEN INTERVAL
- LITHOLOGIC CONTACTS
- ▲— POTENTIOMETRIC SURFACE MEASURED APRIL 2012

16  
0 320  
SCALE IN FEET  
VERTICAL EXAGGERATION = 20X

NOTE:  
SCREEN INTERVAL NOT AVAILABLE FOR MW-3, MW-40, MW-41, MW-44, RW-42



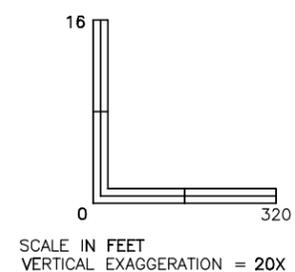
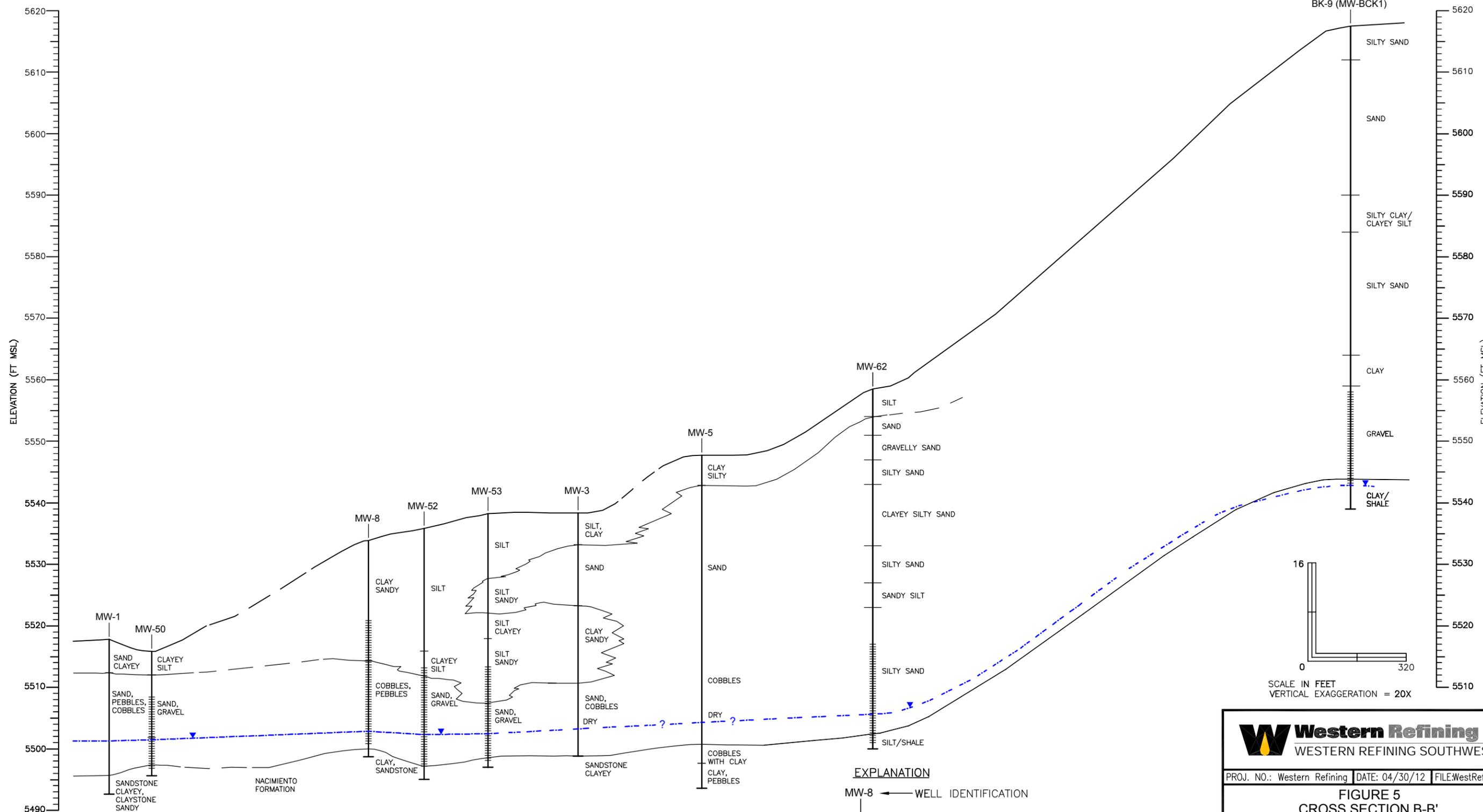
PROJ. NO.: Western Refining | DATE: 04/30/12 | FILE: WestRef-B125

FIGURE 4  
CROSS SECTION A-A'  
WEST TO EAST  
BLOOMFIELD REFINERY

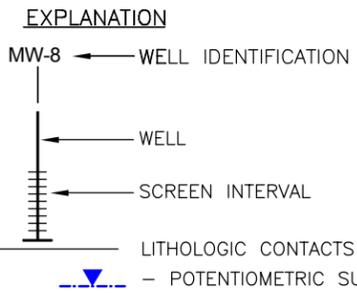
**RPS**  
Cielo Center  
1250 S. Capital of Texas Highway  
Building 3, Suite 200  
Austin, Texas 78746  
TBPE No. 1298

**NORTH  
B**

**SOUTH  
B'**



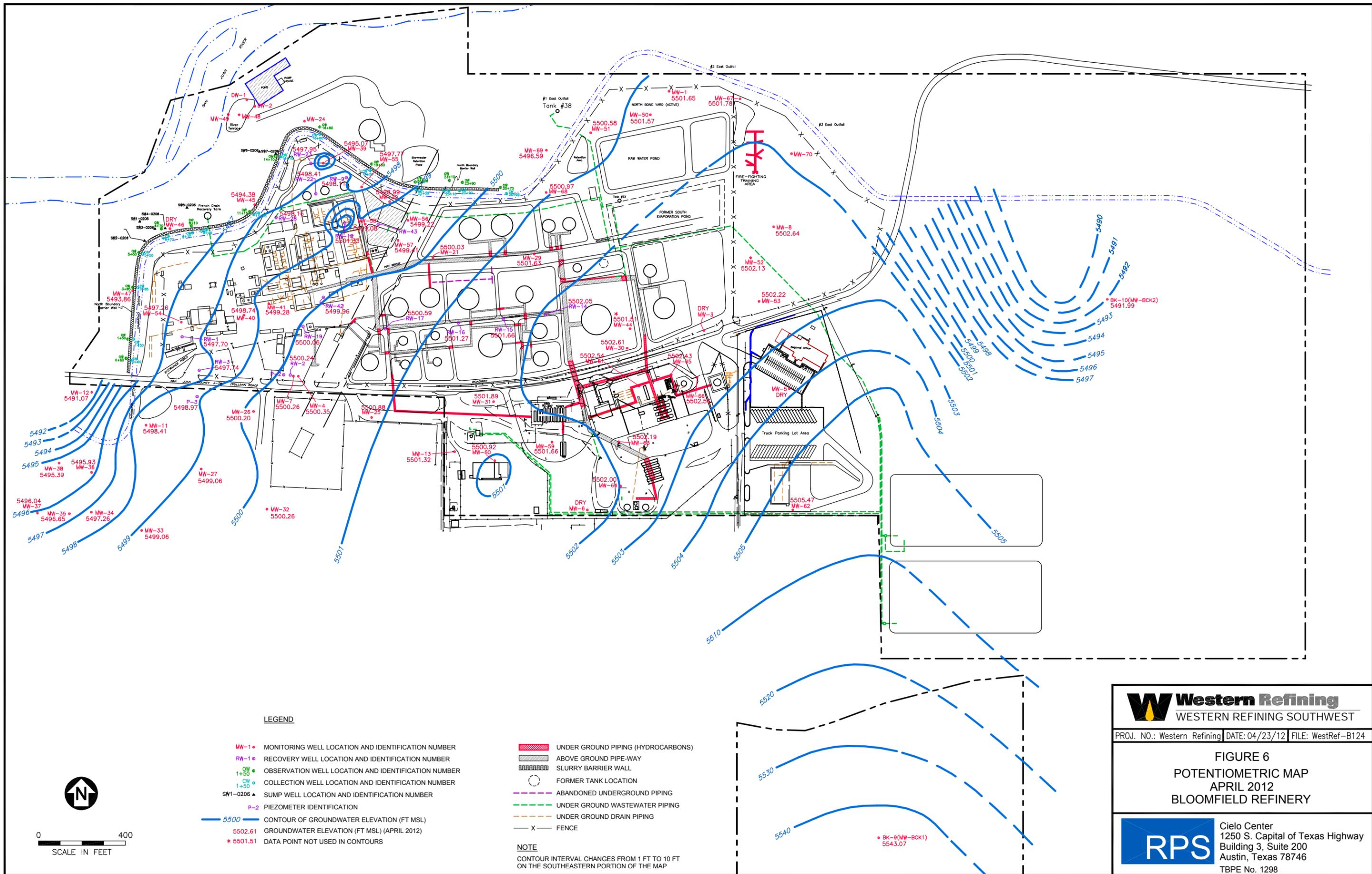
NOTE:  
SCREEN INTERVAL NOT AVAILABLE FOR MW-1, MW-3, MW-5



PROJ. NO.: Western Refining | DATE: 04/30/12 | FILE: WestRef-B126

**FIGURE 5**  
**CROSS SECTION B-B'**  
**NORTH TO SOUTH**  
**BLOOMFIELD REFINERY**

Cielo Center  
1250 S. Capital of Texas Highway  
Building 3, Suite 200  
Austin, Texas 78746  
TBPE No. 1298



PROJ. NO.: Western Refining | DATE: 04/23/12 | FILE: WestRef-B124

**FIGURE 6**  
**POTENTIOMETRIC MAP**  
**APRIL 2012**  
**BLOOMFIELD REFINERY**

**RPS** Cielo Center  
 1250 S. Capital of Texas Highway  
 Building 3, Suite 200  
 Austin, Texas 78746  
 TBPE No. 1298

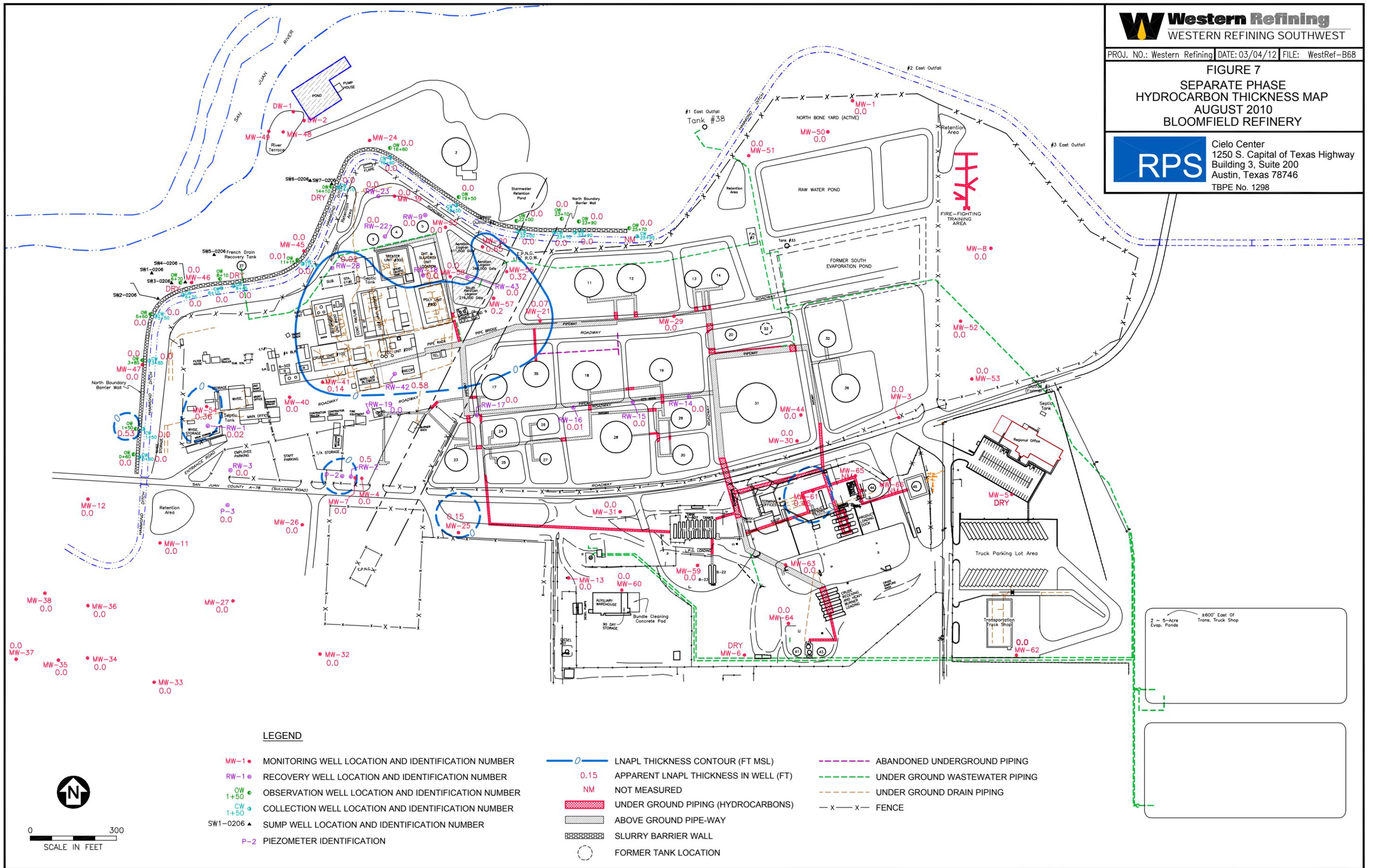
**LEGEND**

- |            |                                                     |  |                                    |
|------------|-----------------------------------------------------|--|------------------------------------|
| MW-1 ●     | MONITORING WELL LOCATION AND IDENTIFICATION NUMBER  |  | UNDER GROUND PIPING (HYDROCARBONS) |
| RW-1 ●     | RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER    |  | ABOVE GROUND PIPE-WAY              |
| OW-1 ●     | OBSERVATION WELL LOCATION AND IDENTIFICATION NUMBER |  | SLURRY BARRIER WALL                |
| CW-1 ●     | COLLECTION WELL LOCATION AND IDENTIFICATION NUMBER  |  | FORMER TANK LOCATION               |
| SW1-0206 ▲ | SUMP WELL LOCATION AND IDENTIFICATION NUMBER        |  | ABANDONED UNDERGROUND PIPING       |
| P-2        | PIEZOMETER IDENTIFICATION                           |  | UNDER GROUND WASTEWATER PIPING     |
| 5500       | CONTOUR OF GROUNDWATER ELEVATION (FT MSL)           |  | UNDER GROUND DRAIN PIPING          |
| 5502.61    | GROUNDWATER ELEVATION (FT MSL) (APRIL 2012)         |  | FENCE                              |
| * 5501.51  | DATA POINT NOT USED IN CONTOURS                     |  |                                    |

**NOTE**  
 CONTOUR INTERVAL CHANGES FROM 1 FT TO 10 FT  
 ON THE SOUTHEASTERN PORTION OF THE MAP

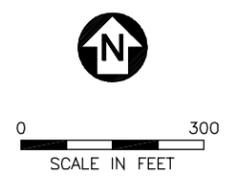
**FIGURE 7**  
**SEPARATE PHASE**  
**HYDROCARBON THICKNESS MAP**  
**AUGUST 2010**  
**BLOOMFIELD REFINERY**

**RPS** Cielo Center  
1250 S. Capital of Texas Highway  
Building 3, Suite 200  
Austin, Texas 78746  
TBPE No. 1298



**LEGEND**

- |            |                                                     |                     |                                       |           |                                |
|------------|-----------------------------------------------------|---------------------|---------------------------------------|-----------|--------------------------------|
| MW-1 ●     | MONITORING WELL LOCATION AND IDENTIFICATION NUMBER  | — 0 —               | LNAPL THICKNESS CONTOUR (FT MSL)      | ---       | ABANDONED UNDERGROUND PIPING   |
| RW-1 ●     | RECOVERY WELL LOCATION AND IDENTIFICATION NUMBER    | 0.15                | APPARENT LNAPL THICKNESS IN WELL (FT) | ---       | UNDER GROUND WASTEWATER PIPING |
| OW 1+50 ●  | OBSERVATION WELL LOCATION AND IDENTIFICATION NUMBER | NM                  | NOT MEASURED                          | ---       | UNDER GROUND DRAIN PIPING      |
| CW 1+50 ●  | COLLECTION WELL LOCATION AND IDENTIFICATION NUMBER  | [Red Hatched Box]   | UNDER GROUND PIPING (HYDROCARBONS)    | - x - x - | FENCE                          |
| SW1-0206 ▲ | SUMP WELL LOCATION AND IDENTIFICATION NUMBER        | [Grey Hatched Box]  | ABOVE GROUND PIPE-WAY                 |           |                                |
| P-2        | PIEZOMETER IDENTIFICATION                           | [Cross-hatched Box] | SLURRY BARRIER WALL                   |           |                                |
|            |                                                     | [Circle]            | FORMER TANK LOCATION                  |           |                                |



±600' East Of  
Trans. Truck Shop

2 ~ 5-Acre  
Evap. Ponds

# Legend

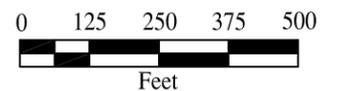
- Monitoring Well
- Observation Well
- Recovery Well
- Collection Well
- Outfall
- Site
- Approximate Property Line



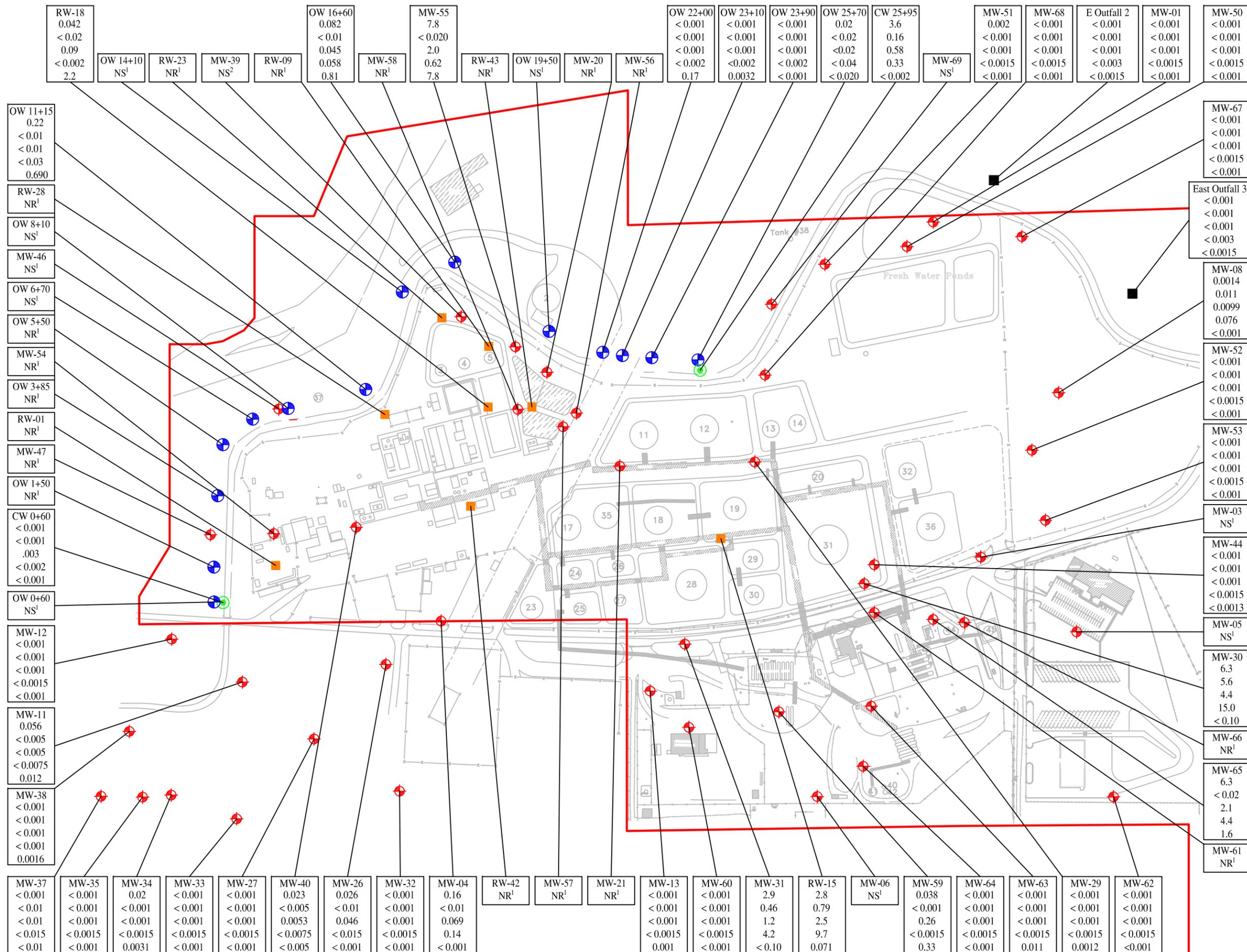
MW-38	-Well ID
< 0.005	-Benzene
< 0.005	-Toluene
< 0.005	-Ethylbenzene
< 0.0075	-Xylenes, Total
0.0016	-MTBE

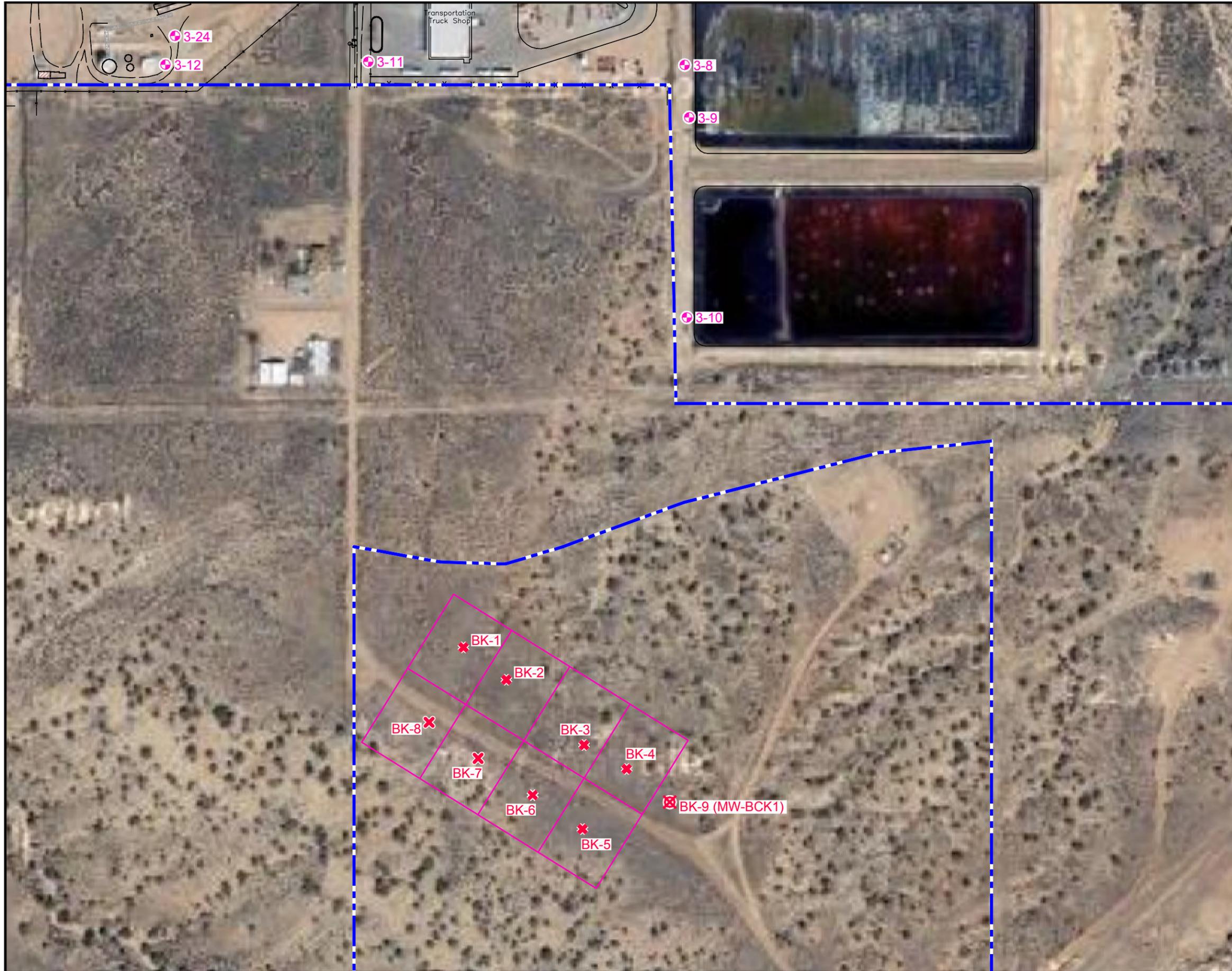
### Notes:

- All concentrations in milligrams per liter (mg/L)
- NS<sup>1</sup> = Well is Dry or Not Enough Water to Sample- No sample
- NS<sup>2</sup> = Not sampled due to approved Facility-wide Monitoring Plan.
- NS<sup>3</sup> = Sample Inadvertently not Collected this Sampling Event.
- NR<sup>1</sup> = No Sample Required - Well Contains Separate Phase Hydrocarbon
- NR<sup>2</sup> = No Sample Required per OCD and NMED Conditions

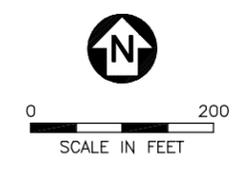


## Dissolved-Phase Groundwater Data August 2011 Bloomfield Refinery

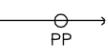




Aerial Map Source: Google Maps, 2008 DigitalGlobe.



LEGEND

-  SAMPLE GRID
-  **BK-1** BACKGROUND SOIL SAMPLE LOCATION AND IDENTIFICATION NUMBER
-  **BK-9 (MW-BCK1)** PROPOSED BACKGROUND MONITORING WELL LOCATION AND IDENTIFICATION NUMBER
-  **3-9** SOIL BORING LOCATION AND IDENTIFICATION NUMBER
-  FENCE
-  ABOVE GROUND ELECTRIC LINE AND POWER POLE
-  WESTERN PROPERTY BOUNDARY



PROJ. NO.: Western Refining | DATE: 05/23/13 | FILE: WestRefB122

**FIGURE 9**  
BACKGROUND SOIL SAMPLE LOCATIONS  
BLOOMFIELD REFINERY

 Cielo Center  
1250 S. Capital of Texas Highway  
Building 3, Suite 200  
Austin, Texas 78746  
TBPE No. 1298

# **Appendix A**

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## **Soils Data**

# Custom Soil Resource Report for San Juan County, New Mexico, Eastern Part

## Bloomfield Refinery Soils Report



# Preface

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Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://soils.usda.gov/sqi/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<http://offices.sc.egov.usda.gov/locator/app?agency=nrsc>) or your NRCS State Soil Scientist ([http://soils.usda.gov/contact/state\\_offices/](http://soils.usda.gov/contact/state_offices/)).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

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# **How Soil Surveys Are Made**

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Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

## Custom Soil Resource Report

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

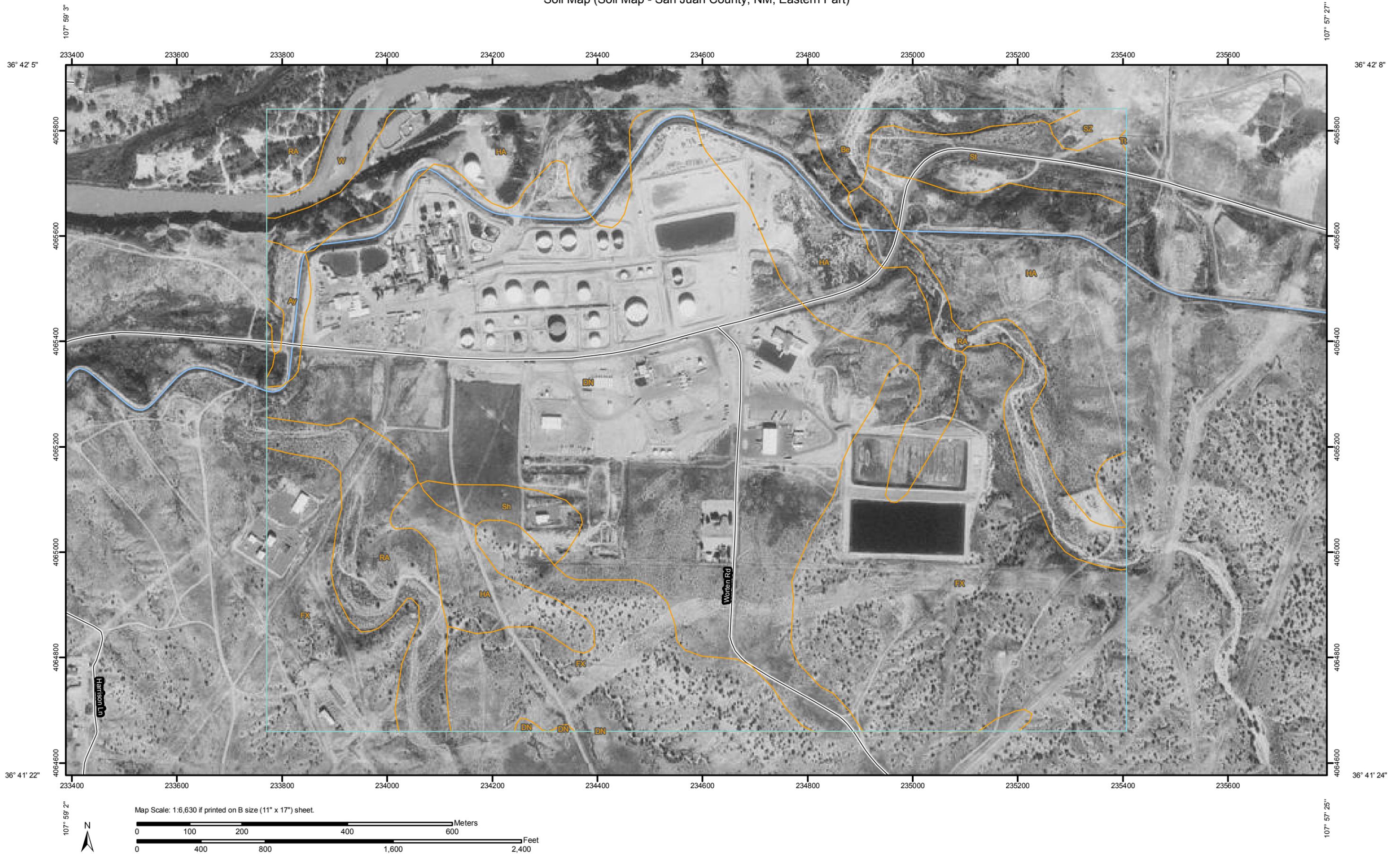
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

# Soil Map

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The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

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Soil Map (Soil Map - San Juan County, NM, Eastern Part)



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## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

 Soil Map Units

### Special Point Features

-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot
-  Spoil Area
-  Stony Spot

 Very Stony Spot

 Wet Spot

 Other

### Special Line Features

-  Gully
-  Short Steep Slope
-  Other

### Political Features

 Cities

### Water Features

-  Oceans
-  Streams and Canals

### Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

## MAP INFORMATION

Map Scale: 1:6,630 if printed on B size (11" × 17") sheet.

The soil surveys that comprise your AOI were mapped at 1:63,360.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>  
 Coordinate System: UTM Zone 13N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Juan County, New Mexico, Eastern Part  
 Survey Area Data: Version 10, Sep 23, 2009

Date(s) aerial images were photographed: 10/9/1997

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend (Soil Map - San Juan County, NM, Eastern Part)

San Juan County, New Mexico, Eastern Part (NM618)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ay	Avalon loam, 0 to 3 percent slopes	3.8	0.8%
Be	Beebe loamy sand	6.7	1.4%
DN	Doak-Avalon association, gently sloping	168.8	35.4%
FX	Fruitland-Persayo-Sheppard complex, hilly	134.6	28.2%
HA	Haplargids-Blackston-Torriorthents complex, very steep	100.7	21.1%
RA	Riverwash	37.8	7.9%
Sh	Shiprock loamy fine sand, 0 to 2 percent slopes	5.5	1.1%
St	Stumble loamy sand, 0 to 3 percent slopes	12.4	2.6%
SZ	Stumble-Slickspots complex, gently sloping	2.1	0.4%
Tt	Turley clay loam, wet, 0 to 2 percent slopes	0.1	0.0%
W	Lakes, rivers, reservoirs	4.4	0.9%
<b>Totals for Area of Interest</b>		<b>477.0</b>	<b>100.0%</b>

## Map Unit Descriptions (Soil Map - San Juan County, NM, Eastern Part)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used.

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Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

## San Juan County, New Mexico, Eastern Part

### Ay—Avalon loam, 0 to 3 percent slopes

#### Map Unit Setting

*Elevation:* 5,600 to 6,400 feet

*Mean annual precipitation:* 6 to 10 inches

*Mean annual air temperature:* 51 to 55 degrees F

*Frost-free period:* 140 to 160 days

#### Map Unit Composition

*Avalon and similar soils:* 90 percent

#### Description of Avalon

##### Setting

*Landform:* Mesas

*Landform position (three-dimensional):* Talf

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Parent material:* Eolian deposits over slope alluvium derived from sandstone and shale

##### Properties and qualities

*Slope:* 0 to 3 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Well drained

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.60 to 2.00 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 20 percent

*Gypsum, maximum content:* 2 percent

*Maximum salinity:* Nonsaline to slightly saline (2.0 to 8.0 mmhos/cm)

*Available water capacity:* High (about 9.8 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 2e

*Land capability (nonirrigated):* 7e

*Ecological site:* Limy (R035XB003NM)

##### Typical profile

*0 to 18 inches:* Loam

*18 to 60 inches:* Sandy clay loam

*60 to 64 inches:* Gravelly sandy loam

### Be—Beebe loamy sand

#### Map Unit Setting

*Elevation:* 4,800 to 6,000 feet

## Custom Soil Resource Report

*Mean annual precipitation:* 6 to 10 inches  
*Mean annual air temperature:* 51 to 55 degrees F  
*Frost-free period:* 140 to 160 days

### Map Unit Composition

*Beebe and similar soils:* 90 percent

### Description of Beebe

#### Setting

*Landform:* Flood plains  
*Landform position (three-dimensional):* Talf  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Stream alluvium derived from igneous and sedimentary rock

#### Properties and qualities

*Slope:* 0 to 1 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (6.00 to 20.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* Frequent  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 1 percent  
*Maximum salinity:* Nonsaline to very slightly saline (2.0 to 4.0 mmhos/cm)  
*Available water capacity:* Low (about 3.6 inches)

#### Interpretive groups

*Land capability classification (irrigated):* 4e  
*Land capability (nonirrigated):* 7e  
*Ecological site:* Sandy (R035XB002NM)

#### Typical profile

*0 to 6 inches:* Loamy sand  
*6 to 81 inches:* Sand

## DN—Doak-Avalon association, gently sloping

### Map Unit Setting

*Elevation:* 5,600 to 6,400 feet  
*Mean annual precipitation:* 6 to 10 inches  
*Mean annual air temperature:* 51 to 55 degrees F  
*Frost-free period:* 140 to 160 days

### Map Unit Composition

*Doak and similar soils:* 50 percent  
*Avalon and similar soils:* 35 percent

## Description of Doak

### Setting

*Landform:* Fan remnants, mesas, stream terraces  
*Landform position (three-dimensional):* Tread, talf  
*Down-slope shape:* Convex, linear  
*Across-slope shape:* Convex, linear  
*Parent material:* Alluvium derived from sandstone and shale

### Properties and qualities

*Slope:* 0 to 3 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.60 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 10 percent  
*Gypsum, maximum content:* 2 percent  
*Maximum salinity:* Nonsaline to very slightly saline (2.0 to 4.0 mmhos/cm)  
*Sodium adsorption ratio, maximum:* 2.0  
*Available water capacity:* High (about 10.1 inches)

### Interpretive groups

*Land capability classification (irrigated):* 2e  
*Land capability (nonirrigated):* 7e  
*Ecological site:* Loamy (R035XB001NM)

### Typical profile

*0 to 5 inches:* Loam  
*5 to 43 inches:* Clay loam  
*43 to 60 inches:* Clay loam

## Description of Avalon

### Setting

*Landform:* Fan remnants, mesas, stream terraces  
*Landform position (three-dimensional):* Tread, talf  
*Down-slope shape:* Convex, linear  
*Across-slope shape:* Convex, linear  
*Parent material:* Eolian deposits over alluvium derived from sandstone and shale

### Properties and qualities

*Slope:* 3 to 5 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 20 percent  
*Gypsum, maximum content:* 2 percent  
*Maximum salinity:* Nonsaline to slightly saline (2.0 to 8.0 mmhos/cm)  
*Sodium adsorption ratio, maximum:* 2.0

## Custom Soil Resource Report

*Available water capacity:* High (about 9.7 inches)

### **Interpretive groups**

*Land capability classification (irrigated):* 3e

*Land capability (nonirrigated):* 7e

*Ecological site:* Limy (R035XB003NM)

### **Typical profile**

*0 to 14 inches:* Loam

*14 to 60 inches:* Loam

*60 to 64 inches:* Gravelly loam

## **FX—Fruitland-Persayo-Sheppard complex, hilly**

### **Map Unit Setting**

*Elevation:* 4,800 to 6,400 feet

*Mean annual precipitation:* 6 to 10 inches

*Mean annual air temperature:* 51 to 55 degrees F

*Frost-free period:* 140 to 160 days

### **Map Unit Composition**

*Fruitland and similar soils:* 40 percent

*Persayo and similar soils:* 30 percent

*Sheppard and similar soils:* 25 percent

### **Description of Fruitland**

#### **Setting**

*Landform:* Alluvial fans, stream terraces

*Landform position (three-dimensional):* Riser, rise

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Slope alluvium derived from sandstone and shale

#### **Properties and qualities**

*Slope:* 5 to 30 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Well drained

*Capacity of the most limiting layer to transmit water (Ksat):* High (2.00 to 6.00 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 10 percent

*Gypsum, maximum content:* 1 percent

*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)

*Sodium adsorption ratio, maximum:* 2.0

*Available water capacity:* Moderate (about 7.2 inches)

### **Interpretive groups**

*Land capability classification (irrigated):* 4e

*Land capability (nonirrigated):* 7e

## Custom Soil Resource Report

*Ecological site:* Sandy (R035XB002NM)

### Typical profile

*0 to 4 inches:* Sandy loam

*4 to 60 inches:* Fine sandy loam

### Description of Persayo

#### Setting

*Landform:* Breaks, hills, ridges

*Landform position (two-dimensional):* Backslope, footslope, shoulder, toeslope

*Landform position (three-dimensional):* Side slope, nose slope, head slope, crest

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Parent material:* Residuum weathered from shale

#### Properties and qualities

*Slope:* 5 to 30 percent

*Depth to restrictive feature:* 5 to 20 inches to paralithic bedrock

*Drainage class:* Well drained

*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 2 percent

*Gypsum, maximum content:* 2 percent

*Maximum salinity:* Nonsaline to slightly saline (0.0 to 8.0 mmhos/cm)

*Sodium adsorption ratio, maximum:* 2.0

*Available water capacity:* Very low (about 2.9 inches)

#### Interpretive groups

*Land capability (nonirrigated):* 7e

*Ecological site:* Shale Hills (R035XA130NM)

### Typical profile

*0 to 18 inches:* Clay loam

*18 to 20 inches:* Bedrock

### Description of Sheppard

#### Setting

*Landform:* Dunes

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Parent material:* Eolian deposits over mixed alluvium

#### Properties and qualities

*Slope:* 5 to 30 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Somewhat excessively drained

*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (6.00 to 20.00 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Maximum salinity:* Nonsaline (0.0 to 2.0 mmhos/cm)

## Custom Soil Resource Report

*Available water capacity:* Low (about 4.2 inches)

### **Interpretive groups**

*Land capability classification (irrigated):* 4e

*Land capability (nonirrigated):* 7e

*Ecological site:* Deep Sand (R035XB007NM)

### **Typical profile**

*0 to 4 inches:* Loamy fine sand

*4 to 60 inches:* Loamy fine sand

## **HA—Haplargids-Blackston-Torriorthents complex, very steep**

### **Map Unit Setting**

*Elevation:* 4,800 to 6,400 feet

*Mean annual precipitation:* 6 to 10 inches

*Mean annual air temperature:* 51 to 55 degrees F

*Frost-free period:* 140 to 160 days

### **Map Unit Composition**

*Haplargids and similar soils:* 45 percent

*Blackston and similar soils:* 30 percent

*Torriorthents and similar soils:* 20 percent

### **Description of Haplargids**

#### **Setting**

*Landform:* Escarpments

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Parent material:* Mixed alluvium

#### **Properties and qualities**

*Slope:* 8 to 50 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Well drained

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.60 to 2.00 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 10 percent

*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)

*Available water capacity:* Moderate (about 7.3 inches)

### **Interpretive groups**

*Land capability (nonirrigated):* 7e

*Ecological site:* Loamy (R035XB001NM)

**Typical profile**

*0 to 7 inches:* Cobbly sandy loam  
*7 to 26 inches:* Cobbly sandy clay loam  
*26 to 60 inches:* Cobbly sandy clay loam

**Description of Blackston**

**Setting**

*Landform:* Escarpments  
*Landform position (three-dimensional):* Side slope  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex  
*Parent material:* Mixed alluvium

**Properties and qualities**

*Slope:* 8 to 40 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 30 percent  
*Maximum salinity:* Very slightly saline to slightly saline (4.0 to 8.0 mmhos/cm)  
*Available water capacity:* Low (about 4.5 inches)

**Interpretive groups**

*Land capability (nonirrigated):* 7e  
*Ecological site:* Limy (R035XB003NM)

**Typical profile**

*0 to 11 inches:* Gravelly loam  
*11 to 26 inches:* Very gravelly loam  
*26 to 60 inches:* Very gravelly sand

**Description of Torriorthents**

**Setting**

*Landform:* Escarpments  
*Landform position (three-dimensional):* Side slope  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex  
*Parent material:* Mixed alluvium

**Properties and qualities**

*Slope:* 8 to 50 percent  
*Depth to restrictive feature:* 10 to 20 inches to paralithic bedrock  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 2 percent  
*Gypsum, maximum content:* 2 percent  
*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)

## Custom Soil Resource Report

*Sodium adsorption ratio, maximum: 2.0*  
*Available water capacity: Very low (about 2.2 inches)*

### **Interpretive groups**

*Land capability (nonirrigated): 7e*  
*Ecological site: Hills (R042XB027NM)*

### **Typical profile**

*0 to 3 inches: Cobbly loam*  
*3 to 15 inches: Cobbly clay loam*  
*15 to 60 inches: Bedrock*

## **RA—Riverwash**

### **Map Unit Setting**

*Elevation: 4,800 to 6,400 feet*  
*Mean annual precipitation: 6 to 10 inches*  
*Mean annual air temperature: 51 to 55 degrees F*  
*Frost-free period: 140 to 160 days*

### **Map Unit Composition**

*Riverwash, clayey: 35 percent*  
*Riverwash, sandy: 35 percent*  
*Riverwash, gravelly: 30 percent*

### **Description of Riverwash, Sandy**

#### **Setting**

*Landform: Flood plains*  
*Landform position (three-dimensional): Talf*  
*Down-slope shape: Linear*  
*Across-slope shape: Linear*  
*Parent material: Stream alluvium derived from igneous and sedimentary rock*

#### **Properties and qualities**

*Slope: 0 to 3 percent*  
*Drainage class: Poorly drained*  
*Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)*  
*Depth to water table: About 0 to 24 inches*  
*Frequency of flooding: Frequent*  
*Available water capacity: Very low (about 2.9 inches)*

### **Interpretive groups**

*Land capability (nonirrigated): 8w*

### **Typical profile**

*0 to 6 inches: Sand*  
*6 to 60 inches: Stratified coarse sand to sandy loam*

### **Description of Riverwash, Clayey**

#### **Setting**

*Landform:* Flood plains  
*Landform position (three-dimensional):* Talf  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Stream alluvium derived from igneous and sedimentary rock

#### **Properties and qualities**

*Slope:* 0 to 1 percent  
*Drainage class:* Poorly drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)  
*Depth to water table:* About 0 to 6 inches  
*Frequency of flooding:* Frequent  
*Available water capacity:* Low (about 6.0 inches)

#### **Interpretive groups**

*Land capability (nonirrigated):* 8w

#### **Typical profile**

*0 to 6 inches:* Clay  
*6 to 60 inches:* Clay

### **Description of Riverwash, Gravelly**

#### **Setting**

*Landform:* Flood plains  
*Landform position (three-dimensional):* Talf  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Stream alluvium derived from igneous and sedimentary rock

#### **Properties and qualities**

*Slope:* 0 to 3 percent  
*Drainage class:* Poorly drained  
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (6.00 to 20.00 in/hr)  
*Depth to water table:* About 0 to 24 inches  
*Frequency of flooding:* Frequent  
*Available water capacity:* Very low (about 1.9 inches)

#### **Interpretive groups**

*Land capability (nonirrigated):* 8w

#### **Typical profile**

*0 to 6 inches:* Gravelly sand  
*6 to 60 inches:* Stratified extremely gravelly coarse sand to gravelly sand

## **Sh—Shiprock loamy fine sand, 0 to 2 percent slopes**

### **Map Unit Setting**

*Elevation:* 5,600 to 6,400 feet

*Mean annual precipitation:* 6 to 10 inches

*Mean annual air temperature:* 51 to 55 degrees F

*Frost-free period:* 140 to 160 days

### **Map Unit Composition**

*Shiprock and similar soils:* 85 percent

### **Description of Shiprock**

#### **Setting**

*Landform:* Mesas

*Landform position (three-dimensional):* Talf

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Parent material:* Eolian deposits over alluvium derived from sandstone and shale

#### **Properties and qualities**

*Slope:* 0 to 2 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Well drained

*Capacity of the most limiting layer to transmit water (Ksat):* High (2.00 to 6.00 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 2 percent

*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)

*Available water capacity:* Moderate (about 6.3 inches)

#### **Interpretive groups**

*Land capability classification (irrigated):* 3e

*Land capability (nonirrigated):* 7e

*Ecological site:* Deep Sand (R035XB007NM)

#### **Typical profile**

*0 to 10 inches:* Loamy fine sand

*10 to 60 inches:* Fine sandy loam

## **St—Stumble loamy sand, 0 to 3 percent slopes**

### **Map Unit Setting**

*Elevation:* 4,800 to 6,400 feet

## Custom Soil Resource Report

*Mean annual precipitation:* 6 to 10 inches  
*Mean annual air temperature:* 51 to 55 degrees F  
*Frost-free period:* 140 to 160 days

### Map Unit Composition

*Stumble and similar soils:* 90 percent  
*Fruitland and similar soils:* 10 percent

### Description of Stumble

#### Setting

*Landform:* Dunes  
*Landform position (three-dimensional):* Side slope  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex  
*Parent material:* Eolian deposits derived from sandstone

#### Properties and qualities

*Slope:* 0 to 3 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Somewhat excessively drained  
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (6.00 to 20.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 2 percent  
*Maximum salinity:* Nonsaline (0.0 to 2.0 mmhos/cm)  
*Available water capacity:* Low (about 3.7 inches)

#### Interpretive groups

*Land capability classification (irrigated):* 4e  
*Land capability (nonirrigated):* 7e  
*Ecological site:* Sandy (R035XB002NM)

#### Typical profile

*0 to 5 inches:* Loamy sand  
*5 to 29 inches:* Loamy sand  
*29 to 49 inches:* Gravelly loamy sand  
*49 to 81 inches:* Loamy sand

### Description of Fruitland

#### Setting

*Landform:* Alluvial fans  
*Landform position (three-dimensional):* Rise  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Fan alluvium derived from sandstone and shale

#### Properties and qualities

*Slope:* 0 to 3 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)  
*Depth to water table:* More than 80 inches

## Custom Soil Resource Report

*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 10 percent  
*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)  
*Available water capacity:* Moderate (about 7.5 inches)

### **Interpretive groups**

*Land capability classification (irrigated):* 2e  
*Land capability (nonirrigated):* 7e  
*Ecological site:* Loamy (R035XB001NM)

### **Typical profile**

*0 to 8 inches:* Loam  
*8 to 60 inches:* Fine sandy loam

## **SZ—Stumble-Slickspots complex, gently sloping**

### **Map Unit Setting**

*Elevation:* 4,800 to 6,400 feet  
*Mean annual precipitation:* 6 to 10 inches  
*Mean annual air temperature:* 51 to 55 degrees F  
*Frost-free period:* 140 to 160 days

### **Map Unit Composition**

*Stumble and similar soils:* 70 percent  
*Slickspots:* 20 percent

### **Description of Stumble**

#### **Setting**

*Landform:* Dunes  
*Landform position (three-dimensional):* Side slope  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex  
*Parent material:* Eolian deposits derived from sandstone

#### **Properties and qualities**

*Slope:* 0 to 5 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Somewhat excessively drained  
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (6.00 to 20.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum content:* 1 percent  
*Maximum salinity:* Nonsaline (0.0 to 2.0 mmhos/cm)  
*Available water capacity:* Low (about 4.2 inches)

### **Interpretive groups**

*Land capability classification (irrigated):* 4e

## Custom Soil Resource Report

*Land capability (nonirrigated): 7e*  
*Ecological site: Sandy (R035XB002NM)*

### Typical profile

*0 to 4 inches: Loamy sand*  
*4 to 60 inches: Loamy sand*

### Description of Slickspots

#### Setting

*Landform: Alluvial fans*  
*Landform position (three-dimensional): Rise*  
*Down-slope shape: Linear*  
*Across-slope shape: Linear*  
*Parent material: Eolian deposits derived from sandstone*

#### Properties and qualities

*Slope: 0 to 5 percent*  
*Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)*  
*Depth to water table: About 0 inches*  
*Maximum salinity: Slightly saline to moderately saline (8.0 to 16.0 mmhos/cm)*  
*Sodium adsorption ratio, maximum: 12.0*

#### Interpretive groups

*Land capability (nonirrigated): 8w*

#### Typical profile

*0 to 2 inches: Clay*  
*2 to 60 inches: Clay*

## Tt—Turley clay loam, wet, 0 to 2 percent slopes

### Map Unit Setting

*Elevation: 4,800 to 6,000 feet*  
*Mean annual precipitation: 6 to 10 inches*  
*Mean annual air temperature: 51 to 55 degrees F*  
*Frost-free period: 140 to 160 days*

### Map Unit Composition

*Turley variant and similar soils: 90 percent*

### Description of Turley Variant

#### Setting

*Landform: Alluvial fans*  
*Landform position (three-dimensional): Rise*  
*Down-slope shape: Linear*  
*Across-slope shape: Linear*  
*Parent material: Fan alluvium derived from sandstone and shale*

## Custom Soil Resource Report

### Properties and qualities

*Slope:* 0 to 2 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Moderately well drained

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.60 in/hr)

*Depth to water table:* About 24 to 60 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 5 percent

*Gypsum, maximum content:* 2 percent

*Maximum salinity:* Nonsaline to very slightly saline (2.0 to 4.0 mmhos/cm)

*Sodium adsorption ratio, maximum:* 2.0

*Available water capacity:* High (about 10.2 inches)

### Interpretive groups

*Land capability classification (irrigated):* 2w

*Land capability (nonirrigated):* 6w

*Ecological site:* Clayey (R035XB004NM)

### Typical profile

*0 to 9 inches:* Clay loam

*9 to 60 inches:* Clay loam

## W—Lakes, rivers, reservoirs

### Map Unit Setting

*Elevation:* 4,800 to 6,400 feet

*Mean annual precipitation:* 6 to 10 inches

*Mean annual air temperature:* 51 to 55 degrees F

*Frost-free period:* 140 to 160 days

### Map Unit Composition

*Water:* 95 percent

### Description of Water

#### Setting

*Landform:* Channels

*Landform position (three-dimensional):* Talf

*Down-slope shape:* Linear

*Across-slope shape:* Linear

# Soil Information for All Uses

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## Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

## Soil Chemical Properties

This folder contains a collection of tabular reports that present soil chemical properties. The reports (tables) include all selected map units and components for each map unit. Soil chemical properties are measured or inferred from direct observations in the field or laboratory. Examples of soil chemical properties include pH, cation exchange capacity, calcium carbonate, gypsum, and electrical conductivity.

## Chemical Soil Properties (Soil Map - San Juan County, NM, Eastern Part)

This table shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated.

*Cation-exchange capacity* is the total amount of extractable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

*Effective cation-exchange capacity* refers to the sum of extractable cations plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

## Custom Soil Resource Report

*Soil reaction* is a measure of acidity or alkalinity. It is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

*Calcium carbonate* equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil.

*Gypsum* is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

*Salinity* is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

*Sodium adsorption ratio* (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced saturated hydraulic conductivity and aeration, and a general degradation of soil structure.

Custom Soil Resource Report

Chemical Soil Properties– San Juan County, New Mexico, Eastern Part								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
Ay—Avalon loam, 0 to 3 percent slopes								
Avalon	0-18	9.8-15	—	7.9-8.4	1-5	0-2	2.0-8.0	0
	18-60	11-23	—	7.9-8.4	10-20	0-2	2.0-8.0	0
	60-64	4.0-11	—	7.9-8.4	15-20	0-2	2.0-8.0	0
Be—Beebe loamy sand								
Beebe	0-6	3.1-7.4	—	7.4-8.4	0-1	0	2.0-4.0	0
	6-81	0.8-7.4	—	7.4-8.4	0-1	0	2.0-4.0	0
DN—Doak-Avalon association, gently sloping								
Doak	0-5	11-19	—	7.4-8.4	0-5	0	0.0-2.0	0
	5-43	15-23	—	7.4-9.0	1-10	0	2.0-4.0	0
	43-60	15-23	—	7.9-9.0	5-10	0-2	2.0-4.0	0-2
Avalon	0-14	11-15	—	7.9-8.4	0-5	0	2.0-8.0	0
	14-60	11-23	—	7.9-8.4	10-20	0-2	2.0-8.0	0
	60-64	4.0-11	—	7.9-8.4	15-20	0-2	2.0-8.0	0-2
FX—Fruitland-Persayo-Sheppard complex, hilly								
Fruitland	0-4	4.1-7.6	—	7.4-8.4	5-10	0-1	0.0-4.0	0-2
	4-60	3.1-12	—	7.4-8.4	5-10	0-1	0.0-4.0	0-2
Persayo	0-18	18-23	—	7.9-9.0	0-2	0-2	0.0-8.0	0-2
	18-20	—	—	—	—	—	—	—
Sheppard	0-4	2.5-5.4	—	7.9-8.4	0	0	0.0-2.0	0
	4-60	2.5-5.4	—	7.9-8.4	0	0	0.0-2.0	0

Custom Soil Resource Report

Chemical Soil Properties— San Juan County, New Mexico, Eastern Part								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
HA—Haplargids-Blackston-Torriorthents complex, very steep								
Haplargids	0-7	7.0-14	—	7.4-8.4	0	0	0.0-4.0	0
	7-26	13-23	—	7.4-8.4	0-5	0	0.0-4.0	0
	26-60	13-18	—	7.4-8.4	1-10	0	0.0-4.0	0
Blackston	0-11	11-18	—	7.9-8.4	0-2	0	0.0-2.0	0
	11-26	9.8-17	—	7.9-8.4	10-20	0	4.0-8.0	0
	26-60	0.0-4.6	—	7.9-8.4	15-30	0	4.0-8.0	0
Torriorthents	0-3	11-17	—	7.4-8.4	0-2	0-2	0.0-4.0	0
	3-15	5.7-19	—	7.4-8.4	0-2	0-2	0.0-4.0	0-2
	15-60	—	—	—	—	—	—	—
RA—Riverwash								
Riverwash, clayey	0-6	—	—	—	—	—	—	—
	6-60	—	—	—	—	—	—	—
Riverwash, sandy	0-6	—	—	—	—	—	—	—
	6-60	—	—	—	—	—	—	—
Riverwash, gravelly	0-6	—	—	—	—	—	—	—
	6-60	—	—	—	—	—	—	—
Sh—Shiprock loamy fine sand, 0 to 2 percent slopes								
Shiprock	0-10	8.1-11	—	7.4-8.4	0-2	0	0.0-2.0	0
	10-60	7.0-13	—	7.4-9.0	0-2	0	0.0-4.0	0

Custom Soil Resource Report

Chemical Soil Properties— San Juan County, New Mexico, Eastern Part								
Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	<i>In</i>	<i>meq/100g</i>	<i>meq/100g</i>	<i>pH</i>	<i>Pct</i>	<i>Pct</i>	<i>mmhos/cm</i>	
St—Stumble loamy sand, 0 to 3 percent slopes								
Stumble	0-5	0.0-7.4	—	7.9-8.4	0-2	0	0.0-2.0	0
	5-29	0.0-7.4	—	7.9-9.0	0-2	0	0.0-2.0	0
	29-49	0.0-3.1	—	7.9-9.0	0-2	0	0.0-2.0	0
	49-81	0.0-5.7	—	7.9-9.0	0-2	0	0.0-2.0	0
Fruitland	0-8	5.7-16	—	7.4-8.4	5-10	0	0.0-4.0	0
	8-60	3.1-12	—	7.4-8.4	5-10	0	0.0-4.0	0
SZ—Stumble-Slickspots complex, gently sloping								
Stumble	0-4	0.0-7.4	—	7.9-8.4	0-1	0	0.0-2.0	0
	4-60	0.0-7.4	—	7.9-9.0	0-1	0	0.0-2.0	0
Slickspots	0-2	—	—	7.9-9.6	0	0	0.0-8.0	2-6
	2-60	—	—	7.9-9.6	0	0	8.0-16.0	4-12
Tt—Turley clay loam, wet, 0 to 2 percent slopes								
Turley variant	0-9	14-22	—	7.4-8.4	1-5	0-2	2.0-4.0	0-2
	9-60	14-22	—	7.4-8.4	1-5	0-2	2.0-4.0	0-2
W—Lakes, rivers, reservoirs								
Water	—	—	—	—	—	—	—	—

## Soil Physical Properties

This folder contains a collection of tabular reports that present soil physical properties. The reports (tables) include all selected map units and components for each map unit. Soil physical properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

### Physical Soil Properties (Soil Map - San Juan County, NM, Eastern Part)

This table shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

*Sand* as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In this table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

*Silt* as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In this table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

*Clay* as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, saturated hydraulic conductivity ( $K_{sat}$ ), plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

*Moist bulk density* is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3- or 1/10-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The

## Custom Soil Resource Report

moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

*Saturated hydraulic conductivity (Ksat)* refers to the ease with which pores in a saturated soil transmit water. The estimates in the table are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity (Ksat) is considered in the design of soil drainage systems and septic tank absorption fields.

*Available water capacity* refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

*Linear extensibility* refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

*Organic matter* is the plant and animal residue in the soil at various stages of decomposition. In this table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of organic matter in a soil can be maintained by returning crop residue to the soil.

Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

*Erosion factors* are shown in the table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and Ksat. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

*Erosion factor Kw* indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

*Erosion factor Kf* indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

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*Erosion factor T* is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

*Wind erodibility groups* are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the "National Soil Survey Handbook."

*Wind erodibility index* is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Reference:

United States Department of Agriculture, Natural Resources Conservation Service.  
National soil survey handbook, title 430-VI. (<http://soils.usda.gov>)

Custom Soil Resource Report

Physical Soil Properties– San Juan County, New Mexico, Eastern Part														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
Ay—Avalon loam, 0 to 3 percent slopes														
Avalon	0-18	-43-	-40-	15-18- 20	1.40-1.50	4.23-14.11	0.16-0.18	0.0-2.9	0.0-1.0	.43	.43	3	4L	86
	18-60	-56-	-18-	18-27- 35	1.40-1.50	4.23-14.11	0.15-0.17	3.0-5.9	0.0-0.5	.43	.43			
	60-64	-67-	-23-	5-10- 15	1.50-1.65	14.11-42.34	0.10-0.12	0.0-2.9	0.0-0.5	.32	.37			
Be—Beebe loamy sand														
Beebe	0-6	-84-	- 9-	5- 8- 10	1.45-1.55	42.34-141.14	0.06-0.08	0.0-2.9	0.0-0.5	.20	.20	5	2	134
	6-81	-93-	- 2-	1- 6- 10	1.45-1.55	141.14	0.03-0.08	0.0-2.9	0.0-0.5	.17	.17			
DN—Doak-Avalon association, gently sloping														
Doak	0-5	-42-	-37-	15-21- 27	1.20-1.30	4.23-14.11	0.15-0.17	0.0-2.9	0.5-0.6	.37	.37	5	5	56
	5-43	-34-	-37-	25-30- 35	1.45-1.55	1.41-4.23	0.15-0.18	3.0-5.9	0.0-0.5	.37	.37			
	43-60	-34-	-37-	25-30- 35	1.40-1.50	1.41-4.23	0.15-0.18	3.0-5.9	0.0-0.5	.37	.37			
Avalon	0-14	-43-	-40-	15-18- 20	1.40-1.50	4.23-14.11	0.16-0.18	0.0-2.9	0.5-1.0	.43	.43	3	4L	86
	14-60	-38-	-36-	18-27- 35	1.40-1.50	4.23-14.11	0.15-0.17	3.0-5.9	0.0-0.5	.43	.43			
	60-64	-46-	-44-	5-10- 15	1.50-1.65	14.11-42.34	0.10-0.12	0.0-2.9	0.0-0.5	.32	.37			

Custom Soil Resource Report

Physical Soil Properties– San Juan County, New Mexico, Eastern Part														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
FX—Fruitland-Persayo-Sheppard complex, hilly														
Fruitland	0-4	-69-	-24-	5- 8- 10	1.45-1.55	14.11-42.34	0.11-0.13	0.0-2.9	0.6-0.8	.28	.28	5	3	86
	4-60	-68-	-21-	5-12- 18	1.45-1.55	14.11-42.34	0.11-0.13	0.0-2.9	0.0-0.5	.28	.28			
Persayo	0-18	-35-	-34-	27-31- 35	1.35-1.45	1.41-4.23	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37	1	8	0
	18-20	—	—	—	—	0.00-1.41	—	—	—					
Sheppard	0-4	-79-	-16-	4- 5- 7	1.45-1.60	42.34-141.14	0.06-0.08	0.0-2.9	0.0-0.5	.15	.15	5	2	134
	4-60	-79-	-16-	4- 5- 7	1.45-1.60	42.34-141.14	0.06-0.08	0.0-2.9	0.0-0.5	.15	.15			
HA—Haplargids-Blackston-Torriorthents complex, very steep														
Haplargids	0-7	-66-	-19-	10-15- 20	1.45-1.55	14.11-42.34	0.08-0.10	0.0-2.9	0.0-0.5	.15	.28	4	4	86
	7-26	-55-	-17-	20-28- 35	1.35-1.45	4.23-14.11	0.11-0.13	0.0-2.9	0.0-0.5	.15	.28			
	26-60	-59-	-18-	20-24- 27	1.35-1.45	4.23-14.11	0.12-0.14	0.0-2.9	0.0-0.5	.20	.37			
Blackston	0-11	-42-	-38-	15-20- 25	1.45-1.55	4.23-14.11	0.11-0.14	0.0-2.9	0.5-1.0	.10	.17	3	8	0
	11-26	-42-	-38-	15-20- 25	1.35-1.45	4.23-14.11	0.07-0.10	0.0-2.9	0.0-0.5	.10	.28			
	26-60	-96-	- 2-	0- 3- 5	1.35-1.45	42.34-141.14	0.03-0.06	0.0-2.9	0.0-0.5	.10	.28			
Torriorthents	0-3	-42-	-38-	15-20- 25	1.40-1.50	4.23-14.11	0.12-0.14	0.0-2.9	0.6-0.8	.20	.37	1	6	48
	3-15	-34-	-37-	10-30- 30	1.40-1.50	1.41-42.34	0.10-0.20	0.0-2.9	0.0-0.5	.20	.32			
	15-60	—	—	—	—	0.00-1.40	—	—	—					

Custom Soil Resource Report

Physical Soil Properties– San Juan County, New Mexico, Eastern Part														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
RA—Riverwash														
Riverwash, clayey	0-6	-12-	-28-	40-60- 80	1.65-1.75	0.00-1.41	0.09-0.11	6.0-8.9	0.0-0.1	.20	.20	5	4	86
	6-60	-12-	-28-	40-60- 80	1.65-1.75	0.00-1.41	0.09-0.11	6.0-8.9	0.0-0.1	.28	.32			
Riverwash, sandy	0-6	-98-	- 2-	0- 1- 1	1.65-1.75	42.34-141.14	0.03-0.04	0.0-2.9	0.0-0.1	.10	.10	5	4	86
	6-60	-68-	-30-	0- 3- 5	1.65-1.75	42.34-141.14	0.04-0.06	0.0-2.9	0.0-0.1	.10	.10			
Riverwash, gravelly	0-6	-98-	- 2-	0- 1- 1	1.65-1.75	42.34-141.14	0.03-0.04	0.0-2.9	0.0-0.1	.05	.10	5	4	86
	6-60	-93-	- 7-	0- 1- 1	1.65-1.75	42.34-141.14	0.02-0.03	0.0-2.9	0.0-0.1	.05	.10			
Sh—Shiprock loamy fine sand, 0 to 2 percent slopes														
Shiprock	0-10	-83-	- 5-	10-13- 15	1.40-1.50	42.34-141.14	0.06-0.09	0.0-2.9	0.5-0.6	.20	.20	5	2	134
	10-60	-70-	-16-	10-14- 18	1.45-1.55	14.11-42.34	0.09-0.12	0.0-2.9	0.0-0.5	.28	.28			
St—Stumble loamy sand, 0 to 3 percent slopes														
Stumble	0-5	-79-	-17-	0- 5- 10	1.45-1.55	42.34-141.14	0.06-0.08	0.0-2.9	0.0-0.5	.17	.17	5	2	134
	5-29	-79-	-17-	0- 5- 10	1.45-1.55	42.34-141.14	0.06-0.08	0.0-2.9	0.0-0.5	.15	.15			
	29-49	-81-	-17-	0- 3- 5	1.45-1.55	42.34-141.14	0.04-0.06	0.0-2.9	0.0	.10	.24			
	49-81	-79-	-17-	0- 5- 10	1.45-1.55	42.34-141.14	0.06	0.0-2.9	0.0	.15	.15			
Fruitland	0-8	-43-	-40-	10-18- 25	1.40-1.50	4.23-14.11	0.15-0.17	0.0-2.9	0.0-0.5	.37	.37	5	5	56
	8-60	-68-	-21-	5-12- 18	1.45-1.55	14.11-42.34	0.11-0.13	0.0-2.9	0.0-0.5	.28	.28			

Custom Soil Resource Report

Physical Soil Properties– San Juan County, New Mexico, Eastern Part														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	<i>In</i>	<i>Pct</i>	<i>Pct</i>	<i>Pct</i>	<i>g/cc</i>	<i>micro m/sec</i>	<i>In/In</i>	<i>Pct</i>	<i>Pct</i>					
SZ—Stumble-Slickspots complex, gently sloping														
Stumble	0-4	-79-	-17-	0- 5- 10	1.45-1.55	42.34-141.14	0.06-0.08	0.0-2.9	0.0-0.5	.17	.17	5	2	134
	4-60	-79-	-17-	0- 5- 10	1.45-1.55	42.34-141.14	0.06-0.08	0.0-2.9	0.0-0.5	.15	.15			
Slickspots	0-2	-32-	-31-	15-37- 45	1.45-1.55	0.00-0.42	—	—	0.5-1.0					
	2-60	-32-	-31-	15-37- 45	1.45-1.55	0.00-1.41	—	—	0.0-0.5					
Tt—Turley clay loam, wet, 0 to 2 percent slopes														
Turley variant	0-9	-35-	-33-	28-32- 35	1.40-1.50	1.41-4.23	0.15-0.19	3.0-5.9	0.0-0.5	.32	.32	5	4L	86
	9-60	-35-	-33-	28-32- 35	1.40-1.50	1.41-4.23	0.15-0.19	3.0-5.9	0.0-0.5	.32	.32			
W—Lakes, rivers, reservoirs														
Water	—	—	—	—	—	—	—	—	—					

# References

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American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. <http://soils.usda.gov/>

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. <http://soils.usda.gov/>

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. <http://soils.usda.gov/>

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. <http://soils.usda.gov/>

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.glti.nrcs.usda.gov/>

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. <http://soils.usda.gov/>

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. <http://soils.usda.gov/>

## Custom Soil Resource Report

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210.

# Appendix B

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## Survey Data



June 25, 2012

Western Refining Southwest, Inc. - Bloomfield Refinery  
P.O. Box 159  
50 Road 4990  
Bloomfield, NM 87413

5121139

ATTN: Kelly R. Robinson  
Environmental Engineer

RE: Monitoring Well Locations  
Soil Boring Locations

Dear Ms. Robinson,

I, Kurt R. Shepherd hereby state that I am a New Mexico Professional Surveyor (No. 11643) and that the license is in good standing with the State.

On March 6, 2012 I supervised the field surveys for the origin of the Horizontal and Vertical Control, derived from a NGS OPUS Solution supplied by US NGS/NOAA. The coordinate basis of the Horizontal Control is State Plane Coordinates New Mexico West Zone, (code 3003). The Vertical Ortho-metric height was computed in NAVD88 using Geoid09 datum.

The attached Exhibit "A" Monitoring Wells Data were field surveyed on March 6, 2012 and computed using the above mentioned control position. All Monitoring Well positions are inside a steel casing and located on the North side of the PVC riser. Horizontal positions are measured to the nearest 0.1-ft and vertical elevations are measured to the nearest 0.01-ft.

The attached Exhibit "B" Soil Boring Locations were field surveyed on March 6, 2012 and computed using the above mentioned control position. Elevations are at ground surface.

If you have any questions or need clarification, please contact me.

Respectfully,

SOUDER, MILLER & ASSOCIATES

A handwritten signature in black ink that reads 'Kurt R. Shepherd'. The signature is written in a cursive, flowing style.

Kurt R. Shepherd, P.L.S.  
Senior Surveyor

Enclosures

KRS/sll  
(Revised)

Western Refinery  
 Soil Boring Location  
 Surveyed on March 06, 2012  
 SPC NM West

## Exhibit "B"

Point Number	Northing	Easting	Elevation	Descriptor
5106	2070966.402	2683615.628	5614.922	BK-4
5107	2071015.801	2683527.543	5612.432	BK-3
5108	2071150.441	2683367.214	5607.917	BK-2
5109	2071217.062	2683278.259	5606.110	BK-1
5110	2071062.706	2683207.278	5606.292	BK-8
5111	2070988.248	2683308.515	5611.983	BK-7
5112	2070912.500	2683421.432	5614.640	BK-6
5113	2070842.812	2683524.437	5617.175	BK-5
5114	2072425.083	2683081.565	5560.964	3-11
5115	2071897.657	2683739.859	5562.729	3-10
5116	2072310.152	2683744.750	5547.801	3-9
5117	2072417.960	2683735.525	5545.561	3-8 APPROX
5118	2072852.131	2683728.100	5536.475	3-7
5121	2073142.651	2683527.872	5543.408	3-6
5125	2073680.648	2683043.322	5534.518	3-5
5127	2074054.545	2683140.101	5526.477	3-26
5132	2074112.867	2683139.843	5525.539	3-27
5137	2074162.263	2683138.224	5524.698	3-28
5141	2073073.202	2682630.774	5538.805	3-21
5142	2073029.620	2682908.499	5542.550	3-23
5147	2072978.678	2682770.735	5541.845	3-22
5149	2072477.987	2682681.970	5554.045	3-24
5153	2072418.903	2682662.390	5551.741	3-12
5156	2072907.016	2682311.543	5538.456	3-19
5157	2072999.105	2682328.533	5538.291	3-20
5166	2072416.017	2682171.780	5553.305	3-13
5169	2072857.067	2682062.506	5537.287	3-18
5170	2072787.476	2681956.385	5537.936	3-14
5175	2072782.685	2681877.332	5537.478	3-15
5178	2072885.743	2681803.840	5534.936	3-17
5180	2072944.418	2681461.020	5531.205	3-16
5182	2073563.107	2681625.150	5523.124	3-25
5185	2073477.156	2681915.466	5522.104	6-4
5187	2073807.200	2682138.079	5515.218	3-4
5195	2073820.002	2681031.127	5526.278	3-3
5197	2073642.845	2680626.731	5525.122	3-1



Western Refinery  
Monitoring Wells  
Surveyed on March 06, 2012  
SPC NM West

## Exhibit "A"

Point Number	Northing	Easting	Elevation	Descriptor
5100	2073370.61	2684757.931	5517.800	BK-10 (MW-BCK2)
5101	2073370.88	2684757.863	5516.522	CONC
5102	2073372.58	2684757.867	5516.131	GS
5103	2070898.1	2683704.928	5620.140	BK-9 (MW-BCK1)
5104	2070898.28	2683705.031	5617.952	CONC
5105	2070899.74	2683705.705	5617.508	GS
5140	2074039.6	2683303.847	5527.96	MW-67
5139	2074039.91	2683304.31	5525.398	CONC
5138	2074041.14	2683305.488	5524.776	GS

### Legend

BK-9, BK-10 & MW67 = Top of casing

Conc = Concrete collar at monitoring well

GS = Ground surface at monitoring well



# **Appendix C**

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## **Field Methods**

## Field Methods

Pursuant to Section IV of the Order, an investigation of soils and groundwater was conducted to determine naturally occurring concentrations of constituents of concern. The field methods are described below and individual discussions are presented for the following activities:

- Drilling procedures;
- Soil screening;
- Decontamination procedures;
- Monitoring well development;
- Fluid level measurements;
- Purging of monitoring wells/groundwater sample collection;
- Sample collection and handling procedures;
- Vadose zone vapor sampling;
- Equipment calibration; and
- Management of investigation derived waste.

### Drilling Procedures

The soil borings were drilled using the hollow-stem auguring (HSA) method and ODEX, or a hand auger was used for shallow (two-foot) borings. Soil samples were collected continuously and logged by a qualified geologist in accordance with the Unified Soil Classification System (USCS) nomenclature. As shown on the boring logs, the data recorded included the lithologic interval, symbol, percent recovery, field screening results, and a sample description of the cuttings and core samples.

### Soil Screening

Samples obtained from the borings were screened in the field on 2-foot intervals for evidence of contaminants. Field screening results were recorded on the soil boring logs. Field screening results were 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.

Visual screening included examining the soil samples for evidence of staining caused by petroleum-related compounds or other substances that may have caused staining of soils such as elemental sulfur or cyanide compounds. Headspace vapor screening was conducted and involved placing a soil sample in a plastic sealable bag allowing space for ambient air. The bag was sealed, labeled and then shaken gently to expose the soil to the air trapped in the container. The sealed bag was allowed to rest for a minimum of 5 minutes while the vapors equilibrated. Vapors present within the sample bag's headspace were then measured by

inserting the probe of a MiniRae 3000 portable volatile organic constituent (VOC) monitor in a small opening in the bag. The maximum value and the ambient air temperature were recorded on the field boring log for each sample. The screening results are presented in Table 1. Field screening results and any conditions that were considered to be capable of influencing the results of the field screening were recorded on the field logs.

#### Decontamination Procedures

The drilling equipment (e.g., hollow-stem augers) was decontaminated between each borehole using a high pressure potable water wash. The sampling equipment coming in direct contact with the samples (e.g., hand augers and split-spoon samplers) were decontaminated using a brush, as necessary, to remove larger particulate matter followed by a rinse with potable water, wash with nonphosphate detergent, rinse with potable water, and double rinse with deionized water.

#### Monitoring Well Development

Following monitoring well completion activities, the new monitoring wells (MW-BCK1 and MW-BCK2) were developed using mechanical surging. The surging motion drew filter pack fines and loosened sediment into the well casing, improving the water quality within the surrounding formation and filter pack.

The groundwater/sediment mixture discharged directly into a 55-gallon drum. A glass jar was used to capture a sample of the purge water every 15 minutes to monitor the improving clarity of the purge water. Development ceased once the purge water was relatively clear.

#### Fluid Level Measurements

The depth to groundwater was measured prior to purging the wells of potentially stagnant groundwater. The measurements are presented in Table 2. A Keck KIR Interface Probe was used to measure fluid levels to 0.01 foot. The depth to the bottom of the wells was also recorded and the depth measured in MW-BCK2 was less than anticipated based on well construction information. This information is presented in Table 2.

#### Purging of Monitoring Wells/Groundwater Sample Collection

Both wells were purged dry and allowed to recover prior to sample collection. The purge volumes, which would otherwise normally apply, are calculated as follows:

Volume (gallons) = water column thickness (ft) x 3.14 x radius of well casing<sup>2</sup> (ft) x 7.48 (gals/ft).  
 The calculated purge volumes and actual volumes removed from each well are presented below.  
 The removal volumes include water purged during well development.

Well (date)	Water Column Thickness (ft)	Calculated Purge Volume (gallons) – 3 Well Volumes	Actual Purge Volume (gallons)
MW-BCK1 (6/14/2012)	3.46	2.3	3.0
MW-BCK2 (6/14/2012)	20.79	10.2	14.0

Field measurements of groundwater stabilization parameters included pH, specific conductance, dissolved oxygen concentrations, oxidation-reduction potential, and temperature. These measurements are presented in Table 5. A disposable bailer was used to remove groundwater from the well during the purging procedures.

#### Sample Collection and Handling Procedures

Soil samples were collected using split-spoon samplers or directly from the auger bucket for borings completed with a hand auger. The selected portion of the sample interval was placed in pre-cleaned, laboratory-prepared sample containers for laboratory chemical analysis. Three soil samples were collected for VOC analysis. An Encore® Sampler was used for collection of soil samples for low-level VOC analysis pursuant to EPA method 5035; the second sample aliquot (approximately 1 gram) was placed in a laboratory-prepared container with a methanol preservative; and the third sample aliquot was placed in an 8-ounce glass jar, which was filled to the top to minimize any head space.

Groundwater samples were collected with disposable bailers and immediately poured directly into clean laboratory supplied sample containers with the exception of samples collected for dissolved analyses. Samples specified for dissolved analyses were filtered in the field using a disposable 0.45 micron filter. A new filter and syringe enclosure were used for each sample. All samples were immediately placed into an ice chest with ice. The samples were maintained in the custody of the sampler until the chain-of-custody form was completed and the ice chest was sealed for shipment to the laboratory.

### Equipment Calibration

Soil vapor screening was conducted using a MiniRae 3000 portable VOC monitor. The instrument was calibrated at the beginning of each work day to a concentration of 100 ppm isobutylene.

The instruments used to measured groundwater stabilization parameters included a YSI 550A dissolved oxygen probe and an Ultrameter 6P made by the Myron L Company. The calibration solutions used at the beginning of each day are as follows:

- 4.0 pH solution;
- 7.0 pH solution;
- 10.0 pH solution;
- 1.413 mS/cm conductivity solution; and
- 220 for ORP.

There were no field conditions encountered during the sampling event that affected procedural or sample testing results.

### Management of Investigation Derived Waste

The decontamination water from the drilling equipment was collected on a mobile decon trailer and was subsequently placed in open top 55-gallon drums, which were sealed at the end of each work day. The decontamination water generated from sampling equipment was collected in buckets and placed in open top 55-gallon drums, which were sealed at the end of each work day. Purge water was also collected in a 55-gallon drum. The decon and purge water was disposed in the Refinery's wastewater treatment system up-stream of the API Separator. Soil cuttings were also placed into open top 55-gallon drums and were sealed when not in use. Each drum of soils was labeled and temporarily stored in a concrete curbed area pending waste characterization.

# **Appendix D**

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## **Boring Logs**



# LOG OF BORING

**Client:** Western Refining Southwest, Inc.  
**Site:** Background Investigation, Bloomfield Refinery  
**Job No.:** UEC01318 - Bloomfield, NM  
**Geologist:** Tracy Payne  
**Driller:** RPS  
**Drilling Rig:** NA  
**Drilling Method:** Hand Auger  
**Sampling Method:** Auger Bucket  
**Comments:** N 36°41.519' W 107°58.151'

**Total Depth:** 2' bgl  
**Ground Water:** Not Encountered  
**Elev., TOC (ft. msl):** --  
**Elev., PAD (ft. msl):** --  
**Elev., GL (ft. msl):** 5606.110  
**Site Coordinates:**  
 N 2071217.062      E 2683278.259

**Boring No.:** BK-1  
**Start Date:** 1/27/2012 1330  
**Finish Date:** 1/27/2012 1345

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Depth (ft.)
	Sample Depth	Time	Sample Type/ Container/No.	Saturation	Organic Vapor (ppm)	USCS Class			
0								Ground Surface	0
0-0.5'	1330	G/4oz/ 2J		0.0 46°F		100	<b>Silt (ML)</b> Very fine grain, loose to compact, damp, brown to light brown, no odor	0	
1.5-2'	1334	G/4oz/ 2J		0.0 46°F				2	
Total Depth = 2' BGL									2
4								4	
6								6	
8								8	
10								10	
12								12	
14								14	
16								16	



# LOG OF BORING

**Client:** Western Refining Southwest, Inc.  
**Site:** Background Investigation, Bloomfield Refinery  
**Job No.:** UEC01318 - Bloomfield, NM  
**Geologist:** Tracy Payne  
**Driller:** RPS  
**Drilling Rig:** NA  
**Drilling Method:** Hand Auger  
**Sampling Method:** Auger Bucket  
**Comments:** N 36°41.507' W 107°58.130'

**Total Depth:** 2' bgl  
**Ground Water:** Not Encountered  
**Elev., TOC (ft. msl):** --  
**Elev., PAD (ft. msl):** --  
**Elev., GL (ft. msl):** 5607.917  
**Site Coordinates:**  
 N 2071150.441      E 2683367.214

**Boring No.:** BK-2  
**Start Date:** 1/27/2012 1400  
**Finish Date:** 1/27/2012 1415

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Depth (ft.)
	Sample Depth	Time	Sample Type/ Container/No.	Saturation	Organic Vapor (ppm)	USCS Class			
0	0-0.5'	1405	G/4oz 2J		0.0 46°F		100	Ground Surface	0
2	1.5-2'	1410	G/4oz 2J		0.0 46°F				<b>Silt (ML)</b> Very fine grain, loose to compact, damp, brown to light brown, no odor
Total Depth = 2' BGL									



# LOG OF BORING

**Client:** Western Refining Southwest, Inc.  
**Site:** Background Investigation, Bloomfield Refinery  
**Job No.:** UEC01318 - Bloomfield, NM  
**Geologist:** Tracy Payne  
**Driller:** RPS  
**Drilling Rig:** NA  
**Drilling Method:** Hand Auger  
**Sampling Method:** Auger Bucket  
**Comments:** N 36°41.486' W 107°58.097'

**Total Depth:** 2' bgl  
**Ground Water:** Not Encountered  
**Elev., TOC (ft. msl):** --  
**Elev., PAD (ft. msl):** --  
**Elev., GL (ft. msl):** 5612.432  
**Site Coordinates:**  
 N 2071015.801      E 2683527.543

**Boring No.:** BK-3  
**Start Date:** 1/27/2012 1420  
**Finish Date:** 1/27/2012 1435

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Depth (ft.)
	Sample Depth	Time	Sample Type/ Container/No.	Saturation	Organic Vapor (ppm)	USCS Class			
0	0-0.5'	1430	G/4oz 2J		0.0 46°F		100	Ground Surface	0
2	1.5-2'	1435	G/4oz 2J		0.0 46°F				<b>Silt (ML)</b> Very fine grain, loose to compact, damp, brown to light brown, no odor
Total Depth = 2' BGL									



# LOG OF BORING

**Client:** Western Refining Southwest, Inc.  
**Site:** Background Investigation, Bloomfield Refinery  
**Job No.:** UEC01318 - Bloomfield, NM  
**Geologist:** Tracy Payne  
**Driller:** RPS  
**Drilling Rig:** NA  
**Drilling Method:** Hand Auger  
**Sampling Method:** Auger Bucket  
**Comments:** N 36°41.478' W 107°58.079'

**Total Depth:** 2' bgl  
**Ground Water:** Not Encountered  
**Elev., TOC (ft. msl):** --  
**Elev., PAD (ft. msl):** --  
**Elev., GL (ft. msl):** 5614.922  
**Site Coordinates:**  
 N 2070966.402      E 2683615.628

**Boring No.:** BK-4  
**Start Date:** 1/27/2012 1440  
**Finish Date:** 1/27/2012 1450

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Depth (ft.)
	Sample Depth	Time	Sample Type/ Container/No.	Saturation	Organic Vapor (ppm)	USCS Class			
0	0-0.5'	1440	G/4oz 2J		0.0 46°F	100	Ground Surface	0	
2	1.5-2'	1445	G/4oz 2J		0.0 46°F		Clayey Silt (ML) Very fine grain, compact, damp, brown, no odor	2	
Total Depth = 2' BGL									



# LOG OF BORING

**Client:** Western Refining Southwest, Inc.  
**Site:** Background Investigation, Bloomfield Refinery  
**Job No.:** UEC01318 - Bloomfield, NM  
**Geologist:** Tracy Payne  
**Driller:** RPS  
**Drilling Rig:** NA  
**Drilling Method:** Hand Auger  
**Sampling Method:** Auger Bucket  
**Comments:** N 36°41.456' W 107°58.099'

**Total Depth:** 2' bgl  
**Ground Water:** Not Encountered  
**Elev., TOC (ft. msl):** --  
**Elev., PAD (ft. msl):** --  
**Elev., GL (ft. msl):** 5617.175  
**Site Coordinates:**  
 N 2070842.812      E 2683524.437

**Boring No.:** BK-5  
**Start Date:** 1/27/2012 1455  
**Finish Date:** 1/27/2012 1510

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Depth (ft.)
	Sample Depth	Time	Sample Type/ Container/No.	Saturation	Organic Vapor (ppm)	USCS Class			
0	0-0.5'	1500	G/4oz 2J		0.0 46°F		100	Ground Surface	0
2	1.5-2'	1505	G/4oz 2J		0.0 46°F			Total Depth = 2' BGL	2
4									4
6								6	
8								8	
10								10	
12								12	
14								14	
16								16	



# LOG OF BORING

**Client:** Western Refining Southwest, Inc.  
**Site:** Background Investigation, Bloomfield Refinery  
**Job No.:** UEC01318 - Bloomfield, NM  
**Geologist:** Tracy Payne  
**Driller:** RPS  
**Drilling Rig:** NA  
**Drilling Method:** Hand Auger  
**Sampling Method:** Auger Bucket  
**Comments:** N 36°41.466' W 107°58.120'

**Total Depth:** 2' bgl  
**Ground Water:** Not Encountered  
**Elev., TOC (ft. msl):** --  
**Elev., PAD (ft. msl):** --  
**Elev., GL (ft. msl):** 5614.640  
**Site Coordinates:**  
 N 2070912.500      E 2683421.432

**Boring No.:** BK-6  
**Start Date:** 1/27/2012 1515  
**Finish Date:** 1/27/2012 1525

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Depth (ft.)
	Sample Depth	Time	Sample Type/ Container/No.	Saturation	Organic Vapor (ppm)	USCS Class			
0	0-0.5'	1515	G/4oz 2J		0.0 46°F		100	Ground Surface	0
2	1.5-2'	1520	G/4oz 2J		0.0 46°F			Total Depth = 2' BGL	2
4									4
6								6	
8								8	
10								10	
12								12	
14								14	
16								16	



# LOG OF BORING

**Client:** Western Refining Southwest, Inc.  
**Site:** Background Investigation, Bloomfield Refinery  
**Job No.:** UEC01318 - Bloomfield, NM  
**Geologist:** Tracy Payne  
**Driller:** RPS  
**Drilling Rig:** NA  
**Drilling Method:** Hand Auger  
**Sampling Method:** Auger Bucket  
**Comments:** N 36°41.480' W 107°58.143'

**Total Depth:** 2' bgl  
**Ground Water:** Not Encountered  
**Elev., TOC (ft. msl):** --  
**Elev., PAD (ft. msl):** --  
**Elev., GL (ft. msl):** 5611.983  
**Site Coordinates:**  
 N 2070988.248      E 2683308.515

**Boring No.:** BK-7  
**Start Date:** 1/27/2012 1525  
**Finish Date:** 1/27/2012 1540

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Depth (ft.)
	Sample Depth	Time	Sample Type/ Container/No.	Saturation	Organic Vapor (ppm)	USCS Class			
0	0-0.5' & Dup	1530	G/4oz 4J		0.0 46°F		100	Ground Surface	0
2	1.5-2'	1535	G/4oz 2J		0.0 46°F				Silt (ML) Very fine grain, loose, damp, brown to light brown, no odor
4								Total Depth = 2' BGL	4
6									6
8									8
10									10
12									12
14									14
16									16



# LOG OF BORING

**Client:** Western Refining Southwest, Inc.  
**Site:** Background Investigation, Bloomfield Refinery  
**Job No.:** UEC01318 - Bloomfield, NM  
**Geologist:** Tracy Payne  
**Driller:** RPS  
**Drilling Rig:** NA  
**Drilling Method:** Hand Auger  
**Sampling Method:** Auger Bucket  
**Comments:** N 36°41.493' W 107°58.164'

**Total Depth:** 2' bgl  
**Ground Water:** Not Encountered  
**Elev., TOC (ft. msl):** --  
**Elev., PAD (ft. msl):** --  
**Elev., GL (ft. msl):** 5606.292  
**Site Coordinates:**  
 N 2071062.706      E 2683207.278

**Boring No.:** BK-8  
**Start Date:** 1/27/2012 1550  
**Finish Date:** 1/27/2012 1600

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Depth (ft.)
	Sample Depth	Time	Sample Type/ Container/No.	Saturation	Organic Vapor (ppm)	USCS Class			
0	0-0.5'	1550	G/4oz 2J		0.0 46°F		100	Ground Surface	0
2	1.5-2'	1555	G/4oz 2J		0.0 46°F				<b>Silt (ML)</b> Very fine grain, loose, damp, brown, becomes calcareous at 0.5' bgl and color becomes grayish brown
Total Depth = 2' BGL									



# WELL CONSTRUCTION

**Client:** Western Refining Southwest, Inc.  
**Site:** Background Investigation, Bloomfield Refinery  
**Job No.:** UEC01318 - Bloomfield, NM  
**Geologist:** Tracy Payne  
**Driller:** Enviro-Drill, Inc.  
**Drilling Rig:** CME 75  
**Drilling Method:** Hollow Stem Augers  
**Sampling Method:** Split Spoon  
**Comments:** N 36°41.873' W 107°57.845'

**Total Depth:** 60' bgl  
**Ground Water:** Not Encountered  
**Elev., TOC (ft. msl):** 5517.800  
**Elev., PAD (ft. msl):** 5516.522  
**Elev., GL (ft. msl):** 5516.131  
**Site Coordinates:**  
**N** 2073370.61 **E** 2684757.931

**Well No.:** BK-10 (MW-BCK2)  
**Start Date:** 2/7/2012 1740  
**Finish Date:** 2/13/2012 1400

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
-2								Ground Surface	
0					0.0 33°F		100	<b>Silt (ML)</b> Very fine grain, loose, dry, brown, no odor	
2					0.0 33°F		90	<b>Silt (ML)</b> Similar to above	
4					0.0 33°F		80	<b>Silt (ML)</b> Similar to above, gravel at base	
6	5-6' & Dup		0753G/4oz/ 4J		0.0 33°F		10	<b>Sandy Gravel (GW)</b> Fine gravel sand in 1/2" to >3" size gravel, damp, gray, no odor	
8					0.0 33°F		30	<b>Sandy Gravel (GW)</b> Similar to above	
10							-	No Recovery	
12					0.0 33°F		95	<b>Silt/Sand/Clay (CL)</b> Very fine grain, compact to dense, dry/crumby, light gray/tan	
14								<b>Silty Clay (CL)</b> Similar to above, gray, no odor, very dense	



# WELL CONSTRUCTION

**Client:** Western Refining Southwest, Inc.  
**Site:** Background Investigation, Bloomfield Refinery  
**Job No.:** UEC01318 - Bloomfield, NM  
**Geologist:** Tracy Payne  
**Driller:** Enviro-Drill, Inc.  
**Drilling Rig:** CME 75  
**Drilling Method:** Hollow Stem Augers  
**Sampling Method:** Split Spoon  
**Comments:** N 36°41.873' W 107°57.845'

**Total Depth:** 60' bgl  
**Ground Water:** Not Encountered  
**Elev., TOC (ft. msl):** 5517.800  
**Elev., PAD (ft. msl):** 5516.522  
**Elev., GL (ft. msl):** 5516.131  
**Site Coordinates:**  
**N** 2073370.61 **E** 2684757.931

**Well No.:** BK-10 (MW-BCK2)  
**Start Date:** 2/7/2012 1740  
**Finish Date:** 2/13/2012 1400

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
16					0.0 33°F		80		
17					0.0 33°F		80	<b>Silty Clay (CL)</b> Similar to above, gray, very dense, calcite crystals present	
18					0.0 33°F		60	<b>Clayey Silt (ML)</b> Very low plasticity, firm, dry, grayish brown, no odor	
19					0.0 33°F		80	<b>Clayey Silt (ML)</b> Similar to above, dry, firm	
20					0.0 33°F		80	<b>Silty Clay (CL)</b> Low plasticity, very stiff/compact, dry, gray, no odor, calcite crystals	
21					0.0 35°F		80	<b>Silty Clay (CL)</b> Similar to above	
22					0.0 35°F		70	<b>Silty Sand/Sandstone (SP/SS)</b> Very fine grain, compact to cemented, damp, greenish gray, no odor	
23					0.0 39°F		50	<b>Silty Sand/Sandstone (SP/SS)</b> Similar to above, no odor	
24					0.0 41°F		50	<b>Silty Sand/Sandstone (SP/SS)</b> Similar to above, cemented, no odor, gray	
25									



# WELL CONSTRUCTION

**Client:** Western Refining Southwest, Inc.  
**Site:** Background Investigation, Bloomfield Refinery  
**Job No.:** UEC01318 - Bloomfield, NM  
**Geologist:** Tracy Payne  
**Driller:** Enviro-Drill, Inc.  
**Drilling Rig:** CME 75  
**Drilling Method:** Hollow Stem Augers  
**Sampling Method:** Split Spoon  
**Comments:** N 36°41.873' W 107°57.845'

**Total Depth:** 60' bgl  
**Ground Water:** Not Encountered  
**Elev., TOC (ft. msl):** 5517.800  
**Elev., PAD (ft. msl):** 5516.522  
**Elev., GL (ft. msl):** 5516.131  
**Site Coordinates:**  
**N** 2073370.61 **E** 2684757.931

**Well No.:** BK-10 (MW-BCK2)  
**Start Date:** 2/7/2012 1740  
**Finish Date:** 2/13/2012 1400

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
33					0.0 41°F		80	<b>Clayey Silt (ML)</b> Very low plasticity, firm, slightly cemented, dry, gray, no odor	<p>           2" Sch. 40 PVC w/Threaded Joints            2" Sch. 40 PVC Slotted 0.01" Screen w/Threaded Joints            Bentonite Pellets            Cement/Bentonite Grout         </p>
35					0.0 43°F		80	<b>Clayey Silt (ML)</b> Similar to above	
37					0.0 41°F		50	<b>Clayey Silt (ML)</b> Similar to above	
39					0.0 43°F		50	<b>Clayey Silt (ML)</b> Similar to above, trace sand	
41	40-42'		1043G/4oz/3J		0.0 43°F		50	<b>Clayey Silt (ML)</b> Similar to above, trace sand, compact to cemented	
43					0.0 47°F		50	<b>Clayey Silt/Sand (ML/SC)</b> Low plasticity, firm, damp, gray, no odor, core saturated outside, poorly cemented	
45					0.0 47°F		25	<b>Clayey Silt/Sand (ML/SC)</b> Similar to above	
47					0.0 47°F		75	<b>Silty Sand (SM)</b> Fine grain, compact to poorly cemented, damp, greenish gray, no odor	
49					0.0		50	<b>Silty Sand (SM)</b> Similar to above	



# WELL CONSTRUCTION

**Client:** Western Refining Southwest, Inc.  
**Site:** Background Investigation, Bloomfield Refinery  
**Job No.:** UEC01318 - Bloomfield, NM  
**Geologist:** Tracy Payne  
**Driller:** Enviro-Drill, Inc.  
**Drilling Rig:** CME 75  
**Drilling Method:** Hollow Stem Augers  
**Sampling Method:** Split Spoon  
**Comments:** N 36°41.873' W 107°57.845'

**Total Depth:** 60' bgl  
**Ground Water:** Not Encountered  
**Elev., TOC (ft. msl):** 5517.800  
**Elev., PAD (ft. msl):** 5516.522  
**Elev., GL (ft. msl):** 5516.131  
**Site Coordinates:**  
**N** 2073370.61 **E** 2684757.931

**Well No.:** BK-10 (MW-BCK2)  
**Start Date:** 2/7/2012 1740  
**Finish Date:** 2/13/2012 1400

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
51					47°F 0.0		50	<b>Silty Sand (SM)</b> Similar to above, fine grain, compact to poorly cemented, damp, greenish gray, no odor	<p>2" Sch. 40 PVC Slotted 0.01" Screen w/Threaded Joints</p> <p>8" Well Sump</p> <p>10/20 Sieve Sand Filter Pack</p> <p>60'</p>
53					47°F 0.0		50	<b>Silty Sand (SM)</b> Similar to above	
55					49°F 0.0		60	<b>Silty Sand (SM)</b> Similar to above, trace clayey sand	
57					49°F 0.0		60	<b>Silty Sand (SM)</b> Similar to above, trace clayey sand	
59					49°F 0.0		60	<b>Silty Sand (SM)</b> Similar to above	
61								Total Depth = 60' BGL	

**Client:** Western Refining Southwest, Inc.

**Site:** Background Investigation, Bloomfield Refinery

**Job No.:** UEC01318 - Bloomfield, NM

**Geologist:** Tracy Payne

**Driller:** Enviro-Drill, Inc.

**Drilling Rig:** CME 75

**Drilling Method:** Hollow Stem Augers

**Sampling Method:** Split Spoon

**Comments:**

**Total Depth:** 79' bgl

**Ground Water:** Saturated @ 73.5' bgl

**Elev., TOC (ft. msl):** 5620.140

**Elev., PAD (ft. msl):** 5617.952

**Elev., GL (ft. msl):** 5617.508

**Site Coordinates:**

**N 2070898.1 E 2683704.928**

**Well No.:** BK-9 (MW-BCK1)

**Start Date:** 1/24/2012 1100

**Finish Date:** 2/1/2012 1425

Depth (ft.)	Sampling						Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class		
-2								
0							Ground Surface	
2					0.0	SM	<b>Silty Sand (SM)</b> Very fine grain, compact, brown, moist to damp, no odor	<p>Aluminum Protective Cover Steel Reinforced Concrete Pad - 4'x4'x6" Cement/Bentonite Grout 2" Sch. 40 PVC w/Threaded Joints 8" Diameter Borehole</p>
4					0.0	SM	<b>Silty Sand (SM)</b> Similar to above, light brown to tan	
6	5-5.5'	1125	G/4oz/3J		0.0	SM	<b>Silty Sand (SM)</b> Similar to above	
8					0.0	SP	<b>Sand (SP)</b> Fine grain, loose, damp, brown, no odor	
					0.0	CL	<b>Sandy Clay (CL)</b> Moderate plasticity, firm, damp, gray, fine grain sand in partings, no odor, calcareous	
					0.0	SP	<b>Sand (SP)</b> Fine grain, loose, damp, light brown, no odor	
					0.0	SP	<b>Sand (SP)</b> Similar to above	
					0.0	SP	<b>Sand (SP)</b> Similar to above	
					0.0	SP	<b>Sand (SP)</b> Similar to above	
					0.0	SP	<b>Sand (SP)</b> Similar to above	



# WELL CONSTRUCTION

**Client:** Western Refining Southwest, Inc.

**Site:** Background Investigation, Bloomfield Refinery

**Job No.:** UEC01318 - Bloomfield, NM

**Geologist:** Tracy Payne

**Driller:** Enviro-Drill, Inc.

**Drilling Rig:** CME 75

**Drilling Method:** Hollow Stem Augers

**Sampling Method:** Split Spoon

**Comments:** !

**Total Depth:** 79' bgl

**Ground Water:** Saturated @ 73.5' bgl

**Elev., TOC (ft. msl):** 5620.140

**Elev., PAD (ft. msl):** 5617.952

**Elev., GL (ft. msl):** 5617.508

**Site Coordinates:**

**N 2070898.1 E 2683704.928**

**Well No.:** BK-9 (MW-BCK1)

**Start Date:** 1/24/2012 1100

**Finish Date:** 2/1/2012 1425

Depth (ft.)	Sampling						Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class		
16					0.0 38°F		90	<p>2" Sch. 40 PVC w/Threaded Joints</p> <p>Cement/Bentonite Grout</p>
18					0.0 41°F		90	
20					0.0 41°F		80	
22					0.0 41°F		90	
24					0.0 45°F		90	
26					0.0 45°F		90	
28					0.0 50°F		90	
30					0.0 50°F		90	
32					0.0 50°F		90	



# WELL CONSTRUCTION

**Client:** Western Refining Southwest, Inc.

**Site:** Background Investigation, Bloomfield Refinery

**Job No.:** UEC01318 - Bloomfield, NM

**Geologist:** Tracy Payne

**Driller:** Enviro-Drill, Inc.

**Drilling Rig:** CME 75

**Drilling Method:** Hollow Stem Augers

**Sampling Method:** Split Spoon

**Comments:**

**Total Depth:** 79' bgl

**Ground Water:** Saturated @ 73.5' bgl

**Elev., TOC (ft. msl):** 5620.140

**Elev., PAD (ft. msl):** 5617.952

**Elev., GL (ft. msl):** 5617.508

**Site Coordinates:**

**N 2070898.1 E 2683704.928**

**Well No.:** BK-9 (MW-BCK1)

**Start Date:** 1/24/2012 1100

**Finish Date:** 2/1/2012 1425

Depth (ft.)	Sampling						Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)	USCS Class			
33					0.0 53°F		90	<b>Clayey Silt/Silt (ML)</b> Similar to above, clay content decreases with depth, light brown	
35					0.0 53°F		70	<b>Silty Sand (SM)</b> Very fine grain, loose, brown, damp	
37					0.0 53°F		90	<b>Sand (SP)</b> Very fine to medium grained, subrounded, loose to compact, brown to gray, no odor, damp	
39					0.0 53°F		80	<b>Silty Sand (SM)</b> Very fine grain, loose, brown, damp, no odor	
41					0.0 54°F		90	<b>Silty Sand (SM)</b> Similar to above	
43					0.0 51°F		90	<b>Silty Sand (SM)</b> Similar to above	
45					0.0 46°F		90	<b>Silty Sand (SM)</b> Similar to above	
47					0.0 46°F		90	<b>Silty Sand (SM)</b> Similar to above	
49					0.0		90	<b>Silty Sand (SM)</b> Similar to above	



# WELL CONSTRUCTION

**Client:** Western Refining Southwest, Inc.

**Site:** Background Investigation, Bloomfield Refinery

**Job No.:** UEC01318 - Bloomfield, NM

**Geologist:** Tracy Payne

**Driller:** Enviro-Drill, Inc.

**Drilling Rig:** CME 75

**Drilling Method:** Hollow Stem Augers

**Sampling Method:** Split Spoon

**Comments:**

**Total Depth:** 79' bgl

**Ground Water:** Saturated @ 73.5' bgl

**Elev., TOC (ft. msl):** 5620.140

**Elev., PAD (ft. msl):** 5617.952

**Elev., GL (ft. msl):** 5617.508

**Site Coordinates:**

**N 2070898.1 E 2683704.928**

**Well No.:** BK-9 (MW-BCK1)

**Start Date:** 1/24/2012 1100

**Finish Date:** 2/1/2012 1425

Depth (ft.)	Sampling					Recovery (%)	Sample Description	Completion Results
	Sample Depth	Time	Sample Type/Container/No	Saturation	Organic Vapor (ppm)			
51					0.0	70	<b>Silty Sand (SM)</b> Very fine grain, loose, brown, damp, no odor, trace fine to medium grain subrounded sand	
53					0.0	70	<b>Silty Sand (SM)</b> Similar to above	
55	54-56'	1500	G/4oz 3J		0.0	95	<b>Clay (CH)</b> High plasticity, stiff, damp, dark brown	
57					0.0	90	<b>Clay (CH)</b> Similar to above	
59					0.0	70	<b>Clay/Gravel (CH/GW)</b> Refusal with split spoon, gravel chips in spoon	
61					0.0	10	<b>Gravel (GW)</b> Gravel chips in spoon	
61					0.0	10	<b>Gravel (GW)</b> Split spoon from 62-62.5' bgl	
63					0.0	10	<b>Gravel (GW)</b> Split spoon from 64-64.5' bgl	
65					0.0	10	<b>Gravel (GW)</b> Split spoon from 66.0-66.5' bgl	
					0.0			



# WELL CONSTRUCTION

**Client:** Western Refining Southwest, Inc.

**Site:** Background Investigation, Bloomfield Refinery

**Job No.:** UEC01318 - Bloomfield, NM

**Geologist:** Tracy Payne

**Driller:** Enviro-Drill, Inc.

**Drilling Rig:** CME 75

**Drilling Method:** Hollow Stem Augers

**Sampling Method:** Split Spoon

**Comments:**

**Total Depth:** 79' bgl

**Ground Water:** Saturated @ 73.5' bgl

**Elev., TOC (ft. msl):** 5620.140

**Elev., PAD (ft. msl):** 5617.952

**Elev., GL (ft. msl):** 5617.508

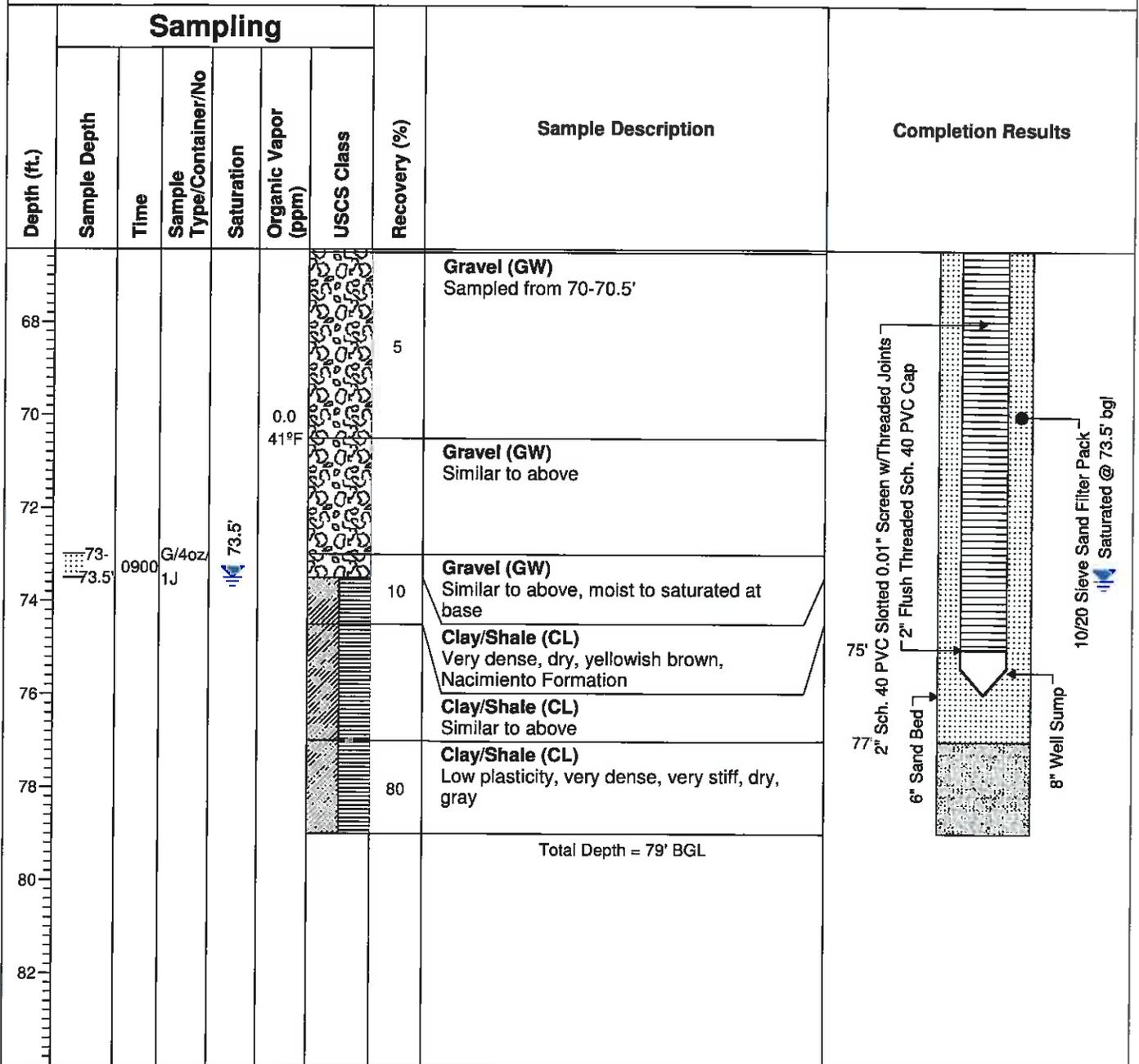
**Site Coordinates:**

**N 2070898.1 E 2683704.928**

**Well No.:** BK-9 (MW-BCK1)

**Start Date:** 1/24/2012 1100

**Finish Date:** 2/1/2012 1425



# **Appendix E**

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## **Analytical Data Reports**



Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)

April 13, 2012

Kelly Robinson

Western Refining Southwest, Inc.

#50 CR 4990

Bloomfield, NM 87413

TEL: (505) 632-4135

FAX (505) 632-3911

RE: RCRA Background Investigation

OrderNo.: 1201809

Dear Kelly Robinson:

Hall Environmental Analysis Laboratory received 3 sample(s) on 1/27/2012 for the analyses presented in the following report.

This report is a revised report and it replaces the original report issued February 24, 2012.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. All samples are reported as received unless otherwise indicated.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman", is written in a cursive style.

Andy Freeman

Laboratory Manager

4901 Hawkins NE

Albuquerque, NM 87109

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201809

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-9 (5-5.5')

**Project:** RCRA Background Investigation

**Collection Date:** 1/24/2012 11:25:00 AM

**Lab ID:** 1201809-001

**Matrix:** SOIL

**Received Date:** 1/27/2012 10:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015B: DIESEL RANGE ORGANICS</b>						Analyst: <b>JMP</b>
Diesel Range Organics (DRO)	ND	9.7		mg/Kg	1	1/29/2012 10:34:45 PM
Motor Oil Range Organics (MRO)	ND	48		mg/Kg	1	1/29/2012 10:34:45 PM
Surr: DNOP	85.5	77.4-131		%REC	1	1/29/2012 10:34:45 PM
<b>EPA METHOD 8015B: GASOLINE RANGE</b>						Analyst: <b>RAA</b>
Gasoline Range Organics (GRO)	ND	4.9		mg/Kg	1	1/30/2012 2:23:47 PM
Surr: BFB	96.4	69.7-121		%REC	1	1/30/2012 2:23:47 PM
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	3.7	0.30		mg/Kg	1	2/1/2012 6:28:23 AM
Chloride	260	30		mg/Kg	20	2/1/2012 7:20:37 AM
Sulfate	330	30		mg/Kg	20	2/1/2012 7:20:37 AM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>JLF</b>
Mercury	0.0063	0.033	J	mg/Kg	1	1/30/2012 3:22:38 PM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	6,600	600		mg/Kg	200	2/8/2012 6:45:33 AM
Antimony	ND	2.5		mg/Kg	1	2/7/2012 9:24:54 AM
Arsenic	1.5	2.5	J	mg/Kg	1	2/7/2012 9:24:54 AM
Barium	250	1.0		mg/Kg	10	2/8/2012 10:20:06 AM
Beryllium	0.24	0.15		mg/Kg	1	2/7/2012 9:24:54 AM
Boron	4.1	2.0		mg/Kg	1	2/7/2012 9:24:54 AM
Cadmium	ND	0.10		mg/Kg	1	2/7/2012 9:24:54 AM
Chromium	3.5	0.30		mg/Kg	1	2/7/2012 9:24:54 AM
Cobalt	2.1	0.30		mg/Kg	1	2/7/2012 9:24:54 AM
Copper	2.3	0.30		mg/Kg	1	2/7/2012 9:24:54 AM
Iron	6,500	200		mg/Kg	200	2/8/2012 6:45:33 AM
Lead	1.7	0.25		mg/Kg	1	2/7/2012 9:24:54 AM
Manganese	160	1.0		mg/Kg	10	2/8/2012 10:20:06 AM
Molybdenum	0.42	0.40		mg/Kg	1	2/7/2012 9:24:54 AM
Nickel	3.0	0.50		mg/Kg	1	2/7/2012 9:24:54 AM
Selenium	ND	2.5		mg/Kg	1	2/7/2012 9:24:54 AM
Silver	ND	0.25		mg/Kg	1	2/7/2012 9:24:54 AM
Thallium	ND	2.5		mg/Kg	1	2/7/2012 9:24:54 AM
Uranium	ND	5.0		mg/Kg	1	2/7/2012 9:24:54 AM
Vanadium	11	2.5		mg/Kg	1	2/7/2012 9:24:54 AM
Zinc	12	2.5		mg/Kg	1	2/7/2012 9:24:54 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201809

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-9 (54-56')

**Project:** RCRA Background Investigation

**Collection Date:** 1/24/2012 3:00:00 PM

**Lab ID:** 1201809-002

**Matrix:** SOIL

**Received Date:** 1/27/2012 10:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	3.9	0.30		mg/Kg	1	2/1/2012 7:38:02 AM
Chloride	2.5	1.5		mg/Kg	1	2/1/2012 7:38:02 AM
Sulfate	250	30		mg/Kg	20	2/1/2012 7:55:27 AM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>JLF</b>
Mercury	0.0082	0.033	J	mg/Kg	1	1/30/2012 3:27:58 PM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	36,000	3,000		mg/Kg	1000	2/10/2012 6:38:26 AM
Antimony	ND	5.0		mg/Kg	2	2/8/2012 6:47:33 AM
Arsenic	2.7	5.0	J	mg/Kg	2	2/8/2012 6:47:33 AM
Barium	52	0.20		mg/Kg	2	2/8/2012 6:47:33 AM
Beryllium	1.2	0.30		mg/Kg	2	2/8/2012 6:47:33 AM
Boron	3.8	4.0	J	mg/Kg	2	2/8/2012 6:47:33 AM
Cadmium	ND	0.20		mg/Kg	2	2/8/2012 6:47:33 AM
Chromium	13	0.60		mg/Kg	2	2/8/2012 6:47:33 AM
Cobalt	7.4	0.60		mg/Kg	2	2/8/2012 6:47:33 AM
Copper	12	0.60		mg/Kg	2	2/8/2012 6:47:33 AM
Iron	31,000	1,000		mg/Kg	1000	3/18/2012 12:31:30 PM
Lead	3.2	0.50		mg/Kg	2	2/8/2012 6:47:33 AM
Manganese	350	1.0		mg/Kg	10	3/16/2012 8:40:02 AM
Molybdenum	0.96	0.80		mg/Kg	2	2/8/2012 6:47:33 AM
Nickel	8.5	1.0		mg/Kg	2	2/8/2012 6:47:33 AM
Selenium	ND	5.0		mg/Kg	2	2/8/2012 6:47:33 AM
Silver	ND	0.50		mg/Kg	2	2/8/2012 6:47:33 AM
Thallium	ND	5.0		mg/Kg	2	2/8/2012 6:47:33 AM
Uranium	ND	25		mg/Kg	5	2/10/2012 6:36:19 AM
Vanadium	33	5.0		mg/Kg	2	2/8/2012 6:47:33 AM
Zinc	46	5.0		mg/Kg	2	2/8/2012 6:47:33 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201809

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** MeOH Blank

**Project:** RCRA Background Investigation

**Collection Date:**

**Lab ID:** 1201809-003

**Matrix:** MEOH BLAN

**Received Date:** 1/27/2012 10:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 8015B: GASOLINE RANGE</b>						Analyst: RAA
Gasoline Range Organics (GRO)	ND	5.0		mg/Kg	1	1/30/2012 4:24:33 PM
Surr: BFB	82.5	69.7-121		%REC	1	1/30/2012 4:24:33 PM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
E Value above quantitation range  
J Analyte detected below quantitation limits  
R RPD outside accepted recovery limits  
S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
RL Reporting Detection Limit

**CASE NARRATIVE**

February 22, 2012

**Lab Name: Anatek Labs, Inc.** 1282 Alturas Drive, Moscow, ID 83843 [www.anateklabs.com](http://www.anateklabs.com) *FL NELAP E87893, NV ID13-2004-31, WA DOE C126, OR ELAP ID200001, MT 0028, ID, CO, NM*

**Project Tracking No.:** 1201809**Anatek Batch:** 120131031

**Project Summary:** Two (2) soil samples were received on 1/31/2012 for Total Cyanide (EPA 335.4) analysis. All samples were received with the appropriate chain of custody. Samples were received at 1.0C.

<u>Client Sample ID</u>	<u>Anatek Sample ID</u>	<u>Method/Prep Method</u>
1201809-001C BK-9 (5-5.5')	120131031-001	EPA 335.4
1201809-002B BK-9 (54-56')	120131031-002	EPA 335.4

**QA/QC Checks**

<u>Parameters</u>	<u>Yes / No</u>	<u>Exceptions / Deviations</u>
Sample Holding Time Valid?	Y	NA
Surrogate Recoveries Valid?	NA	NA
QC Sample(s) Recoveries Valid?	Y	NA
Method Blank(s) Valid?	Y	NA
Tune(s) Valid?	NA	NA
Internal Standard Responses Valid?	NA	NA
Initial Calibration Curve(s) Valid?	Y	NA
Continuing Calibration(s) Valid?	Y	NA
Comments:	Y	NA

**1. Holding Time Requirements**

No problems encountered.

**2. GC/MS Tune Requirements**

N/A

**3. Calibration Requirements**

No problems encountered.

**4. Surrogate Recovery Requirements**

N/A.

**5. QC Sample (LCS/MS/MSD) Recovery Requirements**

No problems encountered.

**6. Method Blank Requirements**

No problems encountered.

**7. Internal Standard(s) Response Requirements**

N/A

**8. Comments**

None.

**I certify that this data package is in compliance with the terms and conditions of the contract. Release of the data contained in this data package has been authorized by the Laboratory Manager or his designee.**

Approved by:

  
\_\_\_\_\_

# Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com  
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

**Client:** HALL ENVIRONMENTAL ANALYSIS LAB  
**Address:** 4901 HAWKINS NE SUITE D  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

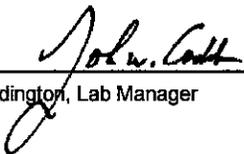
**Batch #:** 120131031  
**Project Name:** 1201809

## Analytical Results Report

<b>Sample Number</b>	120131031-001	<b>Sampling Date</b>	1/24/2012	<b>Date/Time Received</b>	1/31/2012 12:00 PM		
<b>Client Sample ID</b>	1201809-001C / BK-9 (5-5.5)	<b>Sampling Time</b>	11:25 AM				
<b>Matrix</b>	Soil	<b>Sample Location</b>					
<b>Comments</b>							
Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/Kg	0.3	2/7/2012	CRW	EPA 335.4	
%moisture	3.2	Percent		2/8/2012	CRW	%moisture	

<b>Sample Number</b>	120131031-002	<b>Sampling Date</b>	1/24/2012	<b>Date/Time Received</b>	1/31/2012 12:00 PM		
<b>Client Sample ID</b>	1201809-002B / BK-9 (54-56)	<b>Sampling Time</b>	3:00 PM				
<b>Matrix</b>	Soil	<b>Sample Location</b>					
<b>Comments</b>							
Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/Kg	0.3	2/7/2012	CRW	EPA 335.4	
%moisture	15.7	Percent		2/8/2012	CRW	%moisture	

Authorized Signature

  
John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level

ND Not Detected

PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.  
The results reported relate only to the samples indicated.  
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595  
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

# Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com  
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

**Client:** HALL ENVIRONMENTAL ANALYSIS LAB      **Batch #:** 120131031  
**Address:** 4901 HAWKINS NE SUITE D      **Project Name:** 1201809  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

## Analytical Results Report Quality Control Data

### Lab Control Sample

Parameter	LCS Result	Units	LCS Spike	%Rec	AR %Rec	Prep Date	Analysis Date
Cyanide	0.470	mg/kg	0.5	94.0	80-120	2/7/2012	2/7/2012

### Matrix Spike

Sample Number	Parameter	Sample Result	MS Result	Units	MS Spike	%Rec	AR %Rec	Prep Date	Analysis Date
120131031-001	Cyanide	ND	14.2	mg/kg	12.9	110.1	60-140	2/7/2012	2/7/2012

### Matrix Spike Duplicate

Parameter	MSD Result	Units	MSD Spike	%Rec	%RPD	AR %RPD	Prep Date	Analysis Date
Cyanide	13.9	mg/kg	12.9	107.8	2.1	0-25	2/7/2012	2/7/2012

### Method Blank

Parameter	Result	Units	PQL	Prep Date	Analysis Date
Cyanide	ND	mg/Kg	0.3	2/7/2012	2/7/2012

AR      Acceptable Range  
ND      Not Detected  
PQL     Practical Quantitation Limit  
RPD     Relative Percentage Difference

### Comments:

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM:ID00013; OR:ID200001-002; WA:C595  
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

# Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com  
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

## Login Report

**Customer Name:** HALL ENVIRONMENTAL ANALYSIS LAB  
4901 HAWKINS NE SUITE D  
ALBUQUERQUE NM 87109

**Order ID:** 120131031  
**Order Date:** 1/31/2012

**Contact Name:** ANDY FREEMAN

**Project Name:** 1201809

**Comment:**

**Sample #:** 120131031-001 **Customer Sample #:** 1201809-001C / BK-9 (5-5.5)

**Recv'd:**  **Collector:** **Date Collected:** 1/24/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 1/31/2012 12:00:00 P  
**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/10/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/10/2012	<u>Normal (6-10 Days)</u>

**Sample #:** 120131031-002 **Customer Sample #:** 1201809-002B / BK-9 (54-56)

**Recv'd:**  **Collector:** **Date Collected:** 1/24/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 1/31/2012 12:00:00 P  
**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/10/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/10/2012	<u>Normal (6-10 Days)</u>

## SAMPLE CONDITION RECORD

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature inside the cooler?	1.0
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	N/A
Is there a trip blank to accompany VOC samples?	N/A
Labels and chain agree?	Yes

SUB CONTRACTOR: **Anatek Labs** COMPANY: **Anatek Labs, Inc.** PHONE: **(208) 883-2839** FAX: **(208) 882-9246**  
 ADDRESS: **1282 Alburas Dr** ACCOUNT #:  
 CITY, STATE, ZIP: **Moscow, ID 83843** EMAIL:

ITEM	SAMPLE	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	COLLECTION DATE	# CONTAINERS	ANALYTICAL COMMENTS
1	1201809-001C	BK-9 (5-5.5)	4OZGU	Soil	1/24/2012 11:25:00 AM	1	TOTAL CYANIDE
2	1201809-002B	BK-9 (54-56)	4OZGU	Soil	1/24/2012 3:00:00 PM	1	TOTAL CYANIDE
3						0	
4						0	
5						0	
6						0	
7						0	
8						0	
9						0	
10						0	

**SPECIAL INSTRUCTIONS/COMMENTS:**  
 PLEASE PROVIDE LEVEL 4 QA/QC PACKAGE. Please include the blue ice. Thank you!

Requisitioned By: *[Signature]* Date: 1/27/2012 Time: 2:25 PM Received By:  
 Requisitioned By: Date: Time: Received By:  
 Requisitioned By: Date: Time: Received By:

TAT: Standard  RUSH  Next BD  2nd BD  3rd BD

**ANATEK LABS RECEIVING LIST**

RECEIVED INTACT  TEMP: 1.0 °C  
 LABELS & CHAINS AGREE   
 NO HEADSPACE   
 ICE / ICE-PACKS PRESENT: Y  
 CUSTODY SEALS PRESENT: Y  
 PRESERVATIVES: -  
 NUMBER OF CONTAINERS: 2 SHIPPED VIA: E  
 DATE & TIME: 1-31-12 12:00 INSPCTED BY: BT

Temp of samples \_\_\_\_\_  
 Comments: \_\_\_\_\_

FOR LAB USE ONLY  
 RT TRANSMITTAL DESIRED:  FAX  EMAIL  ONLINE   
 Attempt to Cool?  C

hallenvironmental.com Please return all coolers and

# CYANIDE EXTRACTION BENCHSHEET SW 846

Instrument names & IDs: Denver A-160 balance; Alpkem FIA

Date	SAMPLE #	% Solids	Sample Amt (g)	H2O (mL)	Final Volume	Multiplier	Chemist
1/31/12	120125012-1	10.0	10.11	250	250	24.7	CMW
	120126014-1	9.5	10.14			26.0	
	120131027-1	91.8	10.04			27.2	
	-2	92.2	9.98			27.2	
	29-1	88.5	10.03			28.2	
	-2	88.9	10.18			27.6	
	-3	87.7	9.98			28.6	
	-4	90.7	9.99			27.6	
	-5	86.4	10.06			28.8	
	-6	91.2	10.12			27.1	
	-7	96.9	10.07			25.6	
	-8	94.8	10.11			26.1	
2/1/12	120131030-1	96.3	9.98	250	250	26.0	CMW
	-2	96.8	10.04			25.7	
	-3	97.1	10.03			25.5	
	-4	90.7	10.02			27.5	
	-5	92.1	10.03			27.1	
	-6	89.8	10.12			27.5	
	-7	95.1	10.02			26.2	
	-8	91.0	10.00			27.5	
	-9	91.4	10.00			27.4	
	-10	91.1	10.02			27.4	
2/2/12	120131030-11	91.9	10.02	250	250	27.1	CMW
	-12	93.5	10.00			26.7	
	-13	93.4	10.06			26.6	
	-14	93.0	10.02			26.8	
	-15	92.8	10.01			26.9	
	-16	92.4	10.03			27.0	
	-17	97.0	10.19			25.3	
	-18	92.1	10.07			27.0	
	31-1	96.9	10.06			25.7	
	-2	84.3	10.03			27.6	
2/6/12	120101021-1	87.8	10.02	250	250	28.4	CMW
	-2	95.5	10.05			26.0	
	-3	90.6	9.97			27.7	
	-4	93.0	10.04			26.8	
	-5	87.4	10.00			27.0 28.0	
	-6	95.8	10.05			26.0	
	-7	78.2	10.01			31.9	
	-8	96.3	10.03			25.9	
	-9	85.7	9.99			29.2	
	-10	95.6	9.98			26.2	
	120126025-1	67.2	10.01			37.2	
	170202028-1	91.0	10.02			27.4	

**Total Cyanide by Semi-Automated Colorimetry**

**Method: EPA 335.4\SM-4500-CN-E**

**Distillation Bench Sheet**

Weak Acid Dissociable Cyanide by  
SM 4500-CN-I (check WAD column)

Total Cyanide MS/MSD/LCS Soln: M825-01 Exp: 1/4/2013  
Free Cyanide MS/MSD/LCS Soln: M824-05 Exp: 12/28/2012

**Method requirements:** All QC +/- 10%  
**Equipment:** Midi-vap  
**Instrument:** ALPCHEM FIA 3000  
**Absorbance:** 570nm

	Sample ID	Matrix	Preserved	Sample Amount (mL)**	Initial Multiplier*	Final Multiplier	Spike Amount (mL)	WAD? (check if yes)
1	20131031-1	Soil exp	NaOH	50mL	25.7	same		
2	-1ms				↓		hml	
3	-1msd				↓		↓	
4	-lcs				↓			
5	-BL				↓			
6	-2				29.6			
7	30-4				27.5			
8	-5				27.1			
9	-6				27.5			
10	-7			↓	26.2	↓		
11	20131030-8	Soil exp	NaOH	50mL	27.5	same		
12	-9				27.4			
13	-10				27.4			
14	-11				27.1			
15	-12				26.7			
16	-13				26.6			
17	-14				26.8			
18	-15				26.9			
19	-16				27.0			
20	-17		↓	↓	25.3	↓		

\* If soils this calculation is taken from cyanide extraction bench sheet.

\*\* If soils, mLs of extract used for distillation.

**Extraction Reagents: Reagent #:**  
methyl red indicator A041-03  
18 N H<sub>2</sub>SO<sub>4</sub> A043-08  
sulfamic acid R009-12  
0.025N NaOH R014-16  
51% MgCl<sub>2</sub> A043-06

**Analytical Reagents: Reagent #:**  
Barbituric Acid R038-13  
Sodium Phosphate R026-23  
Chloramine-t R048-09  
Pyridine R043-03

Distillation Initials/Date Distilled: CMJ 2/6/12

Analyst Initials/Date Analyzed: OPW 2/7/12

120206FIACNS

CRW 2/8/12

Peak	Cup	Name	Type	Dil	Wt	Area	Calc. (ppm)
1	2	Sync	SYNC		1	5649722	0.999811
2	0	Carryover	CO		1	5578	0.003278
3	0	Carryover	CO		1	-4335	0.001527
B	0	Baseline	RB		1	-1538	0.002021
5	2	Cal 1.00 ppm	C		1	5644961	0.998970
6	2	Cal 1.00 ppm	C		1	5684558	1.005961
7	2	Cal 1.00 ppm	C		1	5671342	1.003628
B	0	Baseline	RB		1	845	0.002442
9	3	Cal 0.80 ppm	C		1	4469971	0.791513
10	3	Cal 0.80 ppm	C		1	4539475	0.803785
11	3	Cal 0.80 ppm	C		1	4521330	0.800581
B	0	Baseline	RB		1	-2089	0.001924
13	4	Cal 0.50 ppm	C		1	2799128	0.496508
14	4	Cal 0.50 ppm	C		1	2829918	0.501945
15	4	Cal 0.50 ppm	C		1	2819781	0.500155
B	0	Baseline	RB		1	-1936	0.001951
17	5	Cal 0.05 ppm	C		1	246194	0.045761
18	5	Cal 0.05 ppm	C		1	249332	0.046315
19	5	Cal 0.05 ppm	C		1	256284	0.047542
B	0	Baseline	RB		1	-1332	0.002058
21	6	Cal 0.01 ppm	C		1	46085	0.010430
22	6	Cal 0.01 ppm	C		1	47002	0.010591
23	6	Cal 0.01 ppm	C		1	43775	0.010022
B	0	Baseline	RB		1	-714	0.002167
25	1	Blank	BLNK		1	-4787	0.001448
26	7	ICV 0.25 ppm	CCV		1	1469100	0.261678
27	1	Blank	BLNK		1	-1123	0.002094
B	0	Baseline	RB		1	-1004	0.002115
29	8	120131031-BL S	U		1	1431	0.002545
30	9	120131031-001	U	25.7	1	4217	0.078057
31	10	120131031-001MS	U	25.7	1	3106466	14.154840
32	11	120131031-001MSD	U	25.7	1	3042568	13.864898
33	12	120131031-LCS	U		1	2647774	0.469785
34	13	120131031-002	U	29.6	1	2538	0.081129
35	14	120131030-004	U	27.5	1	-2146	0.052630
36	15	120131030-005	U	27.1	1	-2489	0.050221
37	16	120131030-006	U	27.5	1	-1456	0.055983
38	17	120131030-007	U	26.2	1	-4790	0.037909
B	0	Baseline	RB		1	-2099	0.001922
40	1	Blank	BLNK		1	28	0.002298
41	4	CCV 0.5 ppm	CCV		1	2774054	0.492081
42	1	Blank	BLNK		1	-632	0.002181
B	0	Read Baseline	RB		1	-819	0.002148
44	18	120131030-008	U	27.5	1	-295	0.061617
45	19	120131030-009	U	27.4	1	11932	0.120543
46	20	120131030-010	U	27.4	1	14931	0.135052
47	21	120131030-011	U	27.1	1	6211	0.091852
48	22	120131030-012	U	26.7	1	-3394	0.045218
49	23	120131030-013	U	26.6	1	-4544	0.039647
50	24	120131030-014	U	26.8	1	-2856	0.047930
51	25	120131030-015	U	26.9	1	-3799	0.043630
52	26	120131030-016	U	27	1	-5851	0.034009
53	27	120131030-017	U	25.3	1	-3846	0.040827
B	0	Baseline	RB		1	-1522	0.002024
55	1	Blank	BLNK		1	-3387	0.001695
56	4	CCV 0.5 ppm	CCV		1	2875216	0.509942
57	1	Blank	BLNK		1	3129	0.002845
B	0	Read Baseline	RB		1	7209	0.003566
59	28	120127027-001 WW	U		1	5418	0.003249
60	29	120127027-001MS	U		1	2857847	0.506876
61	30	120127027-001MSD	U		1	2864381	0.508029
62	31	120127027-002	U	5	1	50381	0.055940
63	32	120127027-005	U	1	1	9078	0.003895
64	33	120202020-001 DW	U		1	831	0.002439
65	34	120202020-001MS	U		1	2933980	0.520318
66	35	120202020-001MSD	U		1	2969286	0.526551

ABT

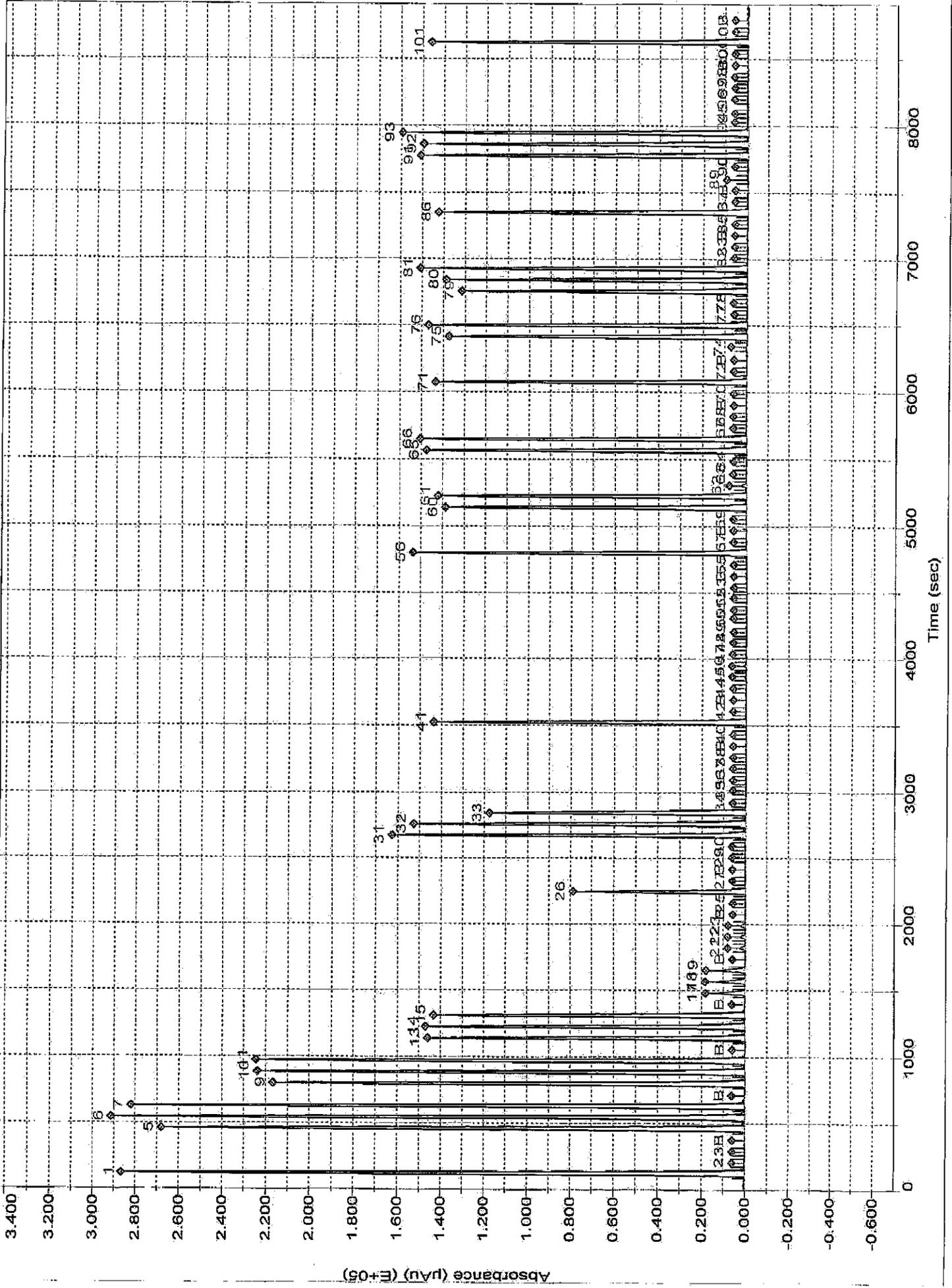
Peak	Cup	Name	Type	Dil	Wt	Area	Calc. (ppm)
7	36	120126041-001	U		1	10276	0.004107
8	37	120126041-002	U		1	9194	0.003916
	0	Baseline	RB		1	1906	0.002629
10	1	Blank	BLNK		1	4062	0.003010
11	4	CCV 0.5 ppm	CCV		1	2861862	0.507585
12	1	Blank	BLNK		1	486	0.002378
	0	Read Baseline	RB		1	-580	0.002190
14	38	120126041-003 RW	U	2	1	12573	0.009025
15	39	120126041-003MS	U	2	1	2821370	1.000871
16	40	120126041-003MSD	U	2	1	2954754	1.047971
17	41	120126025-BL RS	U		1	-6990	0.001059
18	42	120126025-001	U	37.2	1	889	0.091127
19	43	120126025-001MS	U	37.2	1	2653172	17.511463
20	44	120126025-001MSD	U	37.2	1	2806458	18.518251
21	45	120126025-LCS	U		1	3032619	0.537733
22	46	120202028-001	U	27.4	1	-4046	0.043246
23	47	RINSE	U		1	-5244	0.001367
	0	Baseline	RB		1	-1934	0.001951
25	1	Blank	BLNK		1	-4651	0.001471
26	4	CCV 0.5 ppm	CCV		1	2936727	0.520803
27	1	Blank	BLNK		1	-2661	0.001823
	0	Read Baseline	RB		1	-282	0.002243
29	48	120131031-BL	U		1	20842	0.005973
30	49	120131031-001	U	25.7	1	6656	0.089123
31	50	120131031-001MS	U	25.7	1	3144390	14.326928
32	51	120131031-001MSD	U	25.7	1	3054986	13.921247
33	52	120131031-LCS	U		1	3205898	0.568328
34	53		U		1	15323	0.004998
35	54		U		1	12107	0.004430
36	55		U		1	12655	0.004527
37	56		U		1	9435	0.003959
38	57		U		1	5829	0.003322
	0	Baseline	RB		1	-726	0.002165
300	1	Blank	BLNK		1	1683	0.002590
301	4	CCV 0.5 ppm	CCV		1	2958652	0.524674
302	1	Blank	BLNK		1	-3339	0.001703
	0	Read Baseline	RB		1	-3849	0.001613

Peak	Cup	Flags
	2	
	0	
	0	
	0	BL
	2	
	2	
	2	
	0	BL
	3	
10	3	
11	3	
	0	BL
13	4	
14	4	
15	4	
	0	BL
17	5	
18	5	
19	5	OL
	0	BL
21	6	
22	6	
23	6	OL
	0	BL
25	1	
26	7	
27	1	
	0	BL
29	8	

Peak	Cup	Flags
30	9	
31	10	
32	11	
33	12	
34	13	
35	14	
36	15	
37	16	
38	17	
3	0	BL
10	1	
11	4	
12	1	
3	0	BL
14	18	
15	19	
16	20	
17	21	
18	22	
19	23	
30	24	
31	25	
32	26	
33	27	
3	0	BL
35	1	
36	4	
37	1	
3	0	BL
39	28	
50	29	
51	30	
52	31	
53	32	
54	33	
55	34	
56	35	
57	36	
58	37	
3	0	BL
70	1	
71	4	
72	1	
3	0	BL
74	38	
75	39	
76	40	
77	41	
78	42	
79	43	
80	44	
81	45	
82	46	
83	47	
3	0	BL
85	1	
86	4	
87	1	
3	0	BL
89	48	
90	49	
91	50	
92	51	
93	52	
94	53	
95	54	
96	55	
97	56	
98	57	
3	0	BL
100	1	

Peak	Cup	Flags
101	4	
102	1	
B	0	BL

Channel 1: Cyanide



File name: T:\DATA1\FLOW4\2012\EPA335.4\020712CM.RST

Date: February 07, 2012

Operator: CRW

* Name	Conc	Area
* Cal 1.00 ppm	1.000000	5644961.000000
* Cal 1.00 ppm	1.000000	5684557.500000
* Cal 1.00 ppm	1.000000	5671341.500000
* Cal 0.80 ppm	0.800000	4469971.000000
* Cal 0.80 ppm	0.800000	4539475.000000
* Cal 0.80 ppm	0.800000	4521330.000000
* Cal 0.50 ppm	0.500000	2799128.250000
* Cal 0.50 ppm	0.500000	2829918.250000
* Cal 0.50 ppm	0.500000	2819781.250000
* Cal 0.05 ppm	0.050000	246194.078125
* Cal 0.05 ppm	0.050000	249331.515625
* Cal 0.05 ppm	0.050000	256283.828125
* Cal 0.01 ppm	0.010000	46085.363281
* Cal 0.01 ppm	0.010000	47002.277344
* Cal 0.01 ppm	0.010000	43775.347656

Calib Coef:

y=bx+a

a: (intercept) -1.2985e+04

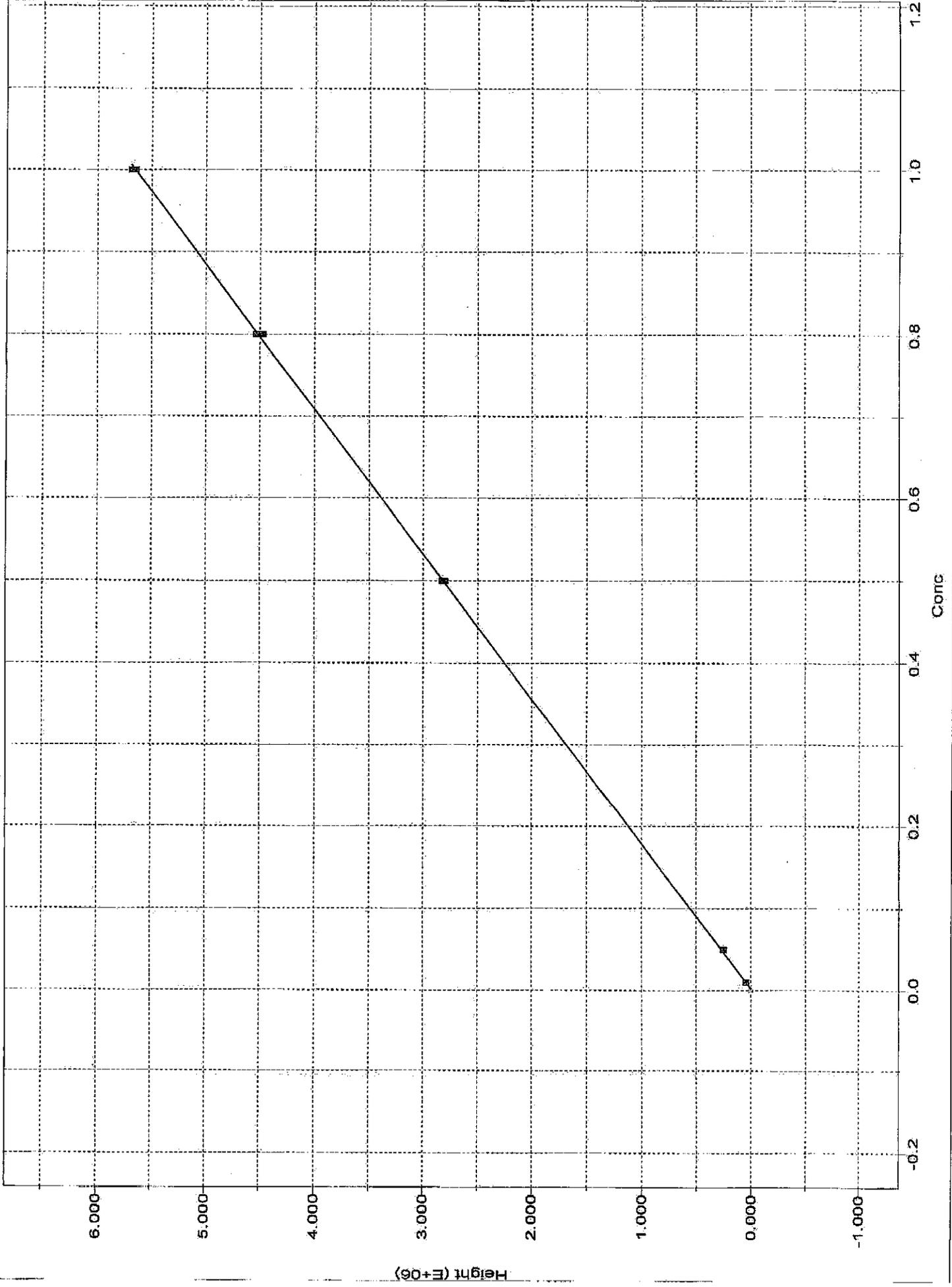
b: 5.6638e+06

Corr Coef: 0.999964

Carryover: 0.0987%

No Drift Peaks

Cyanide: Calibration, Peak 5-103



# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1201809

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID	<b>MB-502</b>	SampType:	<b>MBLK</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>PBS</b>	Batch ID:	<b>502</b>	RunNo:	<b>699</b>					
Prep Date:	<b>1/31/2012</b>	Analysis Date:	<b>1/31/2012</b>	SeqNo:	<b>19902</b>	Units:	<b>mg/Kg</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.30								
Chloride	ND	1.5								
Sulfate	0.46	1.5								J

Sample ID	<b>LCS-502</b>	SampType:	<b>LCS</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>LCSS</b>	Batch ID:	<b>502</b>	RunNo:	<b>699</b>					
Prep Date:	<b>1/31/2012</b>	Analysis Date:	<b>1/31/2012</b>	SeqNo:	<b>19903</b>	Units:	<b>mg/Kg</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	1.6	0.30	1.500	0	104	90	110			
Chloride	14	1.5	15.00	0	94.3	90	110			
Sulfate	29	1.5	30.00	0	97.2	90	110			

Sample ID	<b>1201809-001BMS</b>	SampType:	<b>MS</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>BK-9 (5-5.5')</b>	Batch ID:	<b>502</b>	RunNo:	<b>699</b>					
Prep Date:	<b>1/31/2012</b>	Analysis Date:	<b>2/1/2012</b>	SeqNo:	<b>19949</b>	Units:	<b>mg/Kg</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	4.4	0.30	1.500	3.737	47.5	18.1	130			

Sample ID	<b>1201809-001BMSD</b>	SampType:	<b>MSD</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>BK-9 (5-5.5')</b>	Batch ID:	<b>502</b>	RunNo:	<b>699</b>					
Prep Date:	<b>1/31/2012</b>	Analysis Date:	<b>2/1/2012</b>	SeqNo:	<b>19951</b>	Units:	<b>mg/Kg</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	4.5	0.30	1.500	3.737	51.0	18.1	130	1.19	20	

**Qualifiers:**

\* / X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1201809

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID <b>MB-478</b>	SampType: <b>MBLK</b>		TestCode: <b>EPA Method 8015B: Diesel Range Organics</b>							
Client ID: <b>PBS</b>	Batch ID: <b>478</b>		RunNo: <b>635</b>							
Prep Date: <b>1/28/2012</b>	Analysis Date: <b>1/29/2012</b>		SeqNo: <b>17941</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	10								
Motor Oil Range Organics (MRO)	ND	50								
Surr: DNOP	8.5		10.00		84.6	77.4	131			

Sample ID <b>LCS-478</b>	SampType: <b>LCS</b>		TestCode: <b>EPA Method 8015B: Diesel Range Organics</b>							
Client ID: <b>LCSS</b>	Batch ID: <b>478</b>		RunNo: <b>635</b>							
Prep Date: <b>1/28/2012</b>	Analysis Date: <b>1/29/2012</b>		SeqNo: <b>17942</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	56	10	50.00	0	113	62.7	139			
Surr: DNOP	4.5		5.000		90.4	77.4	131			

**Qualifiers:**

\*X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1201809

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID <b>MB-476</b>	SampType: <b>MBLK</b>		TestCode: <b>EPA Method 8015B: Gasoline Range</b>							
Client ID: <b>PBS</b>	Batch ID: <b>476</b>		RunNo: <b>661</b>							
Prep Date: <b>1/27/2012</b>	Analysis Date: <b>1/30/2012</b>		SeqNo: <b>18848</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	ND	5.0								
Surr: BFB	880		1,000		88.2	69.7	121			

Sample ID <b>LCS-476</b>	SampType: <b>LCS</b>		TestCode: <b>EPA Method 8015B: Gasoline Range</b>							
Client ID: <b>LCSS</b>	Batch ID: <b>476</b>		RunNo: <b>661</b>							
Prep Date: <b>1/27/2012</b>	Analysis Date: <b>1/30/2012</b>		SeqNo: <b>18852</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	32	5.0	25.00	0	126	86.4	132			
Surr: BFB	1,000		1,000		102	69.7	121			

Sample ID <b>1201809-001AMS</b>	SampType: <b>MS</b>		TestCode: <b>EPA Method 8015B: Gasoline Range</b>							
Client ID: <b>BK-9 (5-5.5')</b>	Batch ID: <b>476</b>		RunNo: <b>661</b>							
Prep Date: <b>1/27/2012</b>	Analysis Date: <b>1/30/2012</b>		SeqNo: <b>18853</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	31	5.0	24.78	0	127	85.4	147			
Surr: BFB	1,000		991.1		105	69.7	121			

Sample ID <b>1201809-001AMSD</b>	SampType: <b>MSD</b>		TestCode: <b>EPA Method 8015B: Gasoline Range</b>							
Client ID: <b>BK-9 (5-5.5')</b>	Batch ID: <b>476</b>		RunNo: <b>661</b>							
Prep Date: <b>1/27/2012</b>	Analysis Date: <b>1/30/2012</b>		SeqNo: <b>18854</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	31	4.9	24.53	0	125	85.4	147	2.58	19.2	
Surr: BFB	990		981.4		101	69.7	121	0	0	

**Qualifiers:**

- \* / X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1201809

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID <b>MB-489</b>	SampType: <b>MBLK</b>		TestCode: <b>EPA Method 7471: Mercury</b>							
Client ID: <b>PBS</b>	Batch ID: <b>489</b>		RunNo: <b>652</b>							
Prep Date: <b>1/30/2012</b>	Analysis Date: <b>1/30/2012</b>		SeqNo: <b>18714</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.033								

Sample ID <b>LCS-489</b>	SampType: <b>LCS</b>		TestCode: <b>EPA Method 7471: Mercury</b>							
Client ID: <b>LCSS</b>	Batch ID: <b>489</b>		RunNo: <b>652</b>							
Prep Date: <b>1/30/2012</b>	Analysis Date: <b>1/30/2012</b>		SeqNo: <b>18715</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.18	0.033	0.1667	0	108	80	120			

Sample ID <b>1201809-001BMS</b>	SampType: <b>MS</b>		TestCode: <b>EPA Method 7471: Mercury</b>							
Client ID: <b>BK-9 (5-5.5')</b>	Batch ID: <b>489</b>		RunNo: <b>652</b>							
Prep Date: <b>1/30/2012</b>	Analysis Date: <b>1/30/2012</b>		SeqNo: <b>18717</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.18	0.033	0.1665	0.006308	102	75	125			

Sample ID <b>1201809-001BMSD</b>	SampType: <b>MSD</b>		TestCode: <b>EPA Method 7471: Mercury</b>							
Client ID: <b>BK-9 (5-5.5')</b>	Batch ID: <b>489</b>		RunNo: <b>652</b>							
Prep Date: <b>1/30/2012</b>	Analysis Date: <b>1/30/2012</b>		SeqNo: <b>18718</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.17	0.033	0.1663	0.006308	101	75	125	1.75	20	

**Qualifiers:**

- \*X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1201809

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID	MB-514	SampType:	MBLK	TestCode:	EPA Method 6010B: Soil Metals					
Client ID:	PBS	Batch ID:	514	RunNo:	808					
Prep Date:	1/31/2012	Analysis Date:	2/7/2012	SeqNo:	23089	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.56	3.0								J
Antimony	ND	2.5								
Arsenic	ND	2.5								
Barium	ND	0.10								
Beryllium	ND	0.15								
Boron	ND	2.0								
Cadmium	ND	0.10								
Chromium	ND	0.30								
Cobalt	ND	0.30								
Copper	0.054	0.30								J
Iron	1.1	1.0								
Lead	ND	0.25								
Manganese	ND	0.10								
Molybdenum	ND	0.40								
Nickel	0.093	0.50								J
Selenium	1.0	2.5								J
Silver	ND	0.25								
Thallium	ND	2.5								
Uranium	ND	5.0								
Vanadium	ND	2.5								
Zinc	ND	2.5								

Sample ID	LCS-514	SampType:	LCS	TestCode:	EPA Method 6010B: Soil Metals					
Client ID:	LCSS	Batch ID:	514	RunNo:	808					
Prep Date:	1/31/2012	Analysis Date:	2/7/2012	SeqNo:	23090	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	28	3.0	25.00	0.5570	110	80	120			
Antimony	24	2.5	25.00	0	96.4	80	120			
Arsenic	25	2.5	25.00	0	98.7	80	120			
Barium	24	0.10	25.00	0	97.1	80	120			
Beryllium	26	0.15	25.00	0	103	80	120			
Boron	24	2.0	25.00	0	97.6	80	120			
Cadmium	24	0.10	25.00	0	96.7	80	120			
Chromium	24	0.30	25.00	0	95.7	80	120			
Cobalt	24	0.30	25.00	0	95.7	80	120			
Copper	25	0.30	25.00	0.05450	98.0	80	120			
Iron	26	1.0	25.00	1.128	99.2	80	120			B
Lead	24	0.25	25.00	0	96.8	80	120			
Manganese	24	0.10	25.00	0	95.9	80	120			
Molybdenum	25	0.40	25.00	0	99.6	80	120			

**Qualifiers:**

- \*/X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1201809

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID	<b>LCS-514</b>		SampType:	<b>LCS</b>		TestCode:	<b>EPA Method 6010B: Soil Metals</b>				
Client ID:	<b>LCSS</b>		Batch ID:	<b>514</b>		RunNo:	<b>808</b>				
Prep Date:	<b>1/31/2012</b>		Analysis Date:	<b>2/7/2012</b>		SeqNo:	<b>23090</b>		Units: <b>mg/Kg</b>		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Nickel	24	0.50	25.00	0.09300	94.5	80	120				
Selenium	23	2.5	25.00	1.014	89.5	80	120				
Silver	4.8	0.25	5.000	0	96.5	80	120				
Thallium	24	2.5	25.00	0	96.7	80	120				
Uranium	25	5.0	25.00	0	98.6	80	120				
Vanadium	25	2.5	25.00	0	102	80	120				
Zinc	24	2.5	25.00	0	96.0	80	120				

Sample ID	<b>1201809-001BMS</b>		SampType:	<b>MS</b>		TestCode:	<b>EPA Method 6010B: Soil Metals</b>				
Client ID:	<b>BK-9 (5-5.5')</b>		Batch ID:	<b>514</b>		RunNo:	<b>808</b>				
Prep Date:	<b>1/31/2012</b>		Analysis Date:	<b>2/7/2012</b>		SeqNo:	<b>23094</b>		Units: <b>mg/Kg</b>		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Antimony	11	2.5	24.89	0	43.8	75	125			S	
Arsenic	23	2.5	24.89	1.491	87.5	75	125				
Beryllium	22	0.15	24.89	0.2370	86.9	75	125				
Boron	26	2.0	24.89	4.078	89.3	75	125				
Cadmium	21	0.10	24.89	0	83.5	75	125				
Chromium	24	0.30	24.89	3.460	82.5	75	125				
Cobalt	22	0.30	24.89	2.095	78.5	75	125				
Copper	24	0.30	24.89	2.287	88.0	75	125				
Lead	21	0.25	24.89	1.663	78.0	75	125				
Molybdenum	20	0.40	24.89	0.4185	78.8	75	125				
Nickel	22	0.50	24.89	2.968	77.4	75	125				
Selenium	19	2.5	24.89	0	77.6	75	125				
Silver	4.2	0.25	4.978	0	84.4	75	125				
Thallium	10	2.5	24.89	0	40.7	75	125			S	
Uranium	21	5.0	24.89	0	86.3	75	125				
Vanadium	35	2.5	24.89	11.33	96.5	75	125				
Zinc	31	2.5	24.89	11.58	79.3	75	125				

Sample ID	<b>1201809-001BMSD</b>		SampType:	<b>MSD</b>		TestCode:	<b>EPA Method 6010B: Soil Metals</b>				
Client ID:	<b>BK-9 (5-5.5')</b>		Batch ID:	<b>514</b>		RunNo:	<b>808</b>				
Prep Date:	<b>1/31/2012</b>		Analysis Date:	<b>2/7/2012</b>		SeqNo:	<b>23095</b>		Units: <b>mg/Kg</b>		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Antimony	10	2.5	24.81	0	41.0	75	125	6.88	20	S	
Arsenic	22	2.5	24.81	1.491	82.9	75	125	5.37	20		
Beryllium	21	0.15	24.81	0.2370	84.8	75	125	2.76	20		
Boron	26	2.0	24.81	4.078	87.5	75	125	1.94	20		
Cadmium	20	0.10	24.81	0	81.1	75	125	3.27	20		
Chromium	23	0.30	24.81	3.460	79.4	75	125	3.45	20		

**Qualifiers:**

- \* / X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1201809

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID	<b>1201809-001BMSD</b>	SampType:	<b>MSD</b>	TestCode:	<b>EPA Method 6010B: Soil Metals</b>					
Client ID:	<b>BK-9 (5-5.5')</b>	Batch ID:	<b>514</b>	RunNo:	<b>808</b>					
Prep Date:	<b>1/31/2012</b>	Analysis Date:	<b>2/7/2012</b>	SeqNo:	<b>23095</b>	Units:	<b>mg/Kg</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	21	0.30	24.81	2.095	75.5	75	125	3.77	20	
Copper	24	0.30	24.81	2.287	86.7	75	125	1.70	20	
Lead	20	0.25	24.81	1.663	73.8	75	125	5.40	20	S
Molybdenum	19	0.40	24.81	0.4185	75.6	75	125	4.38	20	
Nickel	21	0.50	24.81	2.968	74.3	75	125	3.77	20	S
Selenium	18	2.5	24.81	0	74.1	75	125	4.97	20	S
Silver	4.0	0.25	4.963	0	81.3	75	125	4.01	20	
Thallium	11	2.5	24.81	0	42.5	75	125	3.98	20	S
Uranium	20	5.0	24.81	0	81.1	75	125	6.48	20	
Vanadium	34	2.5	24.81	11.33	91.5	75	125	3.75	20	
Zinc	30	2.5	24.81	11.58	73.7	75	125	4.73	20	S

Sample ID	<b>MB-1105</b>	SampType:	<b>MBLK</b>	TestCode:	<b>EPA Method 6010B: Soil Metals</b>					
Client ID:	<b>PBS</b>	Batch ID:	<b>1105</b>	RunNo:	<b>1507</b>					
Prep Date:	<b>3/15/2012</b>	Analysis Date:	<b>3/16/2012</b>	SeqNo:	<b>42441</b>	Units:	<b>mg/Kg</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	ND	1.0								
Manganese	ND	0.10								

Sample ID	<b>LCS-1105</b>	SampType:	<b>LCS</b>	TestCode:	<b>EPA Method 6010B: Soil Metals</b>					
Client ID:	<b>LCSS</b>	Batch ID:	<b>1105</b>	RunNo:	<b>1507</b>					
Prep Date:	<b>3/15/2012</b>	Analysis Date:	<b>3/16/2012</b>	SeqNo:	<b>42442</b>	Units:	<b>mg/Kg</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	26	1.0	25.00	0	105	80	120			
Manganese	24	0.10	25.00	0	94.3	80	120			

**Qualifiers:**

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- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit



Hall Environmental Analysis Laboratory  
 4901 Hawkins NE  
 Albuquerque, NM 87105  
 TEL: 505-345-3975 FAX: 505-345-4107  
 Website: www.hallenvironmental.com

# Sample Log-In Check List

Client Name: Western Refining Southwest, Inc Bloomfield      Work Order Number: 1201809  
 Received by/date: 1/27/12  
 Logged By: Michelle Garcia      1/27/2012 10:00:00 AM      *Michelle Garcia*  
 Completed By: Michelle Garcia      1/27/2012 1:06:36 PM      *Michelle Garcia*  
 Reviewed By: 1/27/2012

**Chain of Custody**

- 1. Were seals intact?      Yes  No  Not Present
- 2. Is Chain of Custody complete?      Yes  No  Not Present
- 3. How was the sample delivered?      UPS

**Log In**

- 4. Coolers are present? (see 19. for cooler specific information)      Yes  No  NA
- 5. Was an attempt made to cool the samples?      Yes  No  NA
- 6. Were all samples received at a temperature of >0° C to 6.0°C      Yes  No  NA
- 7. Sample(s) in proper container(s)?      Yes  No
- 8. Sufficient sample volume for indicated test(s)?      Yes  No
- 9. Are samples (except VOA and ONG) properly preserved?      Yes  No
- 10. Was preservative added to bottles?      Yes  No  NA
- 11. VOA vials have zero headspace?      Yes  No  No VOA Vials
- 12. Were any sample containers received broken?      Yes  No
- 13. Does paperwork match bottle labels? (Note discrepancies on chain of custody)      Yes  No
- 14. Are matrices correctly identified on Chain of Custody?      Yes  No
- 15. Is it clear what analyses were requested?      Yes  No
- 16. Were all holding times able to be met? (If no, notify customer for authorization.)      Yes  No

# of preserved bottles checked for pH: \_\_\_\_\_  
 (<2 or >12 unless noted)  
 Adjusted? \_\_\_\_\_  
 Checked by: \_\_\_\_\_

**Special Handling (if applicable)**

- 17. Was client notified of all discrepancies with this order?      Yes  No  NA

Person Notified: \_\_\_\_\_ Date: \_\_\_\_\_  
 By Whom: \_\_\_\_\_ Via:  eMail  Phone  Fax  In Person  
 Regarding: \_\_\_\_\_  
 Client Instructions: \_\_\_\_\_

18. Additional remarks:

**19. Cooler Information**

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.2	Good	Yes			

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**Chain-of-Custody Record**

Client: Western Refining Southwest, Inc.  
Bloomfield Refinery  
 Mailing Address: 50 Road 4990  
Bloomfield, NM 87401  
 Phone #:

email or Fax#: \_\_\_\_\_  
 QA/QC Package:  
 Standard  Level 4 (Full Validation)  
 Accreditation  
 NELAP  Other \_\_\_\_\_  
 EDD (Type) Excel

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No.
1/24/12	11:25	soil	BK-9 (S-5.5')	(3) 4oz Jugs	None	-1
1/24/12	15:00	soil	BK-9 (SH-56')	" "	" "	-2
		Water	M2OH BLANK	1 VIAL	M2OH	-3
		Met				
		AT				

Date: 1/24/12 Time: 15:00 Relinquished by: Kelly Rolan  
 Date: 1/27/12 Time: \_\_\_\_\_ Relinquished by: \_\_\_\_\_

Turn-Around Time:  
 Standard  Rush  
 Project Name:  
RCRA BACKGROUND INVESTIGATION  
 Project #:

Project Manager:  
Kelly Robinson  
 Sampler: Kelly R. + Tracy P.  
 On Ice:  Yes  No  
 Sample Temperature: 12

BTEX + MTBE + TMBs (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F, Cl, NO <sub>3</sub> , NO <sub>2</sub> , PO <sub>4</sub> , SO <sub>4</sub> )	8081 Pesticides / 8082 PCBs	8260B (VOA)	8270 (Semi-VOA)	Metals (See Remarks)	TPH - DCO, MEO, <del>WEO</del>	TPH - GFD	Air Bubbles (Y or N)
											X	X	X	

Received by: TD UPS Date: \_\_\_\_\_ Time: \_\_\_\_\_  
 Received by: Mikhaela Date: 1/27/12 Time: 10:00

Remarks:  
See attached sheet for analyte list.



**HALL ENVIRONMENTAL ANALYSIS LABORATORY**  
 www.hallenvironmental.com  
 4901 Hawkins NE - Albuquerque, NM 87109  
 Tel. 505-345-3975 Fax 505-345-4107

**Analysis Request**

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

### METALS ANALYSES

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 335.3/335.2 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
Thallium	SW-846 method 6010/6020
Vanadium	SW-846 method 6010/6020
Zinc	SW-846 method 6010/6020

Includes  
Soil  
Soil Samples  
+  
GW Samples  
(both dissolved  
& total  
analyses)

### GENERAL CHEMISTRY ANALYSES

Analyte	Analytical Method
Total Dissolved Solids	SM-2540C
Bicarbonate	SM-2320B (dissolved)
Chloride	EPA method 300.0 (dissolved & total)
Sulfate	EPA method 300.0 (dissolved & total)
Calcium	EPA method 6010/6020 (dissolved)
Magnesium	EPA method 6010/6020 (total)
Sodium	EPA method 6010/6020 (dissolved)
Potassium	EPA method 6010/6020 (dissolved)
Manganese	SW-846 method 6010/6020 (dissolved & total)
Nitrate/nitrite	EPA method 300.0 (dissolved)
Iron	SW-846 method 6010/6020 (dissolved & total)

For  
Groundwater  
Samples  
ONLY

### SWMU No. 16 Constituent List

Analyte	Analytical Method
Aluminum	SW-846 method 6010/6020
Boron	SW-846 method 6010/6020
Copper	SW-846 method 6010/6020
Molybdenum	SW-846 method 6010/6020
Uranium	SW-846 method 6020
Fluoride	SW-846 method 300

For Soil  
and Groundwater  
Samples  
(Dissolved  
and  
Totals)



Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)

April 13, 2012

Kelly Robinson

Western Refining Southwest, Inc.

#50 CR 4990

Bloomfield, NM 87413

TEL: (505) 632-4135

FAX (505) 632-3911

RE: RCRA Background Investigation

OrderNo.: 1201885

Dear Kelly Robinson:

Hall Environmental Analysis Laboratory received 18 sample(s) on 1/31/2012 for the analyses presented in the following report.

This report is a revised report and it replaces the original report issued February 23, 2012.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. All samples are reported as received unless otherwise indicated.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman", is written in a cursive style.

Andy Freeman

Laboratory Manager

4901 Hawkins NE

Albuquerque, NM 87109

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201885

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-1 (0-0.5')

**Project:** RCRA Background Investigation

**Collection Date:** 1/27/2012 1:30:00 PM

**Lab ID:** 1201885-001

**Matrix:** SOIL

**Received Date:** 1/31/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	0.94	1.5	J	mg/Kg	5	2/1/2012 2:01:03 PM
Chloride	ND	7.5		mg/Kg	5	2/1/2012 2:01:03 PM
Sulfate	2.1	7.5	J	mg/Kg	5	2/1/2012 2:01:03 PM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>ELS</b>
Mercury	0.012	0.033	J	mg/kg	1	2/2/2012 10:11:04 AM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	20,000	1,500		mg/Kg	500	2/10/2012 6:44:06 AM
Antimony	ND	2.5		mg/Kg	1	2/8/2012 8:08:33 AM
Arsenic	2.8	2.5		mg/Kg	1	2/8/2012 8:08:33 AM
Barium	160	0.50		mg/Kg	5	2/10/2012 6:42:08 AM
Beryllium	0.55	0.15		mg/Kg	1	2/8/2012 8:08:33 AM
Boron	6.7	4.0		mg/Kg	2	2/8/2012 8:10:41 AM
Cadmium	0.034	0.10	J	mg/Kg	1	2/8/2012 8:08:33 AM
Chromium	7.8	0.30		mg/Kg	1	2/8/2012 8:08:33 AM
Cobalt	4.4	0.30		mg/Kg	1	2/8/2012 8:08:33 AM
Copper	8.1	0.30		mg/Kg	1	2/8/2012 8:08:33 AM
Iron	18,000	500		mg/Kg	500	3/18/2012 12:35:55 PM
Lead	2.9	0.25		mg/Kg	1	2/8/2012 8:08:33 AM
Manganese	260	0.98		mg/Kg	10	3/16/2012 8:44:21 AM
Molybdenum	0.36	0.40	J	mg/Kg	1	2/8/2012 8:08:33 AM
Nickel	6.7	0.50		mg/Kg	1	2/8/2012 8:08:33 AM
Selenium	ND	2.5		mg/Kg	1	2/8/2012 8:08:33 AM
Silver	ND	0.25		mg/Kg	1	2/8/2012 8:08:33 AM
Thallium	ND	2.5		mg/Kg	1	2/8/2012 8:08:33 AM
Uranium	0.60	5.0	J	mg/Kg	1	2/8/2012 8:08:33 AM
Vanadium	24	2.5		mg/Kg	1	2/8/2012 8:08:33 AM
Zinc	26	2.5		mg/Kg	1	2/8/2012 8:08:33 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201885

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-1 (1.5-2.0')

**Project:** RCRA Background Investigation

**Collection Date:** 1/27/2012 1:34:00 PM

**Lab ID:** 1201885-002

**Matrix:** SOIL

**Received Date:** 1/31/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	11	1.5		mg/Kg	5	2/1/2012 2:35:52 PM
Chloride	14	7.5		mg/Kg	5	2/1/2012 2:35:52 PM
Sulfate	17	7.5		mg/Kg	5	2/1/2012 2:35:52 PM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>ELS</b>
Mercury	0.018	0.033	J	mg/kg	1	2/2/2012 10:16:27 AM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	17,000	1,500		mg/Kg	500	2/10/2012 6:54:33 AM
Antimony	ND	5.0		mg/Kg	2	2/8/2012 8:19:16 AM
Arsenic	1.9	5.0	J	mg/Kg	2	2/8/2012 8:19:16 AM
Barium	260	1.0		mg/Kg	10	2/13/2012 7:24:14 AM
Beryllium	0.56	0.30		mg/Kg	2	2/8/2012 8:19:16 AM
Boron	8.0	4.0		mg/Kg	2	2/8/2012 8:19:16 AM
Cadmium	ND	0.20		mg/Kg	2	2/8/2012 8:19:16 AM
Chromium	8.4	0.60		mg/Kg	2	2/8/2012 8:19:16 AM
Cobalt	5.3	0.60		mg/Kg	2	2/8/2012 8:19:16 AM
Copper	8.7	0.60		mg/Kg	2	2/8/2012 8:19:16 AM
Iron	18,000	500		mg/Kg	500	3/18/2012 12:38:04 PM
Lead	3.2	0.50		mg/Kg	2	2/8/2012 8:19:16 AM
Manganese	280	1.0		mg/Kg	10	3/16/2012 8:59:36 AM
Molybdenum	0.70	0.80	J	mg/Kg	2	2/8/2012 8:19:16 AM
Nickel	7.4	1.0		mg/Kg	2	2/8/2012 8:19:16 AM
Selenium	ND	5.0		mg/Kg	2	2/8/2012 8:19:16 AM
Silver	ND	0.50		mg/Kg	2	2/8/2012 8:19:16 AM
Thallium	ND	5.0		mg/Kg	2	2/8/2012 8:19:16 AM
Uranium	ND	10		mg/Kg	2	2/8/2012 8:19:16 AM
Vanadium	30	5.0		mg/Kg	2	2/8/2012 8:19:16 AM
Zinc	28	5.0		mg/Kg	2	2/8/2012 8:19:16 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201885

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-2 (0-0.5')

**Project:** RCRA Background Investigation

**Collection Date:** 1/27/2012 2:05:00 PM

**Lab ID:** 1201885-003

**Matrix:** SOIL

**Received Date:** 1/31/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	ND	1.5		mg/Kg	5	2/1/2012 3:45:29 PM
Chloride	ND	7.5		mg/Kg	5	2/1/2012 3:45:29 PM
Sulfate	2.4	7.5	J	mg/Kg	5	2/1/2012 3:45:29 PM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>ELS</b>
Mercury	0.0095	0.033	J	mg/kg	1	2/2/2012 10:18:12 AM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	14,000	1,500		mg/Kg	500	2/10/2012 6:56:35 AM
Antimony	ND	2.5		mg/Kg	1	2/8/2012 8:37:17 AM
Arsenic	1.4	2.5	J	mg/Kg	1	2/8/2012 8:37:17 AM
Barium	94	0.20		mg/Kg	2	2/8/2012 8:39:28 AM
Beryllium	0.42	0.15		mg/Kg	1	2/8/2012 8:37:17 AM
Boron	5.4	2.0		mg/Kg	1	2/8/2012 8:37:17 AM
Cadmium	0.040	0.10	J	mg/Kg	1	2/8/2012 8:37:17 AM
Chromium	6.1	0.30		mg/Kg	1	2/8/2012 8:37:17 AM
Cobalt	3.4	0.30		mg/Kg	1	2/8/2012 8:37:17 AM
Copper	5.4	0.30		mg/Kg	1	2/8/2012 8:37:17 AM
Iron	13,000	500		mg/Kg	500	3/18/2012 12:40:09 PM
Lead	2.8	0.25		mg/Kg	1	2/8/2012 8:37:17 AM
Manganese	270	0.97		mg/Kg	10	3/16/2012 9:09:46 AM
Molybdenum	0.28	0.40	J	mg/Kg	1	2/8/2012 8:37:17 AM
Nickel	4.8	0.50		mg/Kg	1	2/8/2012 8:37:17 AM
Selenium	ND	2.5		mg/Kg	1	2/8/2012 8:37:17 AM
Silver	ND	0.25		mg/Kg	1	2/8/2012 8:37:17 AM
Thallium	ND	2.5		mg/Kg	1	2/8/2012 8:37:17 AM
Uranium	1.0	5.0	J	mg/Kg	1	2/8/2012 8:37:17 AM
Vanadium	17	2.5		mg/Kg	1	2/8/2012 8:37:17 AM
Zinc	20	2.5		mg/Kg	1	2/8/2012 8:37:17 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201885

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-2 (1.5-2.0')

**Project:** RCRA Background Investigation

**Collection Date:** 1/27/2012 2:10:00 PM

**Lab ID:** 1201885-004

**Matrix:** SOIL

**Received Date:** 1/31/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	8.6	1.5		mg/Kg	5	2/1/2012 4:20:17 PM
Chloride	ND	7.5		mg/Kg	5	2/1/2012 4:20:17 PM
Sulfate	17	7.5		mg/Kg	5	2/1/2012 4:20:17 PM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>ELS</b>
Mercury	0.016	0.033	J	mg/kg	1	2/2/2012 10:19:59 AM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	26,000	3,000		mg/Kg	1000	2/13/2012 7:29:38 AM
Antimony	ND	2.5		mg/Kg	1	2/8/2012 8:41:38 AM
Arsenic	3.0	2.5		mg/Kg	1	2/8/2012 8:41:38 AM
Barium	250	1.0		mg/Kg	10	2/13/2012 7:26:06 AM
Beryllium	0.64	0.15		mg/Kg	1	2/8/2012 8:41:38 AM
Boron	8.2	4.0		mg/Kg	2	2/8/2012 8:43:43 AM
Cadmium	ND	0.10		mg/Kg	1	2/8/2012 8:41:38 AM
Chromium	9.3	0.30		mg/Kg	1	2/8/2012 8:41:38 AM
Cobalt	4.8	0.30		mg/Kg	1	2/8/2012 8:41:38 AM
Copper	8.8	0.30		mg/Kg	1	2/8/2012 8:41:38 AM
Iron	19,000	500		mg/Kg	500	3/18/2012 12:42:13 PM
Lead	2.4	0.25		mg/Kg	1	2/8/2012 8:41:38 AM
Manganese	290	1.0		mg/Kg	10	3/16/2012 9:13:50 AM
Molybdenum	0.37	0.40	J	mg/Kg	1	2/8/2012 8:41:38 AM
Nickel	7.6	0.50		mg/Kg	1	2/8/2012 8:41:38 AM
Selenium	ND	2.5		mg/Kg	1	2/8/2012 8:41:38 AM
Silver	ND	0.25		mg/Kg	1	2/8/2012 8:41:38 AM
Thallium	ND	2.5		mg/Kg	1	2/8/2012 8:41:38 AM
Uranium	ND	5.0		mg/Kg	1	2/8/2012 8:41:38 AM
Vanadium	29	2.5		mg/Kg	1	2/8/2012 8:41:38 AM
Zinc	30	2.5		mg/Kg	1	2/8/2012 8:41:38 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201885

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-3 (0-0.5')

**Project:** RCRA Background Investigation

**Collection Date:** 1/27/2012 2:30:00 PM

**Lab ID:** 1201885-005

**Matrix:** SOIL

**Received Date:** 1/31/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	1.6	1.5		mg/Kg	5	2/1/2012 4:55:06 PM
Chloride	17	7.5		mg/Kg	5	2/1/2012 4:55:06 PM
Sulfate	5.8	7.5	J	mg/Kg	5	2/1/2012 4:55:06 PM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>ELS</b>
Mercury	0.011	0.033	J	mg/kg	1	2/2/2012 10:21:44 AM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	23,000	1,500		mg/Kg	500	2/10/2012 7:12:47 AM
Antimony	ND	2.5		mg/Kg	1	2/8/2012 8:45:57 AM
Arsenic	3.1	2.5		mg/Kg	1	2/8/2012 8:45:57 AM
Barium	93	0.20		mg/Kg	2	2/8/2012 8:48:12 AM
Beryllium	0.61	0.15		mg/Kg	1	2/8/2012 8:45:57 AM
Boron	8.2	4.0		mg/Kg	2	2/8/2012 8:48:12 AM
Cadmium	ND	0.10		mg/Kg	1	2/8/2012 8:45:57 AM
Chromium	8.5	0.30		mg/Kg	1	2/8/2012 8:45:57 AM
Cobalt	4.1	0.30		mg/Kg	1	2/8/2012 8:45:57 AM
Copper	6.7	0.30		mg/Kg	1	2/8/2012 8:45:57 AM
Iron	15,000	490		mg/Kg	500	3/16/2012 9:27:35 AM
Lead	2.4	0.25		mg/Kg	1	2/8/2012 8:45:57 AM
Manganese	240	0.97		mg/Kg	10	3/16/2012 9:17:55 AM
Molybdenum	0.33	0.40	J	mg/Kg	1	2/8/2012 8:45:57 AM
Nickel	6.0	0.50		mg/Kg	1	2/8/2012 8:45:57 AM
Selenium	ND	2.5		mg/Kg	1	2/8/2012 8:45:57 AM
Silver	ND	0.25		mg/Kg	1	2/8/2012 8:45:57 AM
Thallium	ND	2.5		mg/Kg	1	2/8/2012 8:45:57 AM
Uranium	1.4	5.0	J	mg/Kg	1	2/8/2012 8:45:57 AM
Vanadium	25	2.5		mg/Kg	1	2/8/2012 8:45:57 AM
Zinc	26	2.5		mg/Kg	1	2/8/2012 8:45:57 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201885

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-3 (1.5-2.0')

**Project:** RCRA Background Investigation

**Collection Date:** 1/27/2012 2:35:00 PM

**Lab ID:** 1201885-006

**Matrix:** SOIL

**Received Date:** 1/31/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	7.5	6.0		mg/Kg	20	2/1/2012 6:22:09 PM
Chloride	420	30		mg/Kg	20	2/1/2012 6:22:09 PM
Sulfate	7,600	30	E	mg/Kg	20	2/1/2012 6:22:09 PM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>ELS</b>
Mercury	0.012	0.033	J	mg/kg	1	2/2/2012 10:23:29 AM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	11,000	1,500		mg/Kg	500	2/10/2012 7:18:34 AM
Antimony	ND	2.5		mg/Kg	1	2/8/2012 8:50:10 AM
Arsenic	3.0	2.5		mg/Kg	1	2/8/2012 8:50:10 AM
Barium	140	0.50		mg/Kg	5	2/10/2012 7:16:26 AM
Beryllium	0.38	0.15		mg/Kg	1	2/8/2012 8:50:10 AM
Boron	12	2.0		mg/Kg	1	2/8/2012 8:50:10 AM
Cadmium	ND	0.10		mg/Kg	1	2/8/2012 8:50:10 AM
Chromium	5.2	0.30		mg/Kg	1	2/8/2012 8:50:10 AM
Cobalt	2.9	0.30		mg/Kg	1	2/8/2012 8:50:10 AM
Copper	5.3	0.30		mg/Kg	1	2/8/2012 8:50:10 AM
Iron	8,400	200		mg/Kg	200	3/16/2012 9:31:59 AM
Lead	1.2	0.25		mg/Kg	1	2/8/2012 8:50:10 AM
Manganese	130	0.98		mg/Kg	10	3/16/2012 9:29:53 AM
Molybdenum	0.31	0.40	J	mg/Kg	1	2/8/2012 8:50:10 AM
Nickel	4.2	0.50		mg/Kg	1	2/8/2012 8:50:10 AM
Selenium	ND	2.5		mg/Kg	1	2/8/2012 8:50:10 AM
Silver	ND	0.25		mg/Kg	1	2/8/2012 8:50:10 AM
Thallium	ND	2.5		mg/Kg	1	2/8/2012 8:50:10 AM
Uranium	ND	5.0		mg/Kg	1	2/8/2012 8:50:10 AM
Vanadium	17	2.5		mg/Kg	1	2/8/2012 8:50:10 AM
Zinc	14	2.5		mg/Kg	1	2/8/2012 8:50:10 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201885

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-4 (0-0.5')

**Project:** RCRA Background Investigation

**Collection Date:** 1/27/2012 2:40:00 PM

**Lab ID:** 1201885-007

**Matrix:** SOIL

**Received Date:** 1/31/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	0.73	1.5	J	mg/Kg	5	2/1/2012 7:14:23 PM
Chloride	ND	7.5		mg/Kg	5	2/1/2012 7:14:23 PM
Sulfate	1.7	7.5	J	mg/Kg	5	2/1/2012 7:14:23 PM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>ELS</b>
Mercury	0.011	0.033	J	mg/kg	1	2/2/2012 10:28:45 AM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	17,000	1,500		mg/Kg	500	2/10/2012 7:20:34 AM
Antimony	0.54	2.5	J	mg/Kg	1	2/8/2012 9:04:21 AM
Arsenic	2.4	2.5	J	mg/Kg	1	2/8/2012 9:04:21 AM
Barium	96	0.20		mg/Kg	2	2/8/2012 9:06:31 AM
Beryllium	0.48	0.15		mg/Kg	1	2/8/2012 9:04:21 AM
Boron	5.0	2.0		mg/Kg	1	2/8/2012 9:04:21 AM
Cadmium	ND	0.10		mg/Kg	1	2/8/2012 9:04:21 AM
Chromium	6.8	0.30		mg/Kg	1	2/8/2012 9:04:21 AM
Cobalt	3.2	0.30		mg/Kg	1	2/8/2012 9:04:21 AM
Copper	5.1	0.30		mg/Kg	1	2/8/2012 9:04:21 AM
Iron	13,000	480		mg/Kg	500	3/16/2012 9:43:16 AM
Lead	1.7	0.25		mg/Kg	1	2/8/2012 9:04:21 AM
Manganese	200	0.95		mg/Kg	10	3/16/2012 9:41:20 AM
Molybdenum	0.28	0.40	J	mg/Kg	1	2/8/2012 9:04:21 AM
Nickel	4.9	0.50		mg/Kg	1	2/8/2012 9:04:21 AM
Selenium	ND	2.5		mg/Kg	1	2/8/2012 9:04:21 AM
Silver	ND	0.25		mg/Kg	1	2/8/2012 9:04:21 AM
Thallium	ND	2.5		mg/Kg	1	2/8/2012 9:04:21 AM
Uranium	1.1	5.0	J	mg/Kg	1	2/8/2012 9:04:21 AM
Vanadium	20	2.5		mg/Kg	1	2/8/2012 9:04:21 AM
Zinc	21	2.5		mg/Kg	1	2/8/2012 9:04:21 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201885

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-4 (1.5-2.0')

**Project:** RCRA Background Investigation

**Collection Date:** 1/27/2012 2:45:00 PM

**Lab ID:** 1201885-008

**Matrix:** SOIL

**Received Date:** 1/31/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	6.5	1.5		mg/Kg	5	2/1/2012 7:49:12 PM
Chloride	13	7.5		mg/Kg	5	2/1/2012 7:49:12 PM
Sulfate	3.6	7.5	J	mg/Kg	5	2/1/2012 7:49:12 PM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>ELS</b>
Mercury	0.014	0.033	J	mg/kg	1	2/2/2012 10:30:30 AM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	17,000	1,500		mg/Kg	500	2/10/2012 7:24:39 AM
Antimony	ND	2.5		mg/Kg	1	2/8/2012 9:08:43 AM
Arsenic	2.6	2.5		mg/Kg	1	2/8/2012 9:08:43 AM
Barium	160	0.50		mg/Kg	5	2/10/2012 7:22:34 AM
Beryllium	0.42	0.15		mg/Kg	1	2/8/2012 9:08:43 AM
Boron	5.1	2.0		mg/Kg	1	2/8/2012 9:08:43 AM
Cadmium	ND	0.10		mg/Kg	1	2/8/2012 9:08:43 AM
Chromium	6.1	0.30		mg/Kg	1	2/8/2012 9:08:43 AM
Cobalt	3.9	0.30		mg/Kg	1	2/8/2012 9:08:43 AM
Copper	6.5	0.30		mg/Kg	1	2/8/2012 9:08:43 AM
Iron	14,000	480		mg/Kg	500	3/16/2012 9:47:30 AM
Lead	2.2	0.25		mg/Kg	1	2/8/2012 9:08:43 AM
Manganese	280	0.96		mg/Kg	10	3/16/2012 9:45:28 AM
Molybdenum	0.24	0.40	J	mg/Kg	1	2/8/2012 9:08:43 AM
Nickel	5.2	0.50		mg/Kg	1	2/8/2012 9:08:43 AM
Selenium	ND	2.5		mg/Kg	1	2/8/2012 9:08:43 AM
Silver	ND	0.25		mg/Kg	1	2/8/2012 9:08:43 AM
Thallium	ND	2.5		mg/Kg	1	2/8/2012 9:08:43 AM
Uranium	ND	5.0		mg/Kg	1	2/8/2012 9:08:43 AM
Vanadium	23	2.5		mg/Kg	1	2/8/2012 9:08:43 AM
Zinc	20	2.5		mg/Kg	1	2/8/2012 9:08:43 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201885

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-5 (0-0.5')

**Project:** RCRA Background Investigation

**Collection Date:** 1/27/2012 3:00:00 PM

**Lab ID:** 1201885-009

**Matrix:** SOIL

**Received Date:** 1/31/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	0.49	1.5	J	mg/Kg	5	2/1/2012 8:24:02 PM
Chloride	ND	7.5		mg/Kg	5	2/1/2012 8:24:02 PM
Sulfate	4.0	7.5	J	mg/Kg	5	2/1/2012 8:24:02 PM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>ELS</b>
Mercury	0.013	0.033	J	mg/kg	1	2/2/2012 10:32:16 AM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	18,000	1,500		mg/Kg	500	2/13/2012 7:33:40 AM
Antimony	ND	2.5		mg/Kg	1	2/8/2012 9:13:14 AM
Arsenic	2.6	2.5		mg/Kg	1	2/8/2012 9:13:14 AM
Barium	140	0.50		mg/Kg	5	2/10/2012 7:26:42 AM
Beryllium	0.53	0.15		mg/Kg	1	2/8/2012 9:13:14 AM
Boron	6.4	4.0		mg/Kg	2	2/8/2012 9:15:27 AM
Cadmium	ND	0.10		mg/Kg	1	2/8/2012 9:13:14 AM
Chromium	7.5	0.30		mg/Kg	1	2/8/2012 9:13:14 AM
Cobalt	4.1	0.30		mg/Kg	1	2/8/2012 9:13:14 AM
Copper	6.5	0.30		mg/Kg	1	2/8/2012 9:13:14 AM
Iron	18,000	500		mg/Kg	500	3/16/2012 9:51:34 AM
Lead	2.4	0.25		mg/Kg	1	2/8/2012 9:13:14 AM
Manganese	290	1.0		mg/Kg	10	3/16/2012 9:49:43 AM
Molybdenum	0.25	0.40	J	mg/Kg	1	2/8/2012 9:13:14 AM
Nickel	6.1	0.50		mg/Kg	1	2/8/2012 9:13:14 AM
Selenium	ND	2.5		mg/Kg	1	2/8/2012 9:13:14 AM
Silver	ND	0.25		mg/Kg	1	2/8/2012 9:13:14 AM
Thallium	ND	2.5		mg/Kg	1	2/8/2012 9:13:14 AM
Uranium	0.84	5.0	J	mg/Kg	1	2/8/2012 9:13:14 AM
Vanadium	23	2.5		mg/Kg	1	2/8/2012 9:13:14 AM
Zinc	25	2.5		mg/Kg	1	2/8/2012 9:13:14 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201885

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-5 (1.5-2.0')

**Project:** RCRA Background Investigation

**Collection Date:** 1/27/2012 3:05:00 PM

**Lab ID:** 1201885-010

**Matrix:** SOIL

**Received Date:** 1/31/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	5.0	1.5		mg/Kg	5	2/1/2012 8:58:52 PM
Chloride	170	7.5		mg/Kg	5	2/1/2012 8:58:52 PM
Sulfate	28	7.5		mg/Kg	5	2/1/2012 8:58:52 PM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>ELS</b>
Mercury	0.015	0.033	J	mg/kg	1	2/2/2012 10:34:02 AM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	15,000	1,500		mg/Kg	500	2/13/2012 7:35:43 AM
Antimony	ND	2.5		mg/Kg	1	2/8/2012 9:17:26 AM
Arsenic	2.2	2.5	J	mg/Kg	1	2/8/2012 9:17:26 AM
Barium	390	1.0		mg/Kg	10	2/10/2012 7:40:15 AM
Beryllium	0.52	0.15		mg/Kg	1	2/8/2012 9:17:26 AM
Boron	7.4	4.0		mg/Kg	2	2/8/2012 9:19:32 AM
Cadmium	ND	0.10		mg/Kg	1	2/8/2012 9:17:26 AM
Chromium	7.9	0.30		mg/Kg	1	2/8/2012 9:17:26 AM
Cobalt	4.8	0.30		mg/Kg	1	2/8/2012 9:17:26 AM
Copper	7.8	0.30		mg/Kg	1	2/8/2012 9:17:26 AM
Iron	18,000	480		mg/Kg	500	3/16/2012 10:03:39 AM
Lead	3.2	0.25		mg/Kg	1	2/8/2012 9:17:26 AM
Manganese	290	0.95		mg/Kg	10	3/16/2012 10:01:46 AM
Molybdenum	0.37	0.40	J	mg/Kg	1	2/8/2012 9:17:26 AM
Nickel	6.8	0.50		mg/Kg	1	2/8/2012 9:17:26 AM
Selenium	ND	2.5		mg/Kg	1	2/8/2012 9:17:26 AM
Silver	ND	0.25		mg/Kg	1	2/8/2012 9:17:26 AM
Thallium	ND	2.5		mg/Kg	1	2/8/2012 9:17:26 AM
Uranium	ND	5.0		mg/Kg	1	2/8/2012 9:17:26 AM
Vanadium	27	2.5		mg/Kg	1	2/8/2012 9:17:26 AM
Zinc	29	2.5		mg/Kg	1	2/8/2012 9:17:26 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201885

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-6 (0-0.5')

**Project:** RCRA Background Investigation

**Collection Date:** 1/27/2012 3:15:00 PM

**Lab ID:** 1201885-011

**Matrix:** SOIL

**Received Date:** 1/31/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	0.79	1.5	J	mg/Kg	5	2/1/2012 9:33:40 PM
Chloride	ND	7.5		mg/Kg	5	2/1/2012 9:33:40 PM
Sulfate	1.4	7.5	J	mg/Kg	5	2/1/2012 9:33:40 PM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>ELS</b>
Mercury	0.0078	0.033	J	mg/kg	1	2/2/2012 10:35:49 AM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	12,000	1,500		mg/Kg	500	2/13/2012 7:37:43 AM
Antimony	ND	2.5		mg/Kg	1	2/8/2012 9:22:01 AM
Arsenic	1.9	2.5	J	mg/Kg	1	2/8/2012 9:22:01 AM
Barium	98	0.20		mg/Kg	2	2/8/2012 9:39:12 AM
Beryllium	0.40	0.15		mg/Kg	1	2/8/2012 9:22:01 AM
Boron	4.2	2.0		mg/Kg	1	2/8/2012 9:22:01 AM
Cadmium	0.028	0.10	J	mg/Kg	1	2/8/2012 9:22:01 AM
Chromium	5.7	0.30		mg/Kg	1	2/8/2012 9:22:01 AM
Cobalt	3.2	0.30		mg/Kg	1	2/8/2012 9:22:01 AM
Copper	4.6	0.30		mg/Kg	1	2/8/2012 9:22:01 AM
Iron	12,000	500		mg/Kg	500	3/18/2012 12:44:17 PM
Lead	2.5	0.25		mg/Kg	1	2/8/2012 9:22:01 AM
Manganese	250	0.97		mg/Kg	10	3/16/2012 10:08:06 AM
Molybdenum	0.27	0.40	J	mg/Kg	1	2/8/2012 9:22:01 AM
Nickel	4.5	0.50		mg/Kg	1	2/8/2012 9:22:01 AM
Selenium	ND	2.5		mg/Kg	1	2/8/2012 9:22:01 AM
Silver	ND	0.25		mg/Kg	1	2/8/2012 9:22:01 AM
Thallium	ND	2.5		mg/Kg	1	2/8/2012 9:22:01 AM
Uranium	0.68	5.0	J	mg/Kg	1	2/8/2012 9:22:01 AM
Vanadium	19	2.5		mg/Kg	1	2/8/2012 9:22:01 AM
Zinc	19	2.5		mg/Kg	1	2/8/2012 9:22:01 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201885

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-6 (1.5-2.0')

**Project:** RCRA Background Investigation

**Collection Date:** 1/27/2012 3:20:00 PM

**Lab ID:** 1201885-012

**Matrix:** SOIL

**Received Date:** 1/31/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	5.7	1.5		mg/Kg	5	2/1/2012 10:43:18 PM
Chloride	ND	7.5		mg/Kg	5	2/1/2012 10:43:18 PM
Sulfate	7.4	7.5	J	mg/Kg	5	2/1/2012 10:43:18 PM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>ELS</b>
Mercury	0.016	0.033	J	mg/kg	1	2/2/2012 10:37:36 AM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	15,000	1,500		mg/Kg	500	2/13/2012 7:49:17 AM
Antimony	ND	2.5		mg/Kg	1	2/8/2012 9:41:24 AM
Arsenic	2.7	2.5		mg/Kg	1	2/8/2012 9:41:24 AM
Barium	150	0.50		mg/Kg	5	2/10/2012 7:49:54 AM
Beryllium	0.47	0.15		mg/Kg	1	2/8/2012 9:41:24 AM
Boron	5.5	2.0		mg/Kg	1	2/8/2012 9:41:24 AM
Cadmium	ND	0.10		mg/Kg	1	2/8/2012 9:41:24 AM
Chromium	6.5	0.30		mg/Kg	1	2/8/2012 9:41:24 AM
Cobalt	3.9	0.30		mg/Kg	1	2/8/2012 9:41:24 AM
Copper	7.2	0.30		mg/Kg	1	2/8/2012 9:41:24 AM
Iron	13,000	480		mg/Kg	500	3/16/2012 10:13:54 AM
Lead	2.2	0.25		mg/Kg	1	2/8/2012 9:41:24 AM
Manganese	210	0.97		mg/Kg	10	3/16/2012 10:12:02 AM
Molybdenum	0.28	0.40	J	mg/Kg	1	2/8/2012 9:41:24 AM
Nickel	5.9	0.50		mg/Kg	1	2/8/2012 9:41:24 AM
Selenium	ND	2.5		mg/Kg	1	2/8/2012 9:41:24 AM
Silver	ND	0.25		mg/Kg	1	2/8/2012 9:41:24 AM
Thallium	ND	2.5		mg/Kg	1	2/8/2012 9:41:24 AM
Uranium	ND	5.0		mg/Kg	1	2/8/2012 9:41:24 AM
Vanadium	22	2.5		mg/Kg	1	2/8/2012 9:41:24 AM
Zinc	21	2.5		mg/Kg	1	2/8/2012 9:41:24 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201885

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-7 (0-0.5')

**Project:** RCRA Background Investigation

**Collection Date:** 1/27/2012 3:30:00 PM

**Lab ID:** 1201885-013

**Matrix:** SOIL

**Received Date:** 1/31/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	ND	1.5		mg/Kg	5	2/1/2012 11:18:07 PM
Chloride	ND	7.5		mg/Kg	5	2/1/2012 11:18:07 PM
Sulfate	ND	7.5		mg/Kg	5	2/1/2012 11:18:07 PM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>ELS</b>
Mercury	0.012	0.033	J	mg/kg	1	2/2/2012 10:39:24 AM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	12,000	1,500		mg/Kg	500	2/13/2012 7:51:19 AM
Antimony	ND	2.5		mg/Kg	1	2/8/2012 9:46:02 AM
Arsenic	3.2	2.5		mg/Kg	1	2/8/2012 9:46:02 AM
Barium	140	0.50		mg/Kg	5	2/10/2012 7:54:00 AM
Beryllium	0.40	0.15		mg/Kg	1	2/8/2012 9:46:02 AM
Boron	4.3	2.0		mg/Kg	1	2/8/2012 9:46:02 AM
Cadmium	ND	0.10		mg/Kg	1	2/8/2012 9:46:02 AM
Chromium	5.8	0.30		mg/Kg	1	2/8/2012 9:46:02 AM
Cobalt	3.2	0.30		mg/Kg	1	2/8/2012 9:46:02 AM
Copper	5.5	0.30		mg/Kg	1	2/8/2012 9:46:02 AM
Iron	11,000	490		mg/Kg	500	3/16/2012 10:17:59 AM
Lead	2.4	0.25		mg/Kg	1	2/8/2012 9:46:02 AM
Manganese	200	0.98		mg/Kg	10	3/16/2012 10:16:07 AM
Molybdenum	0.27	0.40	J	mg/Kg	1	2/8/2012 9:46:02 AM
Nickel	4.6	0.50		mg/Kg	1	2/8/2012 9:46:02 AM
Selenium	ND	2.5		mg/Kg	1	2/8/2012 9:46:02 AM
Silver	ND	0.25		mg/Kg	1	2/8/2012 9:46:02 AM
Thallium	ND	2.5		mg/Kg	1	2/8/2012 9:46:02 AM
Uranium	0.48	5.0	J	mg/Kg	1	2/8/2012 9:46:02 AM
Vanadium	19	2.5		mg/Kg	1	2/8/2012 9:46:02 AM
Zinc	19	2.5		mg/Kg	1	2/8/2012 9:46:02 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201885

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-7 (1.5-2.0')

**Project:** RCRA Background Investigation

**Collection Date:** 1/27/2012 3:35:00 PM

**Lab ID:** 1201885-014

**Matrix:** SOIL

**Received Date:** 1/31/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	2.9	1.5		mg/Kg	5	2/1/2012 11:52:55 PM
Chloride	ND	7.5		mg/Kg	5	2/1/2012 11:52:55 PM
Sulfate	10	7.5		mg/Kg	5	2/1/2012 11:52:55 PM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>ELS</b>
Mercury	0.013	0.033	J	mg/kg	1	2/2/2012 10:41:11 AM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	17,000	1,500		mg/Kg	500	2/13/2012 7:53:19 AM
Antimony	ND	2.5		mg/Kg	1	2/8/2012 9:50:14 AM
Arsenic	2.5	2.5		mg/Kg	1	2/8/2012 9:50:14 AM
Barium	760	2.0		mg/Kg	20	2/10/2012 7:58:10 AM
Beryllium	0.51	0.15		mg/Kg	1	2/8/2012 9:50:14 AM
Boron	6.4	4.0		mg/Kg	2	2/8/2012 9:52:22 AM
Cadmium	ND	0.10		mg/Kg	1	2/8/2012 9:50:14 AM
Chromium	7.5	0.30		mg/Kg	1	2/8/2012 9:50:14 AM
Cobalt	4.4	0.30		mg/Kg	1	2/8/2012 9:50:14 AM
Copper	7.5	0.30		mg/Kg	1	2/8/2012 9:50:14 AM
Iron	16,000	490		mg/Kg	500	3/16/2012 10:31:29 AM
Lead	2.8	0.25		mg/Kg	1	2/8/2012 9:50:14 AM
Manganese	260	0.99		mg/Kg	10	3/16/2012 10:20:14 AM
Molybdenum	0.31	0.40	J	mg/Kg	1	2/8/2012 9:50:14 AM
Nickel	6.6	0.50		mg/Kg	1	2/8/2012 9:50:14 AM
Selenium	ND	2.5		mg/Kg	1	2/8/2012 9:50:14 AM
Silver	ND	0.25		mg/Kg	1	2/8/2012 9:50:14 AM
Thallium	ND	2.5		mg/Kg	1	2/8/2012 9:50:14 AM
Uranium	ND	5.0		mg/Kg	1	2/8/2012 9:50:14 AM
Vanadium	24	2.5		mg/Kg	1	2/8/2012 9:50:14 AM
Zinc	24	2.5		mg/Kg	1	2/8/2012 9:50:14 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201885

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-8 (0-0.5')

**Project:** RCRA Background Investigation

**Collection Date:** 1/27/2012 3:50:00 PM

**Lab ID:** 1201885-015

**Matrix:** SOIL

**Received Date:** 1/31/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	0.85	1.5	J	mg/Kg	5	2/2/2012 12:27:44 AM
Chloride	ND	7.5		mg/Kg	5	2/2/2012 12:27:44 AM
Sulfate	4.0	7.5	J	mg/Kg	5	2/2/2012 12:27:44 AM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>ELS</b>
Mercury	0.0089	0.033	J	mg/kg	1	2/2/2012 10:43:08 AM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	9,700	600		mg/Kg	200	2/13/2012 7:55:20 AM
Antimony	0.57	2.5	J	mg/Kg	1	2/8/2012 9:54:25 AM
Arsenic	1.6	2.5	J	mg/Kg	1	2/8/2012 9:54:25 AM
Barium	150	0.50		mg/Kg	5	2/10/2012 8:09:39 AM
Beryllium	0.33	0.15		mg/Kg	1	2/8/2012 9:54:25 AM
Boron	4.0	2.0		mg/Kg	1	2/8/2012 9:54:25 AM
Cadmium	ND	0.10		mg/Kg	1	2/8/2012 9:54:25 AM
Chromium	4.6	0.30		mg/Kg	1	2/8/2012 9:54:25 AM
Cobalt	2.7	0.30		mg/Kg	1	2/8/2012 9:54:25 AM
Copper	4.0	0.30		mg/Kg	1	2/8/2012 9:54:25 AM
Iron	8,700	200		mg/Kg	200	3/16/2012 10:35:37 AM
Lead	2.3	0.25		mg/Kg	1	2/8/2012 9:54:25 AM
Manganese	180	1.0		mg/Kg	10	3/16/2012 10:33:47 AM
Molybdenum	0.22	0.40	J	mg/Kg	1	2/8/2012 9:54:25 AM
Nickel	3.7	0.50		mg/Kg	1	2/8/2012 9:54:25 AM
Selenium	ND	2.5		mg/Kg	1	2/8/2012 9:54:25 AM
Silver	ND	0.25		mg/Kg	1	2/8/2012 9:54:25 AM
Thallium	ND	2.5		mg/Kg	1	2/8/2012 9:54:25 AM
Uranium	ND	5.0		mg/Kg	1	2/8/2012 9:54:25 AM
Vanadium	15	2.5		mg/Kg	1	2/8/2012 9:54:25 AM
Zinc	15	2.5		mg/Kg	1	2/8/2012 9:54:25 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201885

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-8 (1.5-2.0')

**Project:** RCRA Background Investigation

**Collection Date:** 1/27/2012 3:55:00 PM

**Lab ID:** 1201885-016

**Matrix:** SOIL

**Received Date:** 1/31/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	12	6.0		mg/Kg	20	2/2/2012 1:19:58 AM
Chloride	540	30		mg/Kg	20	2/2/2012 1:19:58 AM
Sulfate	10,000	30	E	mg/Kg	20	2/2/2012 1:19:58 AM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>ELS</b>
Mercury	ND	0.033		mg/kg	1	2/2/2012 10:44:54 AM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	20,000	1,500		mg/Kg	500	2/13/2012 7:57:23 AM
Antimony	ND	2.5		mg/Kg	1	2/8/2012 10:11:44 AM
Arsenic	2.9	2.5		mg/Kg	1	2/8/2012 10:11:44 AM
Barium	480	1.0		mg/Kg	10	2/10/2012 8:13:32 AM
Beryllium	0.67	0.15		mg/Kg	1	2/8/2012 10:11:44 AM
Boron	9.9	2.0		mg/Kg	1	2/8/2012 10:11:44 AM
Cadmium	ND	0.10		mg/Kg	1	2/8/2012 10:11:44 AM
Chromium	8.3	0.30		mg/Kg	1	2/8/2012 10:11:44 AM
Cobalt	4.1	0.30		mg/Kg	1	2/8/2012 10:11:44 AM
Copper	5.2	0.30		mg/Kg	1	2/8/2012 10:11:44 AM
Iron	13,000	480		mg/Kg	500	3/16/2012 10:41:52 AM
Lead	1.4	0.25		mg/Kg	1	2/8/2012 10:11:44 AM
Manganese	360	0.96		mg/Kg	10	3/16/2012 10:39:52 AM
Molybdenum	0.90	0.40		mg/Kg	1	2/8/2012 10:11:44 AM
Nickel	5.4	0.50		mg/Kg	1	2/8/2012 10:11:44 AM
Selenium	ND	2.5		mg/Kg	1	2/8/2012 10:11:44 AM
Silver	ND	0.25		mg/Kg	1	2/8/2012 10:11:44 AM
Thallium	ND	2.5		mg/Kg	1	2/8/2012 10:11:44 AM
Uranium	ND	5.0		mg/Kg	1	2/8/2012 10:11:44 AM
Vanadium	24	2.5		mg/Kg	1	2/8/2012 10:11:44 AM
Zinc	21	2.5		mg/Kg	1	2/8/2012 10:11:44 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201885

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-7 (0-0.5') DUP

**Project:** RCRA Background Investigation

**Collection Date:** 1/27/2012 3:30:00 PM

**Lab ID:** 1201885-017

**Matrix:** SOIL

**Received Date:** 1/31/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	ND	1.5		mg/Kg	5	2/2/2012 9:44:52 AM
Chloride	ND	7.5		mg/Kg	5	2/2/2012 9:44:52 AM
Sulfate	1.4	7.5	J	mg/Kg	5	2/2/2012 9:44:52 AM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>ELS</b>
Mercury	0.011	0.033	J	mg/kg	1	2/2/2012 10:50:11 AM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	11,000	1,500		mg/Kg	500	2/13/2012 7:59:30 AM
Antimony	ND	2.5		mg/Kg	1	2/8/2012 10:16:01 AM
Arsenic	2.2	2.5	J	mg/Kg	1	2/8/2012 10:16:01 AM
Barium	160	0.50		mg/Kg	5	2/10/2012 8:20:00 AM
Beryllium	0.36	0.15		mg/Kg	1	2/8/2012 10:16:01 AM
Boron	4.0	2.0		mg/Kg	1	2/8/2012 10:16:01 AM
Cadmium	ND	0.10		mg/Kg	1	2/8/2012 10:16:01 AM
Chromium	5.3	0.30		mg/Kg	1	2/8/2012 10:16:01 AM
Cobalt	3.0	0.30		mg/Kg	1	2/8/2012 10:16:01 AM
Copper	5.1	0.30		mg/Kg	1	2/8/2012 10:16:01 AM
Iron	12,000	500		mg/Kg	500	3/18/2012 12:46:41 PM
Lead	2.7	0.25		mg/Kg	1	2/8/2012 10:16:01 AM
Manganese	200	0.99		mg/Kg	10	3/16/2012 10:43:55 AM
Molybdenum	0.23	0.40	J	mg/Kg	1	2/8/2012 10:16:01 AM
Nickel	4.3	0.50		mg/Kg	1	2/8/2012 10:16:01 AM
Selenium	ND	2.5		mg/Kg	1	2/8/2012 10:16:01 AM
Silver	ND	0.25		mg/Kg	1	2/8/2012 10:16:01 AM
Thallium	ND	2.5		mg/Kg	1	2/8/2012 10:16:01 AM
Uranium	0.37	5.0	J	mg/Kg	1	2/8/2012 10:16:01 AM
Vanadium	17	2.5		mg/Kg	1	2/8/2012 10:16:01 AM
Zinc	18	2.5		mg/Kg	1	2/8/2012 10:16:01 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201885

Date Reported: 4/13/2012

CLIENT: Western Refining Southwest, Inc.

Client Sample ID: BK-EB-012712

Project: RCRA Background Investigation

Collection Date: 1/27/2012 4:25:00 PM

Lab ID: 1201885-018

Matrix: AQUEOUS

Received Date: 1/31/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 200.7: DISSOLVED METALS</b>						Analyst: RAG
Aluminum	ND	0.020		mg/L	1	2/10/2012 3:10:48 PM
Barium	ND	0.0020		mg/L	1	2/10/2012 3:10:48 PM
Beryllium	ND	0.0020		mg/L	1	2/10/2012 3:10:48 PM
Boron	ND	0.040		mg/L	1	2/10/2012 3:10:48 PM
Cadmium	ND	0.0020		mg/L	1	2/10/2012 3:10:48 PM
Chromium	0.00077	0.0060	J	mg/L	1	2/10/2012 3:10:48 PM
Cobalt	0.00059	0.0060	J	mg/L	1	2/10/2012 3:10:48 PM
Copper	ND	0.0060		mg/L	1	2/10/2012 3:10:48 PM
Iron	ND	0.020		mg/L	1	2/13/2012 2:57:17 PM
Lead	ND	0.0050		mg/L	1	2/10/2012 3:10:48 PM
Manganese	0.00085	0.0020	J	mg/L	1	2/10/2012 3:10:48 PM
Molybdenum	ND	0.0080		mg/L	1	2/10/2012 3:10:48 PM
Nickel	ND	0.010		mg/L	1	2/10/2012 3:10:48 PM
Silver	ND	0.0050		mg/L	1	2/10/2012 3:10:48 PM
Vanadium	ND	0.050		mg/L	1	2/10/2012 3:10:48 PM
Zinc	0.081	0.010		mg/L	1	2/13/2012 2:57:17 PM
<b>EPA METHOD 200.7: TOTAL METALS</b>						Analyst: RAG
Aluminum	0.042	0.020		mg/L	1	2/6/2012 7:27:52 PM
Barium	0.0010	0.0020	J	mg/L	1	2/6/2012 7:27:52 PM
Beryllium	ND	0.0020		mg/L	1	2/6/2012 7:27:52 PM
Boron	0.0036	0.040	J	mg/L	1	2/6/2012 7:27:52 PM
Cadmium	ND	0.0020		mg/L	1	2/6/2012 7:27:52 PM
Chromium	0.00093	0.0060	J	mg/L	1	2/6/2012 7:27:52 PM
Cobalt	ND	0.0060		mg/L	1	2/6/2012 7:27:52 PM
Copper	0.0045	0.0060	J	mg/L	1	2/6/2012 7:27:52 PM
Iron	0.063	0.020		mg/L	1	2/6/2012 7:27:52 PM
Lead	ND	0.0050		mg/L	1	2/6/2012 7:27:52 PM
Manganese	0.00097	0.0020	J	mg/L	1	2/6/2012 7:27:52 PM
Molybdenum	ND	0.0080		mg/L	1	2/6/2012 7:27:52 PM
Nickel	0.00063	0.010	J	mg/L	1	2/6/2012 7:27:52 PM
Silver	ND	0.0050		mg/L	1	2/6/2012 7:27:52 PM
Vanadium	ND	0.050		mg/L	1	2/6/2012 7:27:52 PM
Zinc	0.0099	0.010	J	mg/L	1	2/6/2012 7:27:52 PM
<b>EPA 200.8: DISSOLVED METALS</b>						Analyst: SNV
Antimony	ND	0.0010		mg/L	1	2/7/2012 3:11:22 PM
Arsenic	ND	0.0010		mg/L	1	2/7/2012 3:11:22 PM
Selenium	ND	0.0010		mg/L	1	2/7/2012 3:11:22 PM
Thallium	ND	0.0010		mg/L	1	2/7/2012 3:11:22 PM
Uranium	ND	0.0010		mg/L	1	2/8/2012 10:52:35 AM
<b>200.8 ICPMS METALS:TOTAL</b>						Analyst: SNV

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1201885

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-EB-012712

**Project:** RCRA Background Investigation

**Collection Date:** 1/27/2012 4:25:00 PM

**Lab ID:** 1201885-018

**Matrix:** AQUEOUS

**Received Date:** 1/31/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>200.8 ICPMS METALS:TOTAL</b>						Analyst: <b>SNV</b>
Antimony	ND	0.0025		mg/L	2.5	2/6/2012 2:54:16 PM
Arsenic	ND	0.0025		mg/L	2.5	2/6/2012 2:54:16 PM
Selenium	ND	0.0025		mg/L	2.5	2/6/2012 2:54:16 PM
Thallium	ND	0.0025		mg/L	2.5	2/6/2012 2:54:16 PM
Uranium	ND	0.0025		mg/L	2.5	2/6/2012 2:54:16 PM
<b>EPA METHOD 245.1: MERCURY</b>						Analyst: <b>JLF</b>
Mercury	0.000050	0.00020	J	mg/L	1	2/6/2012 3:41:25 PM

**Qualifiers:**

- \*/X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

**CASE NARRATIVE**

February 22, 2012

**Lab Name: Anatek Labs, Inc.** 1282 Alturas Drive, Moscow, ID 83843 [www.anateklabs.com](http://www.anateklabs.com) FL NELAP E87893, NV ID13-2004-31, WA DOE C126, OR ELAP ID200001, MT 0028, ID, CO, NM

**Project Tracking No.:** 1201885**Anatek Batch:** 120201021

**Project Summary:** Seventeen (17) soil samples were received on 2/1/2012 for Total Cyanide (EPA 335.4) analysis. All samples were received with the appropriate chain of custody. Samples were received at 5.7C.

<u>Client Sample ID</u>	<u>Anatek Sample ID</u>	<u>Method/Prep Method</u>
1201885-001B BK-1 (0-0.5')	120201021-001	EPA 335.4
1201885-002B BK-1 (1.5-2.0')	120201021-002	EPA 335.4
1201885-003B BK-2 (0-0.5')	120201021-003	EPA 335.4
1201885-004B BK-2 (1.5-2.0')	120201021-004	EPA 335.4
1201885-005B BK-3 (0-0.5')	120201021-005	EPA 335.4
1201885-006B BK-3 (1.5-2.0')	120201021-006	EPA 335.4
1201885-007B BK-4 (0-0.5')	120201021-007	EPA 335.4
1201885-008B BK-4 (1.5-2.0')	120201021-008	EPA 335.4
1201885-009B BK-5 (0-0.5')	120201021-009	EPA 335.4
1201885-010B BK-5 (1.5-2.0')	120201021-010	EPA 335.4
1201885-011B BK-6 (0-0.5')	120201021-011	EPA 335.4
1201885-012B BK-6 (1.5-2.0')	120201021-012	EPA 335.4
1201885-013B BK-7 (0-0.5')	120201021-013	EPA 335.4
1201885-014B BK-7 (1.5-2.0')	120201021-014	EPA 335.4
1201885-015B BK-8 (0-0.5')	120201021-015	EPA 335.4
1201885-016B BK-8 (1.5-2.0')	120201021-016	EPA 335.4
1201885-017B BK-7 (0-0.5') DUP	120201021-017	EPA 335.4

**QA/QC Checks**

<u>Parameters</u>	<u>Yes / No</u>	<u>Exceptions / Deviations</u>
Sample Holding Time Valid?	Y	NA
Surrogate Recoveries Valid?	NA	NA
QC Sample(s) Recoveries Valid?	Y	NA
Method Blank(s) Valid?	Y	NA
Tune(s) Valid?	NA	NA
Internal Standard Responses Valid?	NA	NA
Initial Calibration Curve(s) Valid?	Y	NA
Continuing Calibration(s) Valid?	Y	NA
Comments:	Y	NA

**1. Holding Time Requirements**

No problems encountered.

**2. GC/MS Tune Requirements**

N/A

**3. Calibration Requirements**

No problems encountered.

**4. Surrogate Recovery Requirements**

N/A.

**5. QC Sample (LCS/MS/MSD) Recovery Requirements**

No problems encountered.

**6. Method Blank Requirements**

No problems encountered.

**7. Internal Standard(s) Response Requirements**

No problems encountered.

**8. Comments**

None.

**I certify that this data package is in compliance with the terms and conditions of the contract. Release of the data contained in this data package has been authorized by the Laboratory Manager or his designee.**

Approved by:

  
\_\_\_\_\_

# Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com  
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

**Client:** HALL ENVIRONMENTAL ANALYSIS LAB      **Batch #:** 120201021  
**Address:** 4901 HAWKINS NE SUITE D      **Project Name:** 1201885  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

## Analytical Results Report

**Sample Number** 120201021-001      **Sampling Date** 1/27/2012      **Date/Time Received** 2/1/2012 10:37 AM  
**Client Sample ID** 1201885-001B / BK-1 (0-0.5)      **Sampling Time** 1:30 PM  
**Matrix** Soil      **Sample Location**  
**Comments**

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/Kg	0.3	2/9/2012	CRW	EPA 335.4	
%moisture	12.2	Percent		2/14/2012	CRW	%moisture	

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**Client:** HALL ENVIRONMENTAL ANALYSIS LAB      **Batch #:** 120201021  
**Address:** 4901 HAWKINS NE SUITE D      **Project Name:** 1201885  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

## Analytical Results Report

<b>Sample Number</b>	120201021-002	<b>Sampling Date</b>	1/27/2012	<b>Date/Time Received</b>	2/1/2012	10:37 AM
<b>Client Sample ID</b>	1201885-002B / BK-1 (1.5-2.0)	<b>Sampling Time</b>	1:34 PM			
<b>Matrix</b>	Soil	<b>Sample Location</b>				
<b>Comments</b>						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/Kg	0.3	2/9/2012	CRW	EPA 335.4	
%moisture	4.5	Percent		2/14/2012	CRW	%moisture	

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**Client:** HALL ENVIRONMENTAL ANALYSIS LAB      **Batch #:** 120201021  
**Address:** 4901 HAWKINS NE SUITE D      **Project Name:** 1201885  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

## Analytical Results Report

<b>Sample Number</b>	120201021-003	<b>Sampling Date</b>	1/27/2012	<b>Date/Time Received</b>	2/1/2012	10:37 AM	
<b>Client Sample ID</b>	1201885-003B / BK-2 (0-0.5)	<b>Sampling Time</b>	2:05 PM				
<b>Matrix</b>	Soil	<b>Sample Location</b>					
<b>Comments</b>							
Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/Kg	0.3	2/9/2012	CRW	EPA 335.4	
%moisture	9.4	Percent		2/14/2012	CRW	%moisture	

# Anatek Labs, Inc.

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

**Client:** HALL ENVIRONMENTAL ANALYSIS LAB      **Batch #:** 120201021  
**Address:** 4901 HAWKINS NE SUITE D      **Project Name:** 1201885  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

## Analytical Results Report

<b>Sample Number</b>	120201021-004	<b>Sampling Date</b>	1/27/2012	<b>Date/Time Received</b>	2/1/2012	10:37 AM	
<b>Client Sample ID</b>	1201885-004B / BK-2 (1.5-2.0)	<b>Sampling Time</b>	2:10 PM				
<b>Matrix</b>	Soil	<b>Sample Location</b>					
<b>Comments</b>							
<b>Parameter</b>	<b>Result</b>	<b>Units</b>	<b>PQL</b>	<b>Analysis Date</b>	<b>Analyst</b>	<b>Method</b>	<b>Qualifier</b>
Cyanide	ND	mg/Kg	0.3	2/9/2012	CRW	EPA 335.4	
%moisture	7	Percent		2/14/2012	CRW	%moisture	

# Anatek Labs, Inc.

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**Client:** HALL ENVIRONMENTAL ANALYSIS LAB      **Batch #:** 120201021  
**Address:** 4901 HAWKINS NE SUITE D      **Project Name:** 1201885  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

## Analytical Results Report

<b>Sample Number</b>	120201021-005	<b>Sampling Date</b>	1/27/2012	<b>Date/Time Received</b>	2/1/2012	10:37 AM
<b>Client Sample ID</b>	1201885-005B / BK-3 (0-0.5)	<b>Sampling Time</b>	2:30 PM			
<b>Matrix</b>	Soil	<b>Sample Location</b>				
<b>Comments</b>						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/Kg	0.3	2/9/2012	CRW	EPA 335.4	
%moisture	10.6	Percent		2/14/2012	CRW	%moisture	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT: CERT0028; NM: ID00013; OR:ID200001-002; WA:C595  
Certifications held by Anatek Labs WA: EPA:WA00169; CA: Cert2632; ID:WA00169; WA:C585; MT: Cert0095

# Anatek Labs, Inc.

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

**Client:** HALL ENVIRONMENTAL ANALYSIS LAB      **Batch #:** 120201021  
**Address:** 4901 HAWKINS NE SUITE D      **Project Name:** 1201885  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

## Analytical Results Report

<b>Sample Number</b>	120201021-006	<b>Sampling Date</b>	1/27/2012	<b>Date/Time Received</b>	2/1/2012	10:37 AM
<b>Client Sample ID</b>	1201885-006B / BK-3 (1.5-2.0)	<b>Sampling Time</b>	2:05 PM			
<b>Matrix</b>	Soil	<b>Sample Location</b>				
<b>Comments</b>						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/Kg	0.3	2/9/2012	CRW	EPA 335.4	
%moisture	4.2	Percent		2/14/2012	CRW	%moisture	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:JD00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595  
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C595; MT:Cert0095

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**Client:** HALL ENVIRONMENTAL ANALYSIS LAB  
**Address:** 4901 HAWKINS NE SUITE D  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

**Batch #:** 120201021  
**Project Name:** 1201885

## Analytical Results Report

<b>Sample Number</b>	120201021-007	<b>Sampling Date</b>	1/27/2012	<b>Date/Time Received</b>	2/1/2012	10:37 AM
<b>Client Sample ID</b>	1201885-007B / BK-4 (0-0.5)	<b>Sampling Time</b>	2:40 PM			
<b>Matrix</b>	Soil	<b>Sample Location</b>				
<b>Comments</b>						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/Kg	0.3	2/9/2012	CRW	EPA 335.4	
%moisture	21.8	Percent		2/14/2012	CRW	%moisture	

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**Client:** HALL ENVIRONMENTAL ANALYSIS LAB      **Batch #:** 120201021  
**Address:** 4901 HAWKINS NE SUITE D      **Project Name:** 1201885  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

## Analytical Results Report

<b>Sample Number</b>	120201021-008	<b>Sampling Date</b>	1/27/2012	<b>Date/Time Received</b>	2/1/2012	10:37 AM
<b>Client Sample ID</b>	1201885-008B / BK-4 (1.5-2.0)	<b>Sampling Time</b>	2:45 PM			
<b>Matrix</b>	Soil	<b>Sample Location</b>				
<b>Comments</b>						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/Kg	0.3	2/9/2012	CRW	EPA 335.4	
%moisture	3.6	Percent		2/14/2012	CRW	%moisture	

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**Client:** HALL ENVIRONMENTAL ANALYSIS LAB      **Batch #:** 120201021  
**Address:** 4901 HAWKINS NE SUITE D      **Project Name:** 1201885  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

## Analytical Results Report

<b>Sample Number</b>	120201021-009	<b>Sampling Date</b>	1/27/2012	<b>Date/Time Received</b>	2/1/2012	10:37 AM
<b>Client Sample ID</b>	1201885-009B / BK-5 (0-0.5)	<b>Sampling Time</b>	3:00 PM			
<b>Matrix</b>	Soil	<b>Sample Location</b>				
<b>Comments</b>						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/Kg	0.3	2/9/2012	CRW	EPA 335.4	
%moisture	14.3	Percent		2/14/2012	CRW	%moisture	

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**Client:** HALL ENVIRONMENTAL ANALYSIS LAB      **Batch #:** 120201021  
**Address:** 4901 HAWKINS NE SUITE D      **Project Name:** 1201885  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

## Analytical Results Report

<b>Sample Number</b>	120201021-010	<b>Sampling Date</b>	1/27/2012	<b>Date/Time Received</b>	2/1/2012	10:37 AM
<b>Client Sample ID</b>	1201885-010B / BK-5 (1.5-2.0)	<b>Sampling Time</b>	3:05 PM			
<b>Matrix</b>	Soil	<b>Sample Location</b>				
<b>Comments</b>						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/Kg	0.3	2/9/2012	CRW	EPA 335.4	
%moisture	4.4	Percent		2/14/2012	CRW	%moisture	

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**Client:** HALL ENVIRONMENTAL ANALYSIS LAB      **Batch #:** 120201021  
**Address:** 4901 HAWKINS NE SUITE D      **Project Name:** 1201885  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

## Analytical Results Report

<b>Sample Number</b>	120201021-011	<b>Sampling Date</b>	1/27/2012	<b>Date/Time Received</b>	2/1/2012	10:37 AM	
<b>Client Sample ID</b>	1201885-011B / BK-6 (0-0.5)	<b>Sampling Time</b>	3:15 PM				
<b>Matrix</b>	Soil	<b>Sample Location</b>					
<b>Comments</b>							
<b>Parameter</b>	<b>Result</b>	<b>Units</b>	<b>PQL</b>	<b>Analysis Date</b>	<b>Analyst</b>	<b>Method</b>	<b>Qualifier</b>
Cyanide	ND	mg/Kg	0.3	2/9/2012	CRW	EPA 335.4	
%moisture	10.6	Percent		2/14/2012	CRW	%moisture	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM:ID00013; OR:ID200001-002; WA:C595  
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**Address:** 4901 HAWKINS NE SUITE D  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

**Batch #:** 120201021  
**Project Name:** 1201885

## Analytical Results Report

<b>Sample Number</b>	120201021-012	<b>Sampling Date</b>	1/27/2012	<b>Date/Time Received</b>	2/1/2012	10:37 AM
<b>Client Sample ID</b>	1201885-012B / BK-6 (1.5-2.0)	<b>Sampling Time</b>	3:20 PM			
<b>Matrix</b>	Soil	<b>Sample Location</b>				
<b>Comments</b>						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/Kg	0.3	2/9/2012	CRW	EPA 335.4	
%moisture	4.1	Percent		2/14/2012	CRW	%moisture	

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**Address:** 4901 HAWKINS NE SUITE D      **Project Name:** 1201885  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

## Analytical Results Report

<b>Sample Number</b>	120201021-013	<b>Sampling Date</b>	1/27/2012	<b>Date/Time Received</b>	2/1/2012	10:37 AM	
<b>Client Sample ID</b>	1201885-013B / BK-7 (0-0.5)	<b>Sampling Time</b>	3:30 PM				
<b>Matrix</b>	Soil	<b>Sample Location</b>					
<b>Comments</b>							
Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/Kg	0.3	2/9/2012	CRW	EPA 335.4	
%moisture	9.5	Percent		2/14/2012	CRW	%moisture	

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**Address:** 4901 HAWKINS NE SUITE D      **Project Name:** 1201885  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

## Analytical Results Report

<b>Sample Number</b>	120201021-014	<b>Sampling Date</b>	1/27/2012	<b>Date/Time Received</b>	2/1/2012	10:37 AM
<b>Client Sample ID</b>	1201885-014B / BK-7 (1.5-2.0)	<b>Sampling Time</b>	3:35 PM			
<b>Matrix</b>	Soil	<b>Sample Location</b>				
<b>Comments</b>						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/Kg	0.3	2/9/2012	CRW	EPA 335.4	
%moisture	5.2	Percent		2/14/2012	CRW	%moisture	

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**Client:** HALL ENVIRONMENTAL ANALYSIS LAB      **Batch #:** 120201021  
**Address:** 4901 HAWKINS NE SUITE D      **Project Name:** 1201885  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

## Analytical Results Report

<b>Sample Number</b>	120201021-015	<b>Sampling Date</b>	1/27/2012	<b>Date/Time Received</b>	2/1/2012	10:37 AM
<b>Client Sample ID</b>	1201885-015B / BK-8 (0-0.5)	<b>Sampling Time</b>	3:50 PM			
<b>Matrix</b>	Soil	<b>Sample Location</b>				
<b>Comments</b>						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/Kg	0.3	2/9/2012	CRW	EPA 335.4	
%moisture	7.4	Percent		2/14/2012	CRW	%moisture	

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**Client:** HALL ENVIRONMENTAL ANALYSIS LAB      **Batch #:** 120201021  
**Address:** 4901 HAWKINS NE SUITE D      **Project Name:** 1201885  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

## Analytical Results Report

<b>Sample Number</b>	120201021-016	<b>Sampling Date</b>	1/27/2012	<b>Date/Time Received</b>	2/1/2012	10:37 AM
<b>Client Sample ID</b>	1201885-016B / BK-8 (1.5-2.0)	<b>Sampling Time</b>	3:55 PM			
<b>Matrix</b>	Soil	<b>Sample Location</b>				
<b>Comments</b>						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/Kg	0.3	2/9/2012	CRW	EPA 335.4	
%moisture	8.7	Percent		2/14/2012	CRW	%moisture	

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:JD00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:80142; MT: CERT0028; NM: ID00013; OR:ID200001-002; WA:C595  
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**Client:** HALL ENVIRONMENTAL ANALYSIS LAB  
**Address:** 4901 HAWKINS NE SUITE D  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

**Batch #:** 120201021  
**Project Name:** 1201885

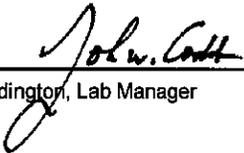
## Analytical Results Report

<b>Sample Number</b>	120201021-017	<b>Sampling Date</b>	1/27/2012	<b>Date/Time Received</b>	2/1/2012	10:37 AM
<b>Client Sample ID</b>	1201885-017B / BK-7 (0-0.5) DUP	<b>Sampling Time</b>	3:30 PM			
<b>Matrix</b>	Soil	<b>Sample Location</b>				
<b>Comments</b>						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/Kg	0.3	2/9/2012	CRW	EPA 335.4	
%moisture	9.6	Percent		2/14/2012	CRW	%moisture	

Authorized Signature

  
\_\_\_\_\_  
John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level  
ND Not Detected  
PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.  
The results reported relate only to the samples indicated.  
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

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**Address:** 4901 HAWKINS NE SUITE D  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

**Batch #:** 120201021  
**Project Name:** 1201885

## Analytical Results Report Quality Control Data

### Lab Control Sample

Parameter	LCS Result	Units	LCS Spike	%Rec	AR %Rec	Prep Date	Analysis Date
Cyanide	0.548	mg/kg	0.5	109.6	80-120	2/9/2012	2/9/2012
Cyanide	0.524	mg/kg	0.5	104.8	80-120	2/9/2012	2/9/2012

### Matrix Spike

Sample Number	Parameter	Sample Result	MS Result	Units	MS Spike	%Rec	AR %Rec	Prep Date	Analysis Date
120201021-016	Cyanide	ND	14.6	mg/kg	13.7	106.6	60-140	2/9/2012	2/9/2012
120201021-002	Cyanide	ND	14.1	mg/kg	13	108.5	60-140	2/9/2012	2/9/2012

### Matrix Spike Duplicate

Parameter	MSD Result	Units	MSD Spike	%Rec	%RPD	AR %RPD	Prep Date	Analysis Date
Cyanide	14.9	mg/kg	13.7	108.8	2.0	0-25	2/9/2012	2/9/2012
Cyanide	14.0	mg/kg	13	107.7	0.7	0-25	2/9/2012	2/9/2012

### Method Blank

Parameter	Result	Units	PQL	Prep Date	Analysis Date
Cyanide	ND	mg/Kg	0.3	2/9/2012	2/9/2012
Cyanide	ND	mg/Kg	0.3	2/9/2012	2/9/2012

AR Acceptable Range  
ND Not Detected  
PQL Practical Quantitation Limit  
RPD Relative Percentage Difference

### Comments:

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C585  
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## Login Report

**Customer Name:** HALL ENVIRONMENTAL ANALYSIS LAB  
4901 HAWKINS NE SUITE D  
ALBUQUERQUE NM 87109

**Order ID:** 120201021  
**Order Date:** 2/1/2012

**Contact Name:** ANDY FREEMAN

**Project Name:** 1201885

**Comment:**

---

**Sample #:** 120201021-001 **Customer Sample #:** 1201885-001B / BK-1 (0-0.5)

**Recv'd:**  **Collector:** **Date Collected:** 1/27/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 2/1/2012 10:37:00 A

**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/13/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/13/2012	<u>Normal (6-10 Days)</u>

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**Sample #:** 120201021-002 **Customer Sample #:** 1201885-002B / BK-1 (1.5-2.0)

**Recv'd:**  **Collector:** **Date Collected:** 1/27/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 2/1/2012 10:37:00 A

**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/13/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/13/2012	<u>Normal (6-10 Days)</u>

---

**Sample #:** 120201021-003 **Customer Sample #:** 1201885-003B / BK-2 (0-0.5)

**Recv'd:**  **Collector:** **Date Collected:** 1/27/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 2/1/2012 10:37:00 A

**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/13/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/13/2012	<u>Normal (6-10 Days)</u>

**Customer Name:** HALL ENVIRONMENTAL ANALYSIS LAB  
4901 HAWKINS NE SUITE D  
ALBUQUERQUE NM 87109

**Order ID:** 120201021  
**Order Date:** 2/1/2012

**Contact Name:** ANDY FREEMAN

**Project Name:** 1201885

**Comment:**

---

**Sample #:** 120201021-004 **Customer Sample #:** 1201885-004B / BK-2 (1.5-2.0)

**Recv'd:**  **Collector:** **Date Collected:** 1/27/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 2/1/2012 10:37:00 A  
**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/13/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/13/2012	<u>Normal (6-10 Days)</u>

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**Sample #:** 120201021-005 **Customer Sample #:** 1201885-005B / BK-3 (0-0.5)

**Recv'd:**  **Collector:** **Date Collected:** 1/27/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 2/1/2012 10:37:00 A  
**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/13/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/13/2012	<u>Normal (6-10 Days)</u>

---

**Sample #:** 120201021-006 **Customer Sample #:** 1201885-006B / BK-3 (1.5-2.0)

**Recv'd:**  **Collector:** **Date Collected:** 1/27/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 2/1/2012 10:37:00 A  
**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/13/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/13/2012	<u>Normal (6-10 Days)</u>

---

**Sample #:** 120201021-007 **Customer Sample #:** 1201885-007B / BK-4 (0-0.5)

**Recv'd:**  **Collector:** **Date Collected:** 1/27/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 2/1/2012 10:37:00 A  
**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/13/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/13/2012	<u>Normal (6-10 Days)</u>

**Customer Name:** HALL ENVIRONMENTAL ANALYSIS LAB  
4901 HAWKINS NE SUITE D  
ALBUQUERQUE NM 87109

**Order ID:** 120201021  
**Order Date:** 2/1/2012

**Contact Name:** ANDY FREEMAN

**Project Name:** 1201885

**Comment:**

---

**Sample #:** 120201021-008 **Customer Sample #:** 1201885-008B / BK-4 (1.5-2.0)

**Recv'd:**  **Collector:** **Date Collected:** 1/27/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 2/1/2012 10:37:00 A  
**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/13/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/13/2012	<u>Normal (6-10 Days)</u>

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**Sample #:** 120201021-009 **Customer Sample #:** 1201885-009B / BK-5 (0-0.5)

**Recv'd:**  **Collector:** **Date Collected:** 1/27/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 2/1/2012 10:37:00 A  
**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/13/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/13/2012	<u>Normal (6-10 Days)</u>

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**Sample #:** 120201021-010 **Customer Sample #:** 1201885-010B / BK-5 (1.5-2.0)

**Recv'd:**  **Collector:** **Date Collected:** 1/27/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 2/1/2012 10:37:00 A  
**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/13/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/13/2012	<u>Normal (6-10 Days)</u>

---

**Sample #:** 120201021-011 **Customer Sample #:** 1201885-011B / BK-6 (0-0.5)

**Recv'd:**  **Collector:** **Date Collected:** 1/27/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 2/1/2012 10:37:00 A  
**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/13/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/13/2012	<u>Normal (6-10 Days)</u>

**Customer Name:** HALL ENVIRONMENTAL ANALYSIS LAB  
4901 HAWKINS NE SUITE D  
ALBUQUERQUE NM 87109

**Order ID:** 120201021  
**Order Date:** 2/1/2012

**Contact Name:** ANDY FREEMAN

**Project Name:** 1201885

**Comment:**

---

**Sample #:** 120201021-012 **Customer Sample #:** 1201885-012B / BK-6 (1.5-2.0)

**Recv'd:**  **Collector:** **Date Collected:** 1/27/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 2/1/2012 10:37:00 A  
**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/13/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/13/2012	<u>Normal (6-10 Days)</u>

---

**Sample #:** 120201021-013 **Customer Sample #:** 1201885-013B / BK-7 (0-0.5)

**Recv'd:**  **Collector:** **Date Collected:** 1/27/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 2/1/2012 10:37:00 A  
**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/13/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/13/2012	<u>Normal (6-10 Days)</u>

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**Sample #:** 120201021-014 **Customer Sample #:** 1201885-014B / BK-7 (1.5-2.0)

**Recv'd:**  **Collector:** **Date Collected:** 1/27/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 2/1/2012 10:37:00 A  
**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/13/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/13/2012	<u>Normal (6-10 Days)</u>

---

**Sample #:** 120201021-015 **Customer Sample #:** 1201885-015B / BK-8 (0-0.5)

**Recv'd:**  **Collector:** **Date Collected:** 1/27/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 2/1/2012 10:37:00 A  
**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/13/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/13/2012	<u>Normal (6-10 Days)</u>

**Customer Name:** HALL ENVIRONMENTAL ANALYSIS LAB  
4901 HAWKINS NE SUITE D  
ALBUQUERQUE NM 87109

**Order ID:** 120201021  
**Order Date:** 2/1/2012

**Contact Name:** ANDY FREEMAN

**Project Name:** 1201885

**Comment:**

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**Sample #:** 120201021-016 **Customer Sample #:** 1201885-016B / BK-8 (1.5-2.0)

**Recv'd:**  **Collector:** **Date Collected:** 1/27/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 2/1/2012 10:37:00 A  
**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/13/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/13/2012	<u>Normal (6-10 Days)</u>

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**Sample #:** 120201021-017 **Customer Sample #:** 1201885-017B / BK-7 (0-0.5) DUP

**Recv'd:**  **Collector:** **Date Collected:** 1/27/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 2/1/2012 10:37:00 A  
**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/13/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/13/2012	<u>Normal (6-10 Days)</u>

### SAMPLE CONDITION RECORD

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Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature inside the cooler?	5.7
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	N/A
Is there a trip blank to accompany VOC samples?	N/A
Labels and chain agree?	Yes



CHAIN OF CUSTODY RECORD

PAGE: 1 OF 2

120201 021 HALL Last Due 2/13/2012  
 1st SAMP 1/27/2012 1st RCVD 2/1/2012  
 1201885

SUB CONTRACTOR: Anatek Labs COMPANY: Anatek Labs, Inc. PHONE: (208) 883-2839 FAX: (208) 882-9246  
 ADDRESS: 1282 Alkuras Dr ACCOUNT #:  
 CITY, STATE, ZIP: Moscow, ID 83843 EMAIL:

ITEM	SAMPLE	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	COLLECTION DATE	# CONTAINERS	ANALYTICAL COMMENTS
1	1201885-001B	BK-1 (0-0.5)	40ZGU	Soil	1/27/2012 1:30:00 PM	1 TOTAL CYANIDE	
2	1201885-002B	BK-1 (1.5-2.0')	40ZGU	Soil	1/27/2012 1:34:00 PM	1 TOTAL CYANIDE	
3	1201885-003B	BK-2 (0-0.5')	40ZGU	Soil	1/27/2012 2:05:00 PM	1 TOTAL CYANIDE	
4	1201885-004B	BK-2 (1.5-2.0')	40ZGU	Soil	1/27/2012 2:10:00 PM	1 TOTAL CYANIDE	
5	1201885-005B	BK-3 (0-0.5')	40ZGU	Soil	1/27/2012 2:30:00 PM	1 TOTAL CYANIDE	
6	1201885-006B	BK-3 (1.5-2.0')	40ZGU	Soil	1/27/2012 2:35:00 PM	1 TOTAL CYANIDE	
7	1201885-007B	BK-4 (0-0.5')	40ZGU	Soil	1/27/2012 2:40:00 PM	1 TOTAL CYANIDE	
8	1201885-008B	BK-4 (1.5-2.0')	40ZGU	Soil	1/27/2012 2:45:00 PM	1 TOTAL CYANIDE	
9	1201885-009B	BK-5 (0-0.5')	40ZGU	Soil	1/27/2012 3:00:00 PM	1 TOTAL CYANIDE	
10	1201885-010B	BK-5 (1.5-2.0')	40ZGU	Soil	1/27/2012 3:05:00 PM	1 TOTAL CYANIDE	
11	1201885-011B	BK-6 (0-0.5')	40ZGU	Soil	1/27/2012 3:15:00 PM	1 TOTAL CYANIDE	
12	1201885-012B	BK-6 (1.5-2.0')	40ZGU	Soil	1/27/2012 3:20:00 PM	1 TOTAL CYANIDE	
13	1201885-013B	BK-7 (0-0.5')	40ZGU	Soil	1/27/2012 3:30:00 PM	1 TOTAL CYANIDE	

SPECIAL INSTRUCTIONS/ COMMENTS:

return all coolers and blue ice. Thank you.  
 Please include the LAB ID and the CLIENT SAMPLE ID on all final reports. Please e-mail results to lab@hallenvironmental.com. Please

Relinquished By:	Date: 1/21/2012	Time: 2:43 PM	Received By:	Date:
Relinquished By:	Date:	Time:	Received By:	Date:
Relinquished By:	Date:	Time:	Received By:	Date:

**ANATEK LABS RECEIVING LIST**

TEMP: 57 °C

RECEIVED INTACT  
 LABELS & CHAINS AGREE  
 NO HEADSPACE  
 ICE / ICE-PACKS PRESENT  
 CUSTODY SEALS PRESENT: Y

PRESERVATIVES: \_\_\_\_\_  
 NUMBER OF CONTAINERS: 13 SHIPPED VIA: F  
 DATE & TIME: 2-1-12 10:37 INSPECTED BY: BT



Hall Environmental Analysis Laboratory  
 1901 Hawkins NE  
 Albuquerque, NM 87109  
 TEL: 505-345-3975  
 FAX: 505-345-4107  
 Website: www.hallenvironmental.com

SUB CONTRACTOR: **Anatek Labs** COMPANY: **Anatek Labs, Inc.** PHONE: **(208) 883-2839** FAX: **(208) 882-9246**  
 ADDRESS: **1282 Akuras Dr** ACCOUNT #: \_\_\_\_\_ EMAIL: \_\_\_\_\_  
 CITY, STATE, ZIP: **Moscow, ID 83843**

ITEM	SAMPLE	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	COLLECTION DATE	# CONTAINERS	ANALYTICAL COMMENTS
14	1201885-014B	BK-7 (1.5-2.0)	4OZGU	Soil	1/27/2012 3:35:00 PM	1 TOTAL	CYANIDE
15	1201885-015B	BK-8 (0-0.5)	4OZGU	Soil	1/27/2012 3:50:00 PM	1 TOTAL	CYANIDE
16	1201885-016B	BK-8 (1.5-2.0)	4OZGU	Soil	1/27/2012 3:55:00 PM	1 TOTAL	CYANIDE
17	1201885-017B	BK-7 (0-0.5) DUP	4OZGU	Soil	1/27/2012 3:30:00 PM	1 TOTAL	CYANIDE
18						0	
19						0	
20						0	

**SPECIAL INSTRUCTIONS/COMMENTS:**

return all coolers and blue ice. Thank you. \_\_\_\_\_ Please include the LAB ID and the CLIENT SAMPLE ID on all final reports. Please e-mail results to lab@hallenvironmental.com. Please

Relinquished By: _____ Date: 1/31/2012 Time: 2:43 PM Received By: _____ Date: _____ Time: _____	Relinquished By: _____ Date: _____ Time: _____ Received By: _____ Date: _____ Time: _____	Relinquished By: _____ Date: _____ Time: _____ Received By: _____ Date: _____ Time: _____	REPORT TRANSMITTAL DESIRED: HARD COPY (extra cost) <input type="checkbox"/> FAX <input type="checkbox"/> EMAIL <input type="checkbox"/> ONLINE <input type="checkbox"/> FOR LAB USE ONLY Temp of samples _____ C Attempt to Cool? <input type="checkbox"/> Comments: _____
TAIT: Standard RUSH Next BD 2nd BD 3rd BD			

# CYANIDE EXTRACTION BENCHSHEET SW 846

Instrument names & IDs: Denver A-160 balance; Alpkem FIA

Date	SAMPLE #	% Solids	Sample Amt (g)	H2O (mL)	Final Volume	Multiplier	Chemist
1/31/12	120125012-1	10.6	10.11	250	250	24.7	CMW
	120126014-1	9.5	10.14			26.0	
	120131027-1	91.8	10.04			27.2	
	-2	92.2	9.98			27.2	
	29-1	88.5	10.03			28.2	
	-2	88.9	10.18			27.6	
	-3	87.7	9.98			28.6	
	-4	90.7	9.99			27.6	
	-5	86.4	10.06			28.8	
	-6	91.2	10.12			27.1	
	-7	96.9	10.07			25.6	
	-8	94.8	10.11			26.1	
2/1/12	120131030-1	96.3	9.98	250	250	26.0	CMW
	-2	96.8	10.04			25.7	
	-3	97.1	10.02			25.5	
	-4	90.7	10.02			27.5	
	-5	92.1	10.03			27.1	
	-6	89.8	10.12			27.5	
	-7	95.1	10.02			26.2	
	-8	91.0	10.00			27.5	
	-9	91.4	10.00			27.4	
	-10	91.1	10.02			27.4	
2/2/12	120131030-11	91.9	10.02	250	250	27.1	CMW
	-12	93.5	10.00			26.7	
	-13	93.4	10.06			26.6	
	-14	93.0	10.02			26.9	
	-15	92.8	10.01			26.9	
	-16	92.4	10.03			27.0	
	-17	97.0	10.19			25.3	
	-18	92.1	10.07			27.0	
	31-1	96.8	10.06			25.7	
	-2	94.3	10.03			27.6	
2/6/12	120701021-1	87.8	10.02	250	250	28.4	CMW
	-2	95.5	10.05			26.0	
	-3	90.6	9.97			27.7	
	-4	93.0	10.04			26.8	
	-5	82.4	10.00			28.0	
	-6	95.8	10.05			26.0	
	-7	78.2	10.01			31.9	
	-8	96.3	10.03			25.9	
	-9	85.7	9.99			29.2	
	-10	95.6	9.98			26.2	
	120126025-1	67.2	10.01			37.2	
	170202028-1	91.0	10.02			27.4	

# CYANIDE EXTRACTION BENCHSHEET SW 846

Instrument names & IDs: Denver A-160 balance; Alchem FIA

Date	SAMPLE #	% Solids	Sample Amt (g)	H2O (mL)	Final Volume	Multiplier	Chemist	
2/7/12	120201021-11	89.4	10.03	250	250	27.9	CPW	
	-12	95.9	10.00			26.1		
	-13	90.5	10.02			27.6		
	-14	94.8	10.07			26.2		
	-15	92.6	10.03			26.9		
	-16	91.3	10.01			27.4		
	-17	90.4	10.11			27.4		
2/8/12	120201019-1	91.8	10.00	250	250	27.2	CPW	
	-2	93.7	10.02			26.6		
	120707027-1	93.0	10.01			26.9		
	-2	89.4	10.08			27.5		
2/8/12	120201019-3	96.7	10.00	250	250	25.9	CPW	
	-4	96.6	5.01	125	125	25.8		
	-5	94.6	5.00			26.4		
	-6	94.5	5.03			26.2		
	-7	94.8	5.10			25.9		
	-8	94.9	5.02			26.2		
	-9	97.2	4.99			25.8		
	-10	92.4	5.01			27.0		
	-11	94.3	5.00			26.5		
		120202031-1	15.0	5.00			16.7	
	2/10/12	120207014-1	95.4	10.04	250	250	26.1	CPW
120207017-1		89.4	10.04			27.9		
-2		92.2	10.00			27.1		
-3		96.7	10.08			25.8		
-4		94.9	10.00			26.3		
-5		95.3	10.01			26.2		
-6		95.5	10.09			25.9		
-7		90.3	9.99			27.7		
-8		90.2	10.05			27.6		
120207027-1		88.9	10.03			28.0		
-2		92.7	10.01			26.9		
-3		87.0	10.03			28.6		
-4		90.4	10.01			27.6		
-5		93.0	10.07			26.7		
-6		89.0	10.07			27.6		
-7		88.8	10.00			28.2		
-8		92.9	10.03			26.8		

**Total Cyanide by Semi-Automated Colorimetry**  
**Method: EPA 335.4\SM-4500-CN-E**  
**Distillation Bench Sheet**

Weak Acid Dissociable Cyanide by  
 SM 4500-CN-I (check WAD column)

Total Cyanide MS/MSD/LCS Soln: M825-01 Exp: 1/4/2013  
 Free Cyanide MS/MSD/LCS Soln: M824-05 Exp: 12/28/2012

**Method requirements:** All QC +/- 10%  
**Equipment:** Midi-vap  
**Instrument:** ALPCHEM FIA 3000  
**Absorbance:** 570nm

	Sample ID	Matrix	Preserved	Sample Amount (mL)**	Initial Multiplier*	Final Multiplier	Spike Amount (mL)	WAD? (check if yes)
1	120131030-18	soil epa	NaOH	50ml	27.0	same		
2	120201021-1				28.4			
3	-2				26.0			
4	-2ms				↓		1ml	
5	-2msd				↓		↓	
6	-1.5				↓		↓	
7	-BL				↓			
8	-3				27.7			
9	-4				26.8			
10	-5	↓	↓	↓	28.0	↓		
11	120201021-6	soil epa	NaOH	50ml	26.0	same		
12	-7				31.9			
13	-8				25.9			
14	-9				29.2			
15	-10				26.2			
16	-11				27.9			
17	-12				26.1			
18	-13				27.6			
19	-14				26.2			
20	-15	↓	↓	↓	26.9	↓		

\* If soils this calculation is taken from cyanide extraction bench sheet.

\*\* If soils, mLs of extract used for distillation.

**Extraction Reagents: Reagent #:**  
 methyl red indicator A041-03  
 18 N H<sub>2</sub>SO<sub>4</sub> A043-08  
 sulfamic acid R009-12  
 0.025N NaOH R014-16  
 51% MgCl<sub>2</sub> A043-06

**Analytical Reagents: Reagent #:**  
 Barbituric Acid R038-13  
 Sodium Phosphate R026-23  
 Chloramine-t R048-09  
 Pyridine R043-03

Distillation Initials/Date Distilled: LAN 2/8/12

Analyst Initials/Date Analyzed: LAN 2/9/12

**Total Cyanide by Semi-Automated Colorimetry**  
**Method: EPA 335.4\SM-4500-CN-E**  
**Distillation Bench Sheet**

Weak Acid Dissociable Cyanide by  
 SM 4500-CN-I (check WAD column)

Total Cyanide MS/MSD/LCS Soln: M825-07 <sup>M838-03 exp: 2/9/2013</sup> Exp: 1/4/2013  
 Free Cyanide MS/MSD/LCS Soln: M824-05 Exp: 12/28/2012

**Method requirements:** All QC +/- 10%  
**Equipment:** Midi-vap  
**Instrument:** ALPHEM FIA 3000  
**Absorbance:** 570nm

	Sample ID	Matrix	Preserved	Sample Amount (mL)**	Initial Multiplier*	Final Multiplier	Spike Amount (mL)	WAD? (check if yes)
1	120201021-16	soil epa	NaOH	50mL	27.4	same		
2	-16ms				↓		1ml	
3	-16ms0				↓			
4	-16s				1x		↓	
5	-16L				↓			
6	-17				27.4			
7	120201019-1				27.2			
8	-2				26.6			
9	120202027-1				26.9			
10	-2	↓	↓	↓	27.5	↓		
11	120201019-3	soil epa	NaOH	50mL	25.9	same		
12	-4				25.8			
13	-5				26.4			
14	-6				26.2			
15	-7				25.9			
16	-8				26.2			
17	-9				25.8			
18	-10				27.0			
19	-11				26.5			
20	120202031-1	↓	↓	↓	16.7	↓		

\* If soils this calculation is taken from cyanide extraction bench sheet.

\*\* If soils, mLs of extract used for distillation.

**Extraction Reagents: Reagent #:**  
 methyl red indicator A041-03  
 18 N H<sub>2</sub>SO<sub>4</sub> A043-08 A043-10  
 sulfamic acid R009-12  
 0.025N NaOH R014-16  
 51% MgCl<sub>2</sub> A043-06

**Analytical Reagents: Reagent #:**  
 Barbituric Acid R038-13  
 Sodium Phosphate R026-23  
 Chloramine-t R048-09  
 Pyridine R043-03

Distillation Initials/Date Distilled: CMW 2/9/12

Analyst Initials/Date Analyzed: CMW 2/9/12

CMW 2/14/12

(20208FIACNS) (20209FIACNS)

Peak	Cup	Name	Type	Dil	Wt	Area	Calc. (ppm)
1	2	Sync	SYNC		1	5390600	0.922962
2	0	Carryover	CO		1	13123	0.005170
3	0	Carryover	CO		1	1186	0.003133
B	0	Baseline	RB		1	-1111	0.002741
5	2	Cal 1.00 ppm	C		1	5834096	0.998655
6	2	Cal 1.00 ppm	C		1	5848290	1.001078
7	2	Cal 1.00 ppm	C		1	5845756	1.000646
B	0	Baseline	RB		1	996	0.003100
9	3	Cal 0.80 ppm	C		1	4595277	0.787222
10	3	Cal 0.80 ppm	C		1	4652028	0.796908
11	3	Cal 0.80 ppm	C		1	4693766	0.804031
B	0	Baseline	RB		1	-5784	0.001943
13	4	Cal 0.50 ppm	C		1	2914050	0.500281
14	4	Cal 0.50 ppm	C		1	2920794	0.501432
15	4	Cal 0.50 ppm	C		1	2940328	0.504766
B	0	Baseline	RB		1	-1799	0.002623
17	5	Cal 0.05 ppm	C		1	249151	0.045454
18	5	Cal 0.05 ppm	C		1	258617	0.047069
19	5	Cal 0.05 ppm	C		1	254447	0.046357
B	0	Baseline	RB		1	-2882	0.002438
21	6	Cal 0.01 ppm	C		1	41520	0.010017
22	6	Cal 0.01 ppm	C		1	43883	0.010420
23	6	Cal 0.01 ppm	C		1	42615	0.010203
B	0	Baseline	RB		1	-1211	0.002723
25	1	Blank	BLNK		1	1633	0.003209
26	7	ICV 0.25 ppm	CCV		1	1492641	0.257684
27	1	Blank	BLNK		1	1020	0.003104
B	0	Baseline	RB		1	1066	0.003112
29	8	120201021-BL S	U		1	-1516	0.002671
30	9	120201021-002	U		26	5024	0.098475
31	10	120201021-002MS	U		26	3152872	14.067086
32	11	120201021-002MSD	U		26	3132856	13.978266
33	12	120201021-LCS	U		1	3051385	0.523721
34	13	120201021-001	U		28.4	13771	0.149965
35	14	120201021-003	U		27.7	22660	0.188294
36	15	120201021-004	U		26.8	6242	0.107080
37	16	120201021-005	U		28	4657	0.104299
38	17	120131031-018	U		27	7313	0.112813
B	0	Baseline	RB		1	698	0.003049
40	1	Blank	BLNK		1	362	0.002992
41	4	CCV 0.5 ppm	CCV		1	2924401	0.502048
42	1	Blank	BLNK		1	2697	0.003390
B	0	Read Baseline	RB		1	-507	0.002844
44	18	120201021-006	U		26	-4678	0.055426
45	19	120201021-007	U		31.9	257	0.094867
46	20	120201021-008	U		25.9	5408	0.099798
47	21	120201021-009	U		29.2	6119	0.116057
48	22	120201021-010	U		26.2	2261	0.086879
49	23	120201021-011	U		27.9	26002	0.205568
50	24	120201021-012	U		26.1	-5326	0.052752
51	25	120201021-013	U		27.6	1812	0.089407
52	26	120201021-014	U		26.2	1717	0.084448
53	27	120201021-015	U		26.9	2772	0.091548
3	0	Baseline	RB		1	-1401	0.002691
55	1	Blank	BLNK		1	-2418	0.002517
56	4	CCV 0.5 ppm	CCV		1	2989289	0.513122
57	1	Blank	BLNK		1	1858	0.003247
3	0	Read Baseline	RB		1	-2480	0.002507
59	28	120201021-BL S	U		1	3007	0.003443
60	29	120201021-016	U		27.4	669	0.083415
61	30	120201021-016MS	U		27.4	3109539	14.621899
62	31	120201021-016MSD	U		27.4	3159403	14.855085
63	32	120201021-LCS	U		1	3195121	0.548252
64	33	120201021-017	U		27.4	844	0.084231
65	34	120202027-001	U		26.9	6422	0.108303
66	35	120202027-002	U		27.5	-4496	0.059477

Peak	Cup	Name	Type	Dil	Wt	Area	Calc. (ppm)	
67	36	120201019-001	U		27.2	1	-1695	0.071828
68	37	120201019-002	U		26.6	1	1626	0.085325
B	0	Baseline	RB			1	-3581	0.002319
70	1	Blank	BLNK		1	1	-2426	0.002516
71	4	CCV 0.5 ppm	CCV		1	1	3002372	0.515355
72	1	Blank	BLNK		1	1	-1646	0.002649
B	0	Read Baseline	RB		1	1	-1297	0.002709
74	38	120201019-003	U		25.9	1	77	0.076230
75	39	120201019-004	U		25.8	1	11861	0.127826
76	40	120201019-005	U		26.4	1	7043	0.109089
77	41	120201019-006	U		26.2	1	7924	0.112200
78	42	120201019-007	U		25.9	1	5897	0.101957
79	43	120201019-008	U		26.2	1	492	0.078968
80	44	120201019-009	U		25.8	1	-3643	0.059557
81	45	120201019-010	U		27	1	4032	0.097694
82	46	120201019-011	U		26.5	1	-1725	0.069845
83	47	120202031-001	U		167	1	22796	1.139075
B	0	Baseline	RB		1	1	-2335	0.002532
85	1	Blank	BLNK		1	1	-2357	0.002528
86	4	CCV 0.5 ppm	CCV		1	1	2972572	0.510269
87	1	Blank	BLNK		1	1	3191	0.003475
B	0	Read Baseline	RB		1	1	-818	0.002790
89	48	120131002-BL F	U		1	1	-1957	0.002596
90	49	120131002-001	U		1	1	-2802	0.002452
91	50	120131002-001MS	U		1	1	2386461	0.410236
92	51	120131002-001MSD	U		1	1	3138382	0.538569
93	52	120131002-LCS	U		1	1	3237147	0.555425
94	53		U		1	1	-3937	0.002258
95	54		U		1	1	-2480	0.002507
96	55		U		1	1	-2668	0.002475
97	56		U		1	1	-6073	0.001894
98	57	120131002-001MS	U		1	1	3113982	0.534404
B	0	Baseline	RB		1	1	-433	0.002858
100	1	Blank	BLNK		1	1	-128	0.002908
101	4	CCV 0.5 ppm	CCV		1	1	3018840	0.518166
102	1	Blank	BLNK		1	1	-2358	0.002528
B	0	Read Baseline	RB		1	1	910	0.003085

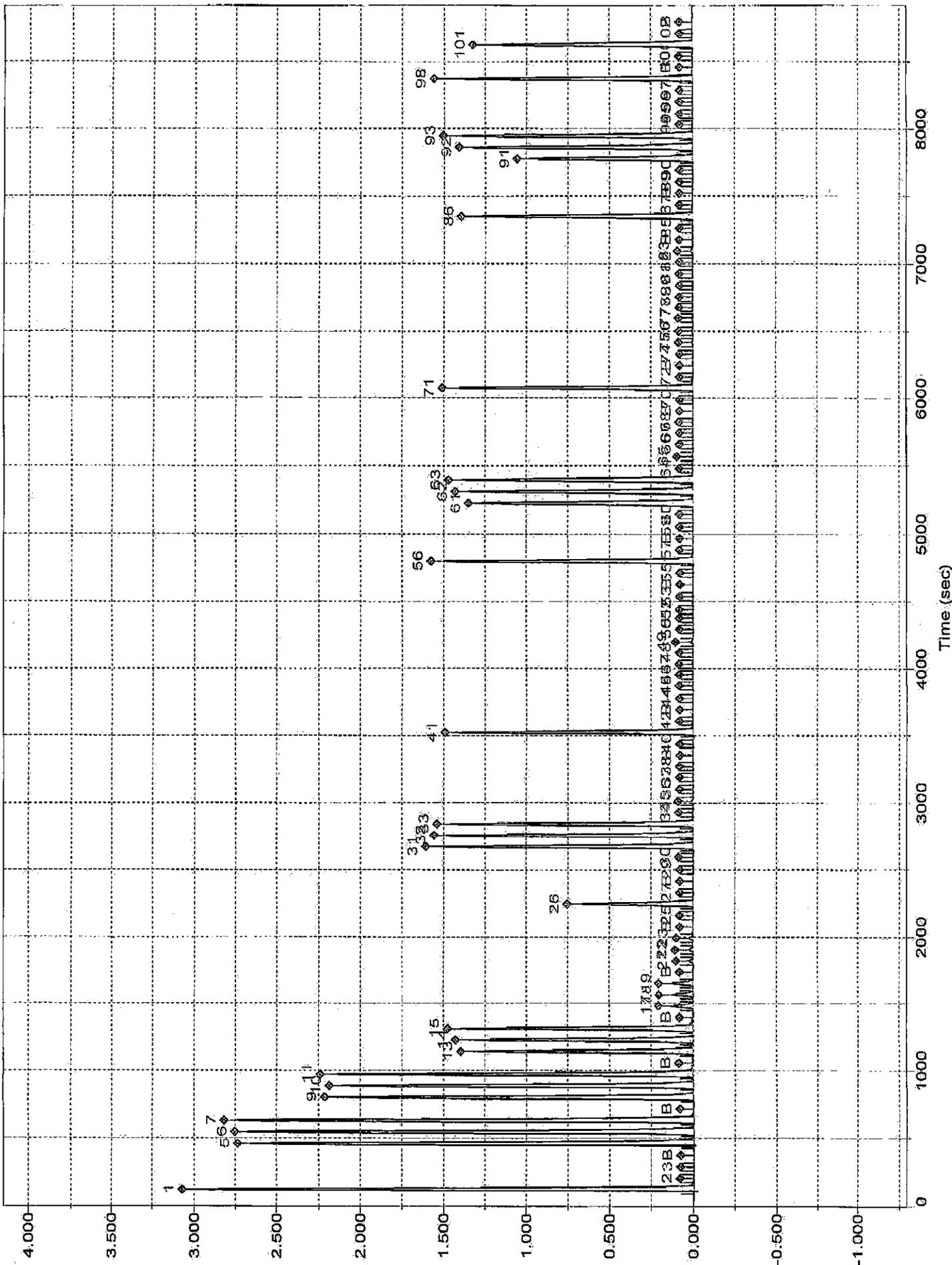
re-run below

ms

Peak	Cup	Flags
1	2	
2	0	
3	0	
3	0	BL
5	2	
5	2	
7	2	
3	0	BL
9	3	
10	3	
11	3	
3	0	BL
13	4	
14	4	
15	4	
3	0	BL
17	5	OL
18	5	
19	5	
3	0	BL
21	6	
22	6	OL
23	6	
3	0	BL
25	1	
26	7	
27	1	
3	0	BL
29	8	

Peak	Cup	Flags
30	9	
31	10	
32	11	
33	12	
34	13	
35	14	
36	15	
37	16	
38	17	
B	0	BL
40	1	
41	4	
42	1	
B	0	BL
44	18	
45	19	
46	20	
47	21	
48	22	
49	23	
50	24	
51	25	
52	26	
53	27	
B	0	BL
55	1	
56	4	
57	1	
B	0	BL
59	28	
60	29	
61	30	
62	31	
63	32	
64	33	
65	34	
66	35	
67	36	
68	37	
B	0	BL
70	1	
71	4	
72	1	
B	0	BL
74	38	
75	39	
76	40	
77	41	
78	42	
79	43	
80	44	
81	45	
82	46	
83	47	
B	0	BL
85	1	
86	4	
87	1	
B	0	BL
89	48	
90	49	
91	50	
92	51	
93	52	
94	53	
95	54	
96	55	
97	56	
98	57	
B	0	BL
100	1	

Channel 1: Cyanide



* Name	Conc	Area
* Cal 1.00 ppm	1.000000	5834096.000000
* Cal 1.00 ppm	1.000000	5848289.500000
* Cal 1.00 ppm	1.000000	5845756.000000
* Cal 0.80 ppm	0.800000	4595277.000000
* Cal 0.80 ppm	0.800000	4652028.000000
* Cal 0.80 ppm	0.800000	4693766.500000
* Cal 0.50 ppm	0.500000	2914049.750000
* Cal 0.50 ppm	0.500000	2920793.500000
* Cal 0.50 ppm	0.500000	2940328.000000
* Cal 0.05 ppm	0.050000	249151.046875
* Cal 0.05 ppm	0.050000	258617.031250
* Cal 0.05 ppm	0.050000	254446.984375
* Cal 0.01 ppm	0.010000	41520.464844
* Cal 0.01 ppm	0.010000	43883.496094
* Cal 0.01 ppm	0.010000	42615.242188

Calib Coef:

y=bx+a

a: (intercept) -1.7168e+04

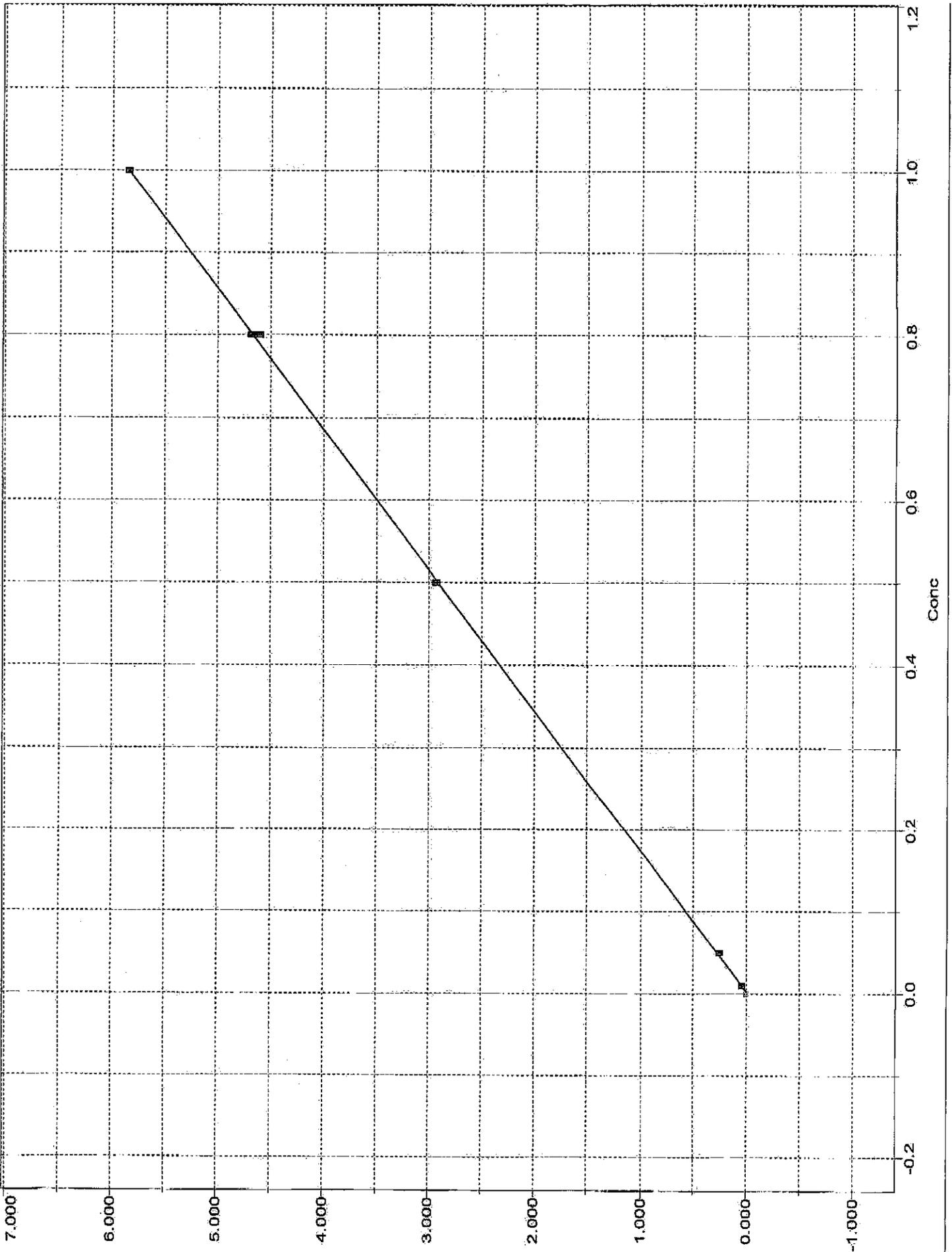
b: 5.8591e+06

Corr Coef: 0.999948

Carryover: 0.243%

No Drift Peaks

Cyanide: Calibration, Peak 5-103



# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1201885

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID <b>MB</b>	SampType: <b>MBLK</b>		TestCode: <b>EPA Method 200.7: Dissolved Metals</b>							
Client ID: <b>PBW</b>	Batch ID: <b>R901</b>		RunNo: <b>901</b>							
Prep Date:	Analysis Date: <b>2/10/2012</b>		SeqNo: <b>25640</b>		Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020								
Barium	ND	0.0020								
Beryllium	ND	0.0020								
Boron	ND	0.040								
Cadmium	ND	0.0020								
Chromium	ND	0.0060								
Cobalt	ND	0.0060								
Copper	ND	0.0060								
Lead	ND	0.0050								
Manganese	ND	0.0020								
Molybdenum	ND	0.0080								
Nickel	ND	0.010								
Silver	ND	0.0050								
Vanadium	ND	0.050								

Sample ID <b>LCS</b>	SampType: <b>LCS</b>		TestCode: <b>EPA Method 200.7: Dissolved Metals</b>							
Client ID: <b>LCSW</b>	Batch ID: <b>R901</b>		RunNo: <b>901</b>							
Prep Date:	Analysis Date: <b>2/10/2012</b>		SeqNo: <b>25641</b>		Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.56	0.020	0.5000	0	112	85	115			
Barium	0.49	0.0020	0.5000	0	97.5	85	115			
Beryllium	0.50	0.0020	0.5000	0	101	85	115			
Boron	0.51	0.040	0.5000	0	103	85	115			
Cadmium	0.49	0.0020	0.5000	0	98.9	85	115			
Chromium	0.49	0.0060	0.5000	0	98.3	85	115			
Cobalt	0.47	0.0060	0.5000	0	94.1	85	115			
Copper	0.48	0.0060	0.5000	0	96.7	85	115			
Lead	0.48	0.0050	0.5000	0	96.2	85	115			
Manganese	0.48	0.0020	0.5000	0	95.5	85	115			
Molybdenum	0.51	0.0080	0.5000	0	101	85	115			
Nickel	0.47	0.010	0.5000	0	93.2	85	115			
Silver	0.10	0.0050	0.1000	0	100	85	115			
Vanadium	0.51	0.050	0.5000	0	102	85	115			

Sample ID <b>MB</b>	SampType: <b>MBLK</b>		TestCode: <b>EPA Method 200.7: Dissolved Metals</b>							
Client ID: <b>PBW</b>	Batch ID: <b>R921</b>		RunNo: <b>921</b>							
Prep Date:	Analysis Date: <b>2/13/2012</b>		SeqNo: <b>26476</b>		Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	0.0032	0.020								J
Zinc	ND	0.010								

**Qualifiers:**

- \*X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1201885

13-Apr-12

**Client:** Western Refining Southwest, Inc.**Project:** RCRA Background Investigation

Sample ID	<b>LCS</b>	SampType:	<b>LCS</b>	TestCode:	<b>EPA Method 200.7: Dissolved Metals</b>					
Client ID:	<b>LCSW</b>	Batch ID:	<b>R921</b>	RunNo:	<b>921</b>					
Prep Date:		Analysis Date:	<b>2/13/2012</b>	SeqNo:	<b>26477</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	0.49	0.020	0.5000	0.003150	98.2	85	115			
Zinc	0.50	0.010	0.5000	0	99.7	85	115			

**Qualifiers:**

\*/X Value exceeds Maximum Contaminant Level.

E Value above quantitation range

J Analyte detected below quantitation limits

R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1201885

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID	MB-551	SampType:	MBLK	TestCode:	EPA Method 200.7: Total Metals					
Client ID:	PBW	Batch ID:	551	RunNo:	801					
Prep Date:	2/2/2012	Analysis Date:	2/6/2012	SeqNo:	22882	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020								
Barium	ND	0.0020								
Beryllium	0.00014	0.0020								J
Boron	ND	0.040								
Cadmium	ND	0.0020								
Chromium	ND	0.0060								
Cobalt	0.00059	0.0060								J
Copper	ND	0.0060								
Iron	0.011	0.020								J
Lead	ND	0.0050								
Manganese	ND	0.0020								
Molybdenum	0.0024	0.0080								J
Nickel	ND	0.010								
Silver	ND	0.0050								
Vanadium	0.00086	0.050								J
Zinc	0.0013	0.010								J

Sample ID	LCS-551	SampType:	LCS	TestCode:	EPA Method 200.7: Total Metals					
Client ID:	LCSW	Batch ID:	551	RunNo:	801					
Prep Date:	2/2/2012	Analysis Date:	2/6/2012	SeqNo:	22883	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.56	0.020	0.5000	0	112	85	115			
Barium	0.49	0.0020	0.5000	0	97.4	85	115			
Beryllium	0.51	0.0020	0.5000	0.0001400	101	85	115			
Boron	0.50	0.040	0.5000	0	99.9	85	115			
Cadmium	0.49	0.0020	0.5000	0	98.3	85	115			
Chromium	0.49	0.0060	0.5000	0	97.1	85	115			
Cobalt	0.47	0.0060	0.5000	0.0005900	94.8	85	115			
Copper	0.49	0.0060	0.5000	0	97.8	85	115			
Iron	0.49	0.020	0.5000	0.01060	95.0	85	115			
Lead	0.49	0.0050	0.5000	0	97.3	85	115			
Manganese	0.48	0.0020	0.5000	0	95.7	85	115			
Molybdenum	0.51	0.0080	0.5000	0.002410	101	85	115			
Nickel	0.47	0.010	0.5000	0	93.5	85	115			
Silver	0.099	0.0050	0.1000	0	98.8	85	115			
Vanadium	0.51	0.050	0.5000	0.0008600	102	85	115			
Zinc	0.49	0.010	0.5000	0.001310	97.0	85	115			

**Qualifiers:**

- \*X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1201885

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID <b>MB</b>	SampType: <b>MBLK</b>		TestCode: <b>EPA 200.8: Dissolved Metals</b>							
Client ID: <b>PBW</b>	Batch ID: <b>R818</b>		RunNo: <b>818</b>							
Prep Date:	Analysis Date: <b>2/7/2012</b>		SeqNo: <b>23440</b>		Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	ND	0.0010								
Arsenic	ND	0.0010								
Cadmium	ND	0.0010								
Copper	ND	0.0010								
Lead	ND	0.0010								
Nickel	ND	0.0010								
Selenium	ND	0.0010								
Thallium	ND	0.0010								

Sample ID <b>LCS</b>	SampType: <b>LCS</b>		TestCode: <b>EPA 200.8: Dissolved Metals</b>							
Client ID: <b>LCSW</b>	Batch ID: <b>R818</b>		RunNo: <b>818</b>							
Prep Date:	Analysis Date: <b>2/7/2012</b>		SeqNo: <b>23451</b>		Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.022	0.0010	0.02500	0	87.5	85	115			
Arsenic	0.023	0.0010	0.02500	0	92.0	85	115			
Cadmium	0.023	0.0010	0.02500	0	92.6	85	115			
Copper	0.022	0.0010	0.02500	0	89.5	85	115			
Lead	0.022	0.0010	0.02500	0	86.4	85	115			
Nickel	0.023	0.0010	0.02500	0	90.1	85	115			
Selenium	0.025	0.0010	0.02500	0	100	85	115			
Thallium	0.022	0.0010	0.02500	0	86.8	85	115			

Sample ID <b>MB</b>	SampType: <b>MBLK</b>		TestCode: <b>EPA 200.8: Dissolved Metals</b>							
Client ID: <b>PBW</b>	Batch ID: <b>R841</b>		RunNo: <b>841</b>							
Prep Date:	Analysis Date: <b>2/8/2012</b>		SeqNo: <b>24238</b>		Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Uranium	ND	0.0010								

Sample ID <b>LCS</b>	SampType: <b>LCS</b>		TestCode: <b>EPA 200.8: Dissolved Metals</b>							
Client ID: <b>LCSW</b>	Batch ID: <b>R841</b>		RunNo: <b>841</b>							
Prep Date:	Analysis Date: <b>2/8/2012</b>		SeqNo: <b>24239</b>		Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Uranium	0.025	0.0010	0.02500	0	99.3	85	115			

**Qualifiers:**

\*X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1201885

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID	<b>MB-551</b>	SampType:	<b>MBLK</b>	TestCode:	<b>200.8 ICPMS Metals:Total</b>					
Client ID:	<b>PBW</b>	Batch ID:	<b>551</b>	RunNo:	<b>788</b>					
Prep Date:	<b>2/2/2012</b>	Analysis Date:	<b>2/6/2012</b>	SeqNo:	<b>22523</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Copper	ND	0.0025								
Antimony	ND	0.0025								
Arsenic	ND	0.0025								
Cadmium	ND	0.0025								
Lead	ND	0.0025								
Nickel	ND	0.0025								
Selenium	ND	0.0025								
Thallium	ND	0.0025								
Uranium	ND	0.0025								

**Qualifiers:**

\*X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1201885

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID	<b>MB-602</b>	SampType:	<b>MBLK</b>	TestCode:	<b>EPA Method 245.1: Mercury</b>					
Client ID:	<b>PBW</b>	Batch ID:	<b>602</b>	RunNo:	<b>789</b>					
Prep Date:	<b>2/6/2012</b>	Analysis Date:	<b>2/6/2012</b>	SeqNo:	<b>22439</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.000051	0.00020								J

Sample ID	<b>LCS-602</b>	SampType:	<b>LCS</b>	TestCode:	<b>EPA Method 245.1: Mercury</b>					
Client ID:	<b>LCSW</b>	Batch ID:	<b>602</b>	RunNo:	<b>789</b>					
Prep Date:	<b>2/6/2012</b>	Analysis Date:	<b>2/6/2012</b>	SeqNo:	<b>22440</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0051	0.00020	0.005000	.00005124	101	80	120			

Sample ID	<b>1201885-018AMS</b>	SampType:	<b>MS</b>	TestCode:	<b>EPA Method 245.1: Mercury</b>					
Client ID:	<b>BK-EB-012712</b>	Batch ID:	<b>602</b>	RunNo:	<b>789</b>					
Prep Date:	<b>2/6/2012</b>	Analysis Date:	<b>2/6/2012</b>	SeqNo:	<b>22442</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0053	0.00020	0.005000	.00004974	104	75	125			

Sample ID	<b>1201885-018AMSD</b>	SampType:	<b>MSD</b>	TestCode:	<b>EPA Method 245.1: Mercury</b>					
Client ID:	<b>BK-EB-012712</b>	Batch ID:	<b>602</b>	RunNo:	<b>789</b>					
Prep Date:	<b>2/6/2012</b>	Analysis Date:	<b>2/6/2012</b>	SeqNo:	<b>22443</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0052	0.00020	0.005000	.00004974	103	75	125	0.661	20	

**Qualifiers:**

- \*X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1201885

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID <b>MB-522</b>	SampType: <b>MBLK</b>		TestCode: <b>EPA Method 300.0: Anions</b>							
Client ID: <b>PBS</b>	Batch ID: <b>522</b>		RunNo: <b>719</b>							
Prep Date: <b>1/31/2012</b>	Analysis Date: <b>2/1/2012</b>		SeqNo: <b>20699</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.30								
Chloride	ND	1.5								
Sulfate	ND	1.5								

Sample ID <b>LCS-522</b>	SampType: <b>LCS</b>		TestCode: <b>EPA Method 300.0: Anions</b>							
Client ID: <b>LCSS</b>	Batch ID: <b>522</b>		RunNo: <b>719</b>							
Prep Date: <b>1/31/2012</b>	Analysis Date: <b>2/1/2012</b>		SeqNo: <b>20700</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	1.5	0.30	1.500	0	101	90	110			
Chloride	14	1.5	15.00	0	91.0	90	110			
Sulfate	28	1.5	30.00	0	94.3	90	110			

**Qualifiers:**

\*X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1201885

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID	<b>MB-545</b>	SampType:	<b>MBLK</b>	TestCode:	<b>EPA Method 7471: Mercury</b>					
Client ID:	<b>PBS</b>	Batch ID:	<b>545</b>	RunNo:	<b>717</b>					
Prep Date:	<b>2/2/2012</b>	Analysis Date:	<b>2/2/2012</b>	SeqNo:	<b>20502</b>	Units:	<b>mg/kg</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.033								

Sample ID	<b>LCS-545</b>	SampType:	<b>LCS</b>	TestCode:	<b>EPA Method 7471: Mercury</b>					
Client ID:	<b>LCSS</b>	Batch ID:	<b>545</b>	RunNo:	<b>717</b>					
Prep Date:	<b>2/2/2012</b>	Analysis Date:	<b>2/2/2012</b>	SeqNo:	<b>20503</b>	Units:	<b>mg/kg</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.17	0.033	0.1667	0	104	80	120			

Sample ID	<b>1201885-001AMS</b>	SampType:	<b>MS</b>	TestCode:	<b>EPA Method 7471: Mercury</b>					
Client ID:	<b>BK-1 (0-0.5')</b>	Batch ID:	<b>545</b>	RunNo:	<b>717</b>					
Prep Date:	<b>2/2/2012</b>	Analysis Date:	<b>2/2/2012</b>	SeqNo:	<b>20505</b>	Units:	<b>mg/kg</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.18	0.033	0.1657	0.01196	102	75	125			

Sample ID	<b>1201885-001AMSD</b>	SampType:	<b>MSD</b>	TestCode:	<b>EPA Method 7471: Mercury</b>					
Client ID:	<b>BK-1 (0-0.5')</b>	Batch ID:	<b>545</b>	RunNo:	<b>717</b>					
Prep Date:	<b>2/2/2012</b>	Analysis Date:	<b>2/2/2012</b>	SeqNo:	<b>20506</b>	Units:	<b>mg/kg</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.18	0.033	0.1659	0.01196	98.7	75	125	3.22	20	

**Qualifiers:**

- \*X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1201885

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID	MB-529	SampType:	MBLK	TestCode:	EPA Method 6010B: Soil Metals						
Client ID:	PBS	Batch ID:	529	RunNo:	833						
Prep Date:	2/1/2012	Analysis Date:	2/8/2012	SeqNo:	23909	Units:	mg/Kg				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Aluminum	0.53	3.0								J	
Antimony	ND	2.5									
Arsenic	ND	2.5									
Barium	ND	0.10									
Beryllium	ND	0.15									
Cadmium	ND	0.10									
Chromium	ND	0.30									
Copper	0.14	0.30								J	
Lead	ND	0.25									
Molybdenum	ND	0.40									
Nickel	0.10	0.50								J	
Selenium	1.4	2.5								J	
Silver	ND	0.25									
Thallium	ND	2.5									
Uranium	ND	5.0									
Vanadium	ND	2.5									
Zinc	ND	2.5									

Sample ID	LCS-529	SampType:	LCS	TestCode:	EPA Method 6010B: Soil Metals						
Client ID:	LCSS	Batch ID:	529	RunNo:	833						
Prep Date:	2/1/2012	Analysis Date:	2/8/2012	SeqNo:	23910	Units:	mg/Kg				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Aluminum	28	3.0	25.00	0.5285	110	80	120				
Antimony	25	2.5	25.00	0	102	80	120				
Arsenic	24	2.5	25.00	0	96.5	80	120				
Barium	24	0.10	25.00	0	96.9	80	120				
Beryllium	25	0.15	25.00	0	100	80	120				
Cadmium	24	0.10	25.00	0	96.4	80	120				
Chromium	24	0.30	25.00	0	96.9	80	120				
Copper	25	0.30	25.00	0.1390	101	80	120				
Lead	24	0.25	25.00	0	95.8	80	120				
Molybdenum	25	0.40	25.00	0	101	80	120				
Nickel	23	0.50	25.00	0.1040	93.0	80	120				
Selenium	24	2.5	25.00	1.362	91.1	80	120				
Silver	4.9	0.25	5.000	0	97.9	80	120				
Thallium	24	2.5	25.00	0	97.5	80	120				
Uranium	25	5.0	25.00	0	98.2	80	120				
Vanadium	25	2.5	25.00	0	101	80	120				
Zinc	24	2.5	25.00	0	97.1	80	120				

**Qualifiers:**

- \* / X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1201885

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID 1201885-002AMS		SampType: MS		TestCode: EPA Method 6010B: Soil Metals							
Client ID: BK-1 (1.5-2.0')		Batch ID: 529		RunNo: 833							
Prep Date: 2/1/2012		Analysis Date: 2/8/2012		SeqNo: 23957		Units: mg/Kg					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Antimony	7.9	5.0	24.68	0	32.1	75	125			S	
Arsenic	24	5.0	24.68	1.894	91.1	75	125				
Beryllium	23	0.30	24.68	0.5638	91.8	75	125				
Cadmium	22	0.20	24.68	0	88.6	75	125				
Chromium	31	0.60	24.68	8.403	91.5	75	125				
Copper	32	0.60	24.68	8.672	94.4	75	125				
Lead	23	0.50	24.68	3.223	79.5	75	125				
Molybdenum	20	0.80	24.68	0.7050	77.2	75	125				
Nickel	27	1.0	24.68	7.398	80.2	75	125				
Selenium	17	5.0	24.68	0	67.7	75	125			S	
Silver	4.4	0.50	4.936	0	88.4	75	125				
Thallium	ND	5.0	24.68	0	0	75	125			S	
Uranium	22	10	24.68	0	90.1	75	125				
Vanadium	57	5.0	24.68	29.62	112	75	125				
Zinc	51	5.0	24.68	28.34	91.6	75	125				

Sample ID 1201885-002AMSD		SampType: MSD		TestCode: EPA Method 6010B: Soil Metals							
Client ID: BK-1 (1.5-2.0')		Batch ID: 529		RunNo: 833							
Prep Date: 2/1/2012		Analysis Date: 2/8/2012		SeqNo: 23960		Units: mg/Kg					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Antimony	7.4	5.0	24.92	0	29.6	75	125	6.95	20	S	
Arsenic	23	5.0	24.92	1.894	84.8	75	125	5.72	20		
Beryllium	21	0.30	24.92	0.5638	83.5	75	125	8.37	20		
Cadmium	21	0.20	24.92	0	82.5	75	125	6.22	20		
Chromium	29	0.60	24.92	8.403	81.8	75	125	7.37	20		
Copper	30	0.60	24.92	8.672	85.8	75	125	6.13	20		
Lead	22	0.50	24.92	3.223	74.6	75	125	4.69	20	S	
Molybdenum	19	0.80	24.92	0.7050	72.4	75	125	5.20	20	S	
Nickel	25	1.0	24.92	7.398	71.7	75	125	7.39	20	S	
Selenium	17	5.0	24.92	0	67.3	75	125	0.411	20	S	
Silver	4.1	0.50	4.984	0	81.5	75	125	7.14	20		
Thallium	ND	5.0	24.92	0	0	75	125	0	20	S	
Uranium	19	10	24.92	0	78.0	75	125	13.5	20		
Vanadium	53	5.0	24.92	29.62	93.5	75	125	7.66	20		
Zinc	47	5.0	24.92	28.34	75.9	75	125	7.51	20		

Sample ID MB-529		SampType: MBLK		TestCode: EPA Method 6010B: Soil Metals							
Client ID: PBS		Batch ID: 529		RunNo: 836							
Prep Date: 2/1/2012		Analysis Date: 2/8/2012		SeqNo: 24025		Units: mg/Kg					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	

**Qualifiers:**

- \*X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1201885

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID <b>MB-529</b>	SampType: <b>MBLK</b>		TestCode: <b>EPA Method 6010B: Soil Metals</b>							
Client ID: <b>PBS</b>	Batch ID: <b>529</b>		RunNo: <b>836</b>							
Prep Date: <b>2/1/2012</b>	Analysis Date: <b>2/8/2012</b>		SeqNo: <b>24025</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.15	2.0								J

Sample ID <b>LCS-529</b>	SampType: <b>LCS</b>		TestCode: <b>EPA Method 6010B: Soil Metals</b>							
Client ID: <b>LCSS</b>	Batch ID: <b>529</b>		RunNo: <b>836</b>							
Prep Date: <b>2/1/2012</b>	Analysis Date: <b>2/8/2012</b>		SeqNo: <b>24026</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	25	2.0	25.00	0.1460	97.7	80	120			

Sample ID <b>1201885-002AMS</b>	SampType: <b>MS</b>		TestCode: <b>EPA Method 6010B: Soil Metals</b>							
Client ID: <b>BK-1 (1.5-2.0')</b>	Batch ID: <b>529</b>		RunNo: <b>836</b>							
Prep Date: <b>2/1/2012</b>	Analysis Date: <b>2/8/2012</b>		SeqNo: <b>24037</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	33	4.0	24.68	8.018	100	75	125			

Sample ID <b>1201885-002AMSD</b>	SampType: <b>MSD</b>		TestCode: <b>EPA Method 6010B: Soil Metals</b>							
Client ID: <b>BK-1 (1.5-2.0')</b>	Batch ID: <b>529</b>		RunNo: <b>836</b>							
Prep Date: <b>2/1/2012</b>	Analysis Date: <b>2/8/2012</b>		SeqNo: <b>24040</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	31	4.0	24.92	8.018	91.4	75	125	6.16	20	

Sample ID <b>MB-529</b>	SampType: <b>MBLK</b>		TestCode: <b>EPA Method 6010B: Soil Metals</b>							
Client ID: <b>PBS</b>	Batch ID: <b>529</b>		RunNo: <b>837</b>							
Prep Date: <b>2/1/2012</b>	Analysis Date: <b>2/8/2012</b>		SeqNo: <b>24083</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	ND	0.30								

Sample ID <b>LCS-529</b>	SampType: <b>LCS</b>		TestCode: <b>EPA Method 6010B: Soil Metals</b>							
Client ID: <b>LCSS</b>	Batch ID: <b>529</b>		RunNo: <b>837</b>							
Prep Date: <b>2/1/2012</b>	Analysis Date: <b>2/8/2012</b>		SeqNo: <b>24084</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	24	0.30	25.00	0	94.5	80	120			

Sample ID <b>1201885-002AMS</b>	SampType: <b>MS</b>		TestCode: <b>EPA Method 6010B: Soil Metals</b>							
Client ID: <b>BK-1 (1.5-2.0')</b>	Batch ID: <b>529</b>		RunNo: <b>837</b>							
Prep Date: <b>2/1/2012</b>	Analysis Date: <b>2/8/2012</b>		SeqNo: <b>24116</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	26	0.60	24.68	5.300	84.4	75	125			

**Qualifiers:**

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- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1201885

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID	<b>1201885-002AMSD</b>	SampType:	<b>MSD</b>	TestCode:	<b>EPA Method 6010B: Soil Metals</b>					
Client ID:	<b>BK-1 (1.5-2.0')</b>	Batch ID:	<b>529</b>	RunNo:	<b>837</b>					
Prep Date:	<b>2/1/2012</b>	Analysis Date:	<b>2/8/2012</b>	SeqNo:	<b>24119</b>	Units:	<b>mg/Kg</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	24	0.60	24.92	5.300	76.5	75	125	6.99	20	

Sample ID	<b>MB-1105</b>	SampType:	<b>MBLK</b>	TestCode:	<b>EPA Method 6010B: Soil Metals</b>					
Client ID:	<b>PBS</b>	Batch ID:	<b>1105</b>	RunNo:	<b>1507</b>					
Prep Date:	<b>3/15/2012</b>	Analysis Date:	<b>3/16/2012</b>	SeqNo:	<b>42441</b>	Units:	<b>mg/Kg</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	ND	1.0								
Manganese	ND	0.10								

Sample ID	<b>LCS-1105</b>	SampType:	<b>LCS</b>	TestCode:	<b>EPA Method 6010B: Soil Metals</b>					
Client ID:	<b>LCSS</b>	Batch ID:	<b>1105</b>	RunNo:	<b>1507</b>					
Prep Date:	<b>3/15/2012</b>	Analysis Date:	<b>3/16/2012</b>	SeqNo:	<b>42442</b>	Units:	<b>mg/Kg</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	26	1.0	25.00	0	105	80	120			
Manganese	24	0.10	25.00	0	94.3	80	120			

**Qualifiers:**

\*X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

**Sample Log-In Check List**

Client Name: **Western Refining Southwest, Inc Bloomfield** Work Order Number: **1201885**

Received by/date: *LM* *1/31/12*  
 Logged By: **Lindsay Mangin** **1/31/2012 9:30:00 AM** *[Signature]*  
 Completed By: **Lindsay Mangin** **1/31/2012 1:43:09 PM** *[Signature]*  
 Reviewed By: *ME 1/31/12*

**Chain of Custody**

- 1. Were seals intact? Yes  No  Not Present
- 2. Is Chain of Custody complete? Yes  No  Not Present
- 3. How was the sample delivered? UPS

**Log In**

- 4. Coolers are present? (see 19. for cooler specific information) Yes  No  NA
- 5. Was an attempt made to cool the samples? Yes  No  NA
- 6. Were all samples received at a temperature of >0° C to 6.0°C Yes  No  NA
- 7. Sample(s) in proper container(s)? Yes  No
- 8. Sufficient sample volume for indicated test(s)? Yes  No
- 9. Are samples (except VOA and ONG) properly preserved? Yes  No
- 10. Was preservative added to bottles? Yes  No  NA
- 11. VOA vials have zero headspace? Yes  No  No VOA Vials
- 12. Were any sample containers received broken? Yes  No
- 13. Does paperwork match bottle labels? (Note discrepancies on chain of custody) Yes  No  # of preserved bottles checked for pH:
- 14. Are matrices correctly identified on Chain of Custody? Yes  No  (<2 or >12 unless noted)
- 15. Is it clear what analyses were requested? Yes  No  Adjusted?
- 16. Were all holding times able to be met? (If no, notify customer for authorization.) Yes  No  Checked by:

**Special Handling (if applicable)**

- 17. Was client notified of all discrepancies with this order? Yes  No  NA

Person Notified: \_\_\_\_\_ Date: \_\_\_\_\_  
 By Whom: \_\_\_\_\_ Via: eMail Phone Fax In Person  
 Regarding: \_\_\_\_\_  
 Client Instructions: \_\_\_\_\_

18. Additional remarks:  
 RECEIVED ONLY HNO3 BOTTLES FOR THE GW SAMPLE.

**19. Cooler Information**

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	3.8	Good	Yes			

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### Chain-of-Custody Record

Client: Western Refining Southwest, Inc.  
Bloomfield Refinery  
 Mailing Address: 50 Road 4940  
Bloomfield, NM 87401  
 Phone #: 505-832-4166  
 email or Fax#: Kelly.Robinson@wrc.com

Turn-Around Time: \_\_\_\_\_  
 Standard  Rush  
 Project Name: RURA BACKGROUND INVESTIGATION  
 Project #: \_\_\_\_\_

QA/QC Package:  
 Standard  Level 4 (Full Validation)  
 Accreditation  
 NELAP  Other  
 EDD (Type) EXCEL

Project Manager: Kelly Robinson  
 Sampler: Kelly R & Tracy P.  
 On Ice  Yes  No  
 Sample Temperature: 3.8

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No.	
1/27/12	13:30	Soil	BK-1 (0-0.5')	(2) 4oz Jar	None	-1	
	13:34		BK-1 (1.5-2.0')			-2	
	14:05		BK-2 (0-0.5')			-3	
	14:10		BK-2 (1.5-2.0')			-4	
	14:30		BK-3 (0-0.5')			-5	
	14:35		BK-3 (1.5-2.0')			-6	
	14:40		BK-4 (0-0.5')			-7	
	14:45		BK-4 (1.5-2.0')			-8	
	15:00		BK-5 (0-0.5')			-9	
	15:05		BK-5 (1.5-2.0')			-10	
	15:15		BK-6 (0-0.5')			-11	
	15:20		BK-6 (1.5-2.0')			-12	
Date:	Time:	Relinquished by:	Received by: <u>TO UPS</u>				Date
1/30/12	15:00	<u>Kelly Robinson</u>	Date				1/31/12 09:30
Date:	Time:	Relinquished by:	Received by:				Date



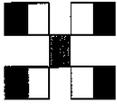
**HALL ENVIRONMENTAL ANALYSIS LABORATORY**  
 www.hallenvironmental.com  
 4001 Hawkins NE - Albuquerque, NM 87109  
 Tel. 505-345-3975 Fax 505-345-4107

Analysis Request	
BTEX + MTBE + TMB's (8021)	
BTEX + MTBE + TPH (Gas only)	
TPH Method 8015B (Gas/Diesel)	
TPH (Method 418.1)	
EDB (Method 504.1)	
8310 (PNA or PAH)	
RCRA 8 Metals	
Anions (F, Cl, NO <sub>3</sub> , NO <sub>2</sub> , PO <sub>4</sub> , SO <sub>4</sub> )	
8081 Pesticides / 8082 PCB's	
8260B (VOA)	
8270 (Semi-VOA)	
Metals (See attached)	
TEP PROX	
TPH GPO	
Air Bubbles (Y or N)	

Remarks:  
See attached sheet for analytical list

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

# HALL ENVIRONMENTAL ANALYSIS LABORATORY



www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

## Chain-of-Custody Record

Client: Western Refining Services, Inc.  
 Bloomfield Refinery  
 Mailing Address: 50 Road 4990  
 Bloomfield, NM 87401  
 Phone #: 505-632-4166

email or Fax#: Kelly.Robinson@wnr.com

QA/QC Package:  Standard  Level 4 (Full Validation)

Accreditation:  NELAP  Other

EDD (Type)  Excel

Turn-Around Time:

Standard  Rush

Project Name:

RRA BACKGROUND INVESTIGATION

Project #:

Project Manager:

Kelly Robinson

Sampler: Kelly R. + Tracy P.

On Ice:  Yes  No

Sample Temperature: 38

Container Type and #

Preservative Type

HEAL No.

120185

None

(8) 4oz

-13

-14

-15

-16

-17

-18

DUP

2 Paly

HNO<sub>3</sub>

### Analysis Request

BTEX + MTBE + TMBs (8021)	
BTEX + MTBE + TPH (Gas only)	
TPH Method 8015B (Gas/Diesel)	
TPH (Method 418.1)	
EDB (Method 504.1)	
8310 (PNA or PAH)	
RCRA 8 Metals	
Anions (F, Cl, NO <sub>3</sub> , NO <sub>2</sub> , PO <sub>4</sub> , SO <sub>4</sub> )	
8081 Pesticides / 8082 PCB's	
8260B (VOA)	
8270 (Semi-VOA)	
Metals (See attached)	X
TPH - BRO, MKC	X
TPH - GRO	X
Air Bubbles (Y or N)	

Remarks:

See attached for analyte list.

Received by: TD VPS

Date: 1/31/12

Received by: [Signature]

Date: 1/31/12

### METALS ANALYSES

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 335.3/335.2 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
Thallium	SW-846 method 6010/6020
Vanadium	SW-846 method 6010/6020
Zinc	SW-846 method 6010/6020

Includes  
~~Soil~~  
Soil Samples  
+  
GW Samples  
(both dissolved  
+ total  
analyses)

### GENERAL CHEMISTRY ANALYSES

Analyte	Analytical Method
Total Dissolved Solids	SM-2540C
Bicarbonate	SM-2320B (dissolved)
Chloride	EPA method 300.0 (dissolved & total)
Sulfate	EPA method 300.0 (dissolved & total)
Calcium	EPA method 6010/6020 (dissolved)
Magnesium	EPA method 6010/6020 (total)
Sodium	EPA method 6010/6020 (dissolved)
Potassium	EPA method 6010/6020 (dissolved)
Manganese	SW-846 method 6010/6020 (dissolved & total)
Nitrate/nitrite	EPA method 300.0 (dissolved)
Iron	SW-846 method 6010/6020 (dissolved & total)

For  
Groundwater  
Samples  
ONLY

### SWMU No. 16 Constituent List

Analyte	Analytical Method
Aluminum	SW-846 method 6010/6020
Boron	SW-846 method 6010/6020
Copper	SW-846 method 6010/6020
Molybdenum	SW-846 method 6010/6020
Uranium	SW-846 method 6020
Fluoride	SW-846 method 300

For Soil  
and Groundwater  
Samples  
(Dissolved  
and  
Totals)

Both lists  
for  
Ground  
Soils and  
EBs

KR



Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)

April 13, 2012

Kelly Robinson

Western Refining Southwest, Inc.

#50 CR 4990

Bloomfield, NM 87413

TEL: (505) 632-4135

FAX (505) 632-3911

RE: RCRA Background Investigation

OrderNo.: 1202153

Dear Kelly Robinson:

Hall Environmental Analysis Laboratory received 1 sample(s) on 2/3/2012 for the analyses presented in the following report.

This report is a revised report and it replaces the original report issued February 28, 2012.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. All samples are reported as received unless otherwise indicated.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman", is written in a cursive style.

Andy Freeman

Laboratory Manager

4901 Hawkins NE

Albuquerque, NM 87109

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1202153

Date Reported: 4/13/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-9 (73-73.5)

**Project:** RCRA Background Investigation

**Collection Date:** 2/1/2012 9:00:00 AM

**Lab ID:** 1202153-001

**Matrix:** SOIL

**Received Date:** 2/3/2012 3:25:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						
Fluoride	0.85	1.5	J	mg/Kg	5	2/6/2012 1:37:01 PM
<b>EPA METHOD 7471: MERCURY</b>						
Mercury	ND	0.033		mg/Kg	1	2/15/2012 4:29:46 PM
<b>EPA METHOD 6010B: SOIL METALS</b>						
Aluminum	10,000	1,500		mg/Kg	500	2/20/2012 12:25:14 PM
Antimony	2.1	2.5	J	mg/Kg	1	2/19/2012 8:46:30 AM
Arsenic	ND	2.5		mg/Kg	1	2/19/2012 8:46:30 AM
Barium	720	2.0		mg/Kg	20	2/20/2012 12:23:23 PM
Beryllium	0.23	0.15		mg/Kg	1	2/19/2012 8:46:30 AM
Boron	ND	2.0		mg/Kg	1	2/19/2012 8:46:30 AM
Cadmium	0.10	0.10		mg/Kg	1	2/19/2012 8:46:30 AM
Chromium	49	0.30		mg/Kg	1	2/19/2012 8:46:30 AM
Cobalt	6.1	0.30		mg/Kg	1	2/19/2012 8:46:30 AM
Copper	19	0.30		mg/Kg	1	2/19/2012 8:46:30 AM
Lead	1.4	0.50		mg/Kg	2	2/20/2012 12:16:29 PM
Molybdenum	4.0	0.40		mg/Kg	1	2/19/2012 8:46:30 AM
Nickel	12	0.50		mg/Kg	1	2/19/2012 8:46:30 AM
Selenium	ND	2.5		mg/Kg	1	2/19/2012 8:46:30 AM
Silver	ND	0.25		mg/Kg	1	2/19/2012 8:46:30 AM
Thallium	ND	2.5		mg/Kg	1	2/19/2012 8:46:30 AM
Uranium	5.6	5.0		mg/Kg	1	2/19/2012 8:46:30 AM
Vanadium	35	2.5		mg/Kg	1	2/19/2012 8:46:30 AM
Zinc	27	2.5		mg/Kg	1	2/19/2012 8:46:30 AM
<b>CYANIDE-TOTAL</b>						
Cyanide	ND	0.30		mg/Kg	1	2/14/2012

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

**CASE NARRATIVE**

February 27, 2012

**Lab Name:** Anatek Labs, Inc. 1282 Alturas Drive, Moscow, ID 83843 [www.anateklabs.com](http://www.anateklabs.com) *FL NELAP E87893, NV ID13-2004-31, WA DOE C126, OR ELAP ID200001, MT 0028, ID, CO, NM*

**Project Tracking No.:** 1202153  
**Anatek Batch:** 120207014

**Project Summary:** One (1) soil sample was received on 2/7/2012 for Total Cyanide (EPA 335.4) analysis. All samples were received with the appropriate chain of custody. Sample was received at 4.5 C.

<u>Client Sample ID</u>	<u>Anatek Sample ID</u>	<u>Method/Prep Method</u>
1202153 BK-9 (73-73.5)	120207014-001	EPA 335.4

**QA/QC Checks**

<u>Parameters</u>	<u>Yes / No</u>	<u>Exceptions / Deviations</u>
Sample Holding Time Valid?	Y	NA
Surrogate Recoveries Valid?	NA	NA
QC Sample(s) Recoveries Valid?	Y	NA
Method Blank(s) Valid?	Y	NA
Tune(s) Valid?	NA	NA
Internal Standard Responses Valid?	NA	NA
Initial Calibration Curve(s) Valid?	Y	NA
Continuing Calibration(s) Valid?	Y	NA
Comments:	Y	NA

**1. Holding Time Requirements**

No problems encountered.

**2. GC/MS Tune Requirements**

N/A

**3. Calibration Requirements**

No problems encountered.

**4. Surrogate Recovery Requirements**

N/A.

**5. QC Sample (LCS/MS/MSD) Recovery Requirements**

No problems encountered.

**6. Method Blank Requirements**

No problems encountered.

**7. Internal Standard(s) Response Requirements**

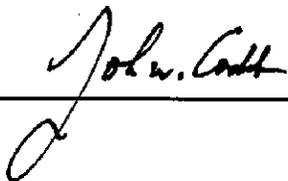
N/A

**8. Comments**

None.

**I certify that this data package is in compliance with the terms and conditions of the contract. Release of the data contained in this data package has been authorized by the Laboratory Manager or his designee.**

Approved by:

  
\_\_\_\_\_

# Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com  
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

**Client:** HALL ENVIRONMENTAL ANALYSIS LAB  
**Address:** 4901 HAWKINS NE SUITE D  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

**Batch #:** 120207014  
**Project Name:** 1202153

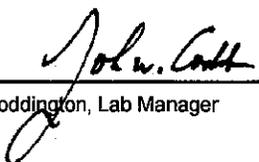
## Analytical Results Report

<b>Sample Number</b>	120207014-001	<b>Sampling Date</b>	2/1/2012	<b>Date/Time Received</b>	2/7/2012	11:45 AM
<b>Client Sample ID</b>	1202153-001B / BK-9 (73-73.5)	<b>Sampling Time</b>	9:00 AM			
<b>Matrix</b>	Soil	<b>Sample Location</b>				
<b>Comments</b>						

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/Kg	0.3	2/14/2012	CRW	EPA 335.4	
%moisture	4.6	Percent		2/17/2012	CRW	%moisture	

## Surrogate Data

Authorized Signature

  
\_\_\_\_\_  
John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level  
ND Not Detected  
PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.  
The results reported relate only to the samples indicated.  
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595  
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

Monday, February 27, 2012

Page 1 of 1

# Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com  
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

**Client:** HALL ENVIRONMENTAL ANALYSIS LAB      **Batch #:** 120207014  
**Address:** 4901 HAWKINS NE SUITE D      **Project Name:** 1202153  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

## Analytical Results Report Quality Control Data

### Lab Control Sample

Parameter	LCS Result	Units	LCS Spike	%Rec	AR %Rec	Prep Date	Analysis Date
Cyanide	0.512	mg/kg	0.5	102.4	80-120	2/14/2012	2/14/2012

### Matrix Spike

Sample Number	Parameter	Sample Result	MS Result	Units	MS Spike	%Rec	AR %Rec	Prep Date	Analysis Date
120207017-001	Cyanide	ND	13.7	mg/kg	14	97.9	60-140	2/14/2012	2/14/2012

### Matrix Spike Duplicate

Parameter	MSD Result	Units	MSD Spike	%Rec	%RPD	AR %Rec	Prep Date	Analysis Date
Cyanide	14.2	mg/kg	14	101.4	3.6	0-25	2/14/2012	2/14/2012

### Method Blank

Parameter	Result	Units	PQL	Prep Date	Analysis Date
Cyanide	ND	mg/Kg	0.3	2/14/2012	2/14/2012

AR      Acceptable Range  
ND      Not Detected  
PQL     Practical Quantitation Limit  
RPD     Relative Percentage Difference

### Comments:

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C585  
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

Monday, February 27, 2012

Page 1 of 1

# Anatek Labs, Inc.

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

## Login Report

**Customer Name:** HALL ENVIRONMENTAL ANALYSIS LAB  
4901 HAWKINS NE SUITE D  
ALBUQUERQUE NM 87109

**Order ID:** 120207014  
**Order Date:** 2/7/2012

**Contact Name:** ANDY FREEMAN

**Project Name:** 1202153

**Comment:**

---

**Sample #:** 120207014-001 **Customer Sample #:** 1202153-001B / BK-9 (73-73.5)

**Recv'd:**  **Collector:** **Date Collected:** 2/1/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 2/7/2012 11:45:00 A

**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/17/2012	<b><u>Normal (6-10 Days)</u></b>
CYANIDE TOTAL EPA	M	EPA 335.4	2/17/2012	<b><u>Normal (6-10 Days)</u></b>

## SAMPLE CONDITION RECORD

---

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature inside the cooler?	4.5
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	N/A
Is there a trip blank to accompany VOC samples?	N/A
Labels and chain agree?	Yes

120207 014 **HALL** Last Due 2/17/2012  
 1st SAMP 2/1/2012 1st RCVD 2/7/2012  
 1202153

SUB CONTRACTOR: Anatek Labs COMPANY: Anatek Labs, Inc. PHONE: (208) 883-2839 FAX: (208) 882-9246  
 ADDRESS: 1282 Alkurpas Dr ACCOUNT # EMAIL:  
 CITY, STATE, ZIP: Moscow, ID 83843

ITEM	SAMPLE	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	COLLECTION DATE	# CONTAINERS	ANALYTICAL COMMENTS
1	1202153-001B	BK-9 (73-73.5)	40ZGU	Soil	2/1/2012 9:00:00 AM	1	TOTAL CYANIDE
2						0	
3						0	MIBS
4						0	
5						0	
6						0	
7						0	
8						0	
9						0	
10						0	

**SPECIAL INSTRUCTIONS/COMMENTS:**  
 \*\*\*\*\*LEVEL 4 DATA PACKET. PROVIDE QC\*\*\*\*\*Please include the LAB ID and the CLIENT SAMPLE ID on all final reports. Please e-mail results to lab@hallenvt.com. Please return all coolers and blue ice. Thank you.

Requisitioned By: [Signature] Date: 2/6/2012 Time: 2:16 PM Received By: [Signature] Date: \_\_\_\_\_  
 Requisitioned By: [Signature] Date: \_\_\_\_\_ Time: \_\_\_\_\_ Received By: [Signature] Date: \_\_\_\_\_  
 Participated By: [Signature] Date: \_\_\_\_\_ Time: \_\_\_\_\_ Received By: [Signature] Date: \_\_\_\_\_

TAT:  Standard  RUSH  Next BD  2nd BD  3rd B

**ANATEK LABS RECEIVING LIST**  
 RECEIVED INTACT  TEMP: 4.5 °C  
 LABELS & CHAINS AGREE   
 NO HEADSPACE   
 ICE / ICE-PACKS PRESENT: Y  
 CUSTODY SEALS PRESENT: Y  
 PRESERVATIVES: \_\_\_\_\_  
 NUMBER OF CONTAINERS: 1 SHIPPED VIA: F  
 DATE & TIME: 2-7-12 11:45 AM INSPECTED BY: BT

# CYANIDE EXTRACTION BENCHSHEET SW 846

Instrument names & IDs: Denver A-160 balance; Alchem FIA

Date	SAMPLE #	% Solids	Sample Amt (g)	H2O (mL)	Final Volume	Multiplier	Chemist
2/7/12	120201021-11	89.4	10.03	250	250	27.9	CRW
	-12	95.9	10.00			26.1	
	-13	90.5	10.02			27.6	
	-14	94.8	10.07			26.2	
	-15	92.6	10.03			26.9	
	-16	91.3	10.01			27.4	
	-17	90.4	10.11			27.4	
2/8/12	120201019-1	91.8	10.00	250	250	27.2	CRW
	-2	93.7	10.02			26.6	
	120201027-1	93.0	10.01			26.9	
2/8/12	-2	89.4	10.08			27.5	
	120201019-3	96.7	10.00	250	250	25.9	CRW
	-4	96.6	5.01	125	125	25.8	
	-5	94.6	5.00			26.4	
	-6	94.5	5.05			26.2	
	-7	94.8	5.10			25.9	
	-8	94.9	5.02			26.2	
	-9	97.2	4.99			25.8	
	-10	92.4	5.01			27.0	
	-11	94.3	5.00			26.5	
	-12	15.0	5.00			16.7	
2/10/12	120207014-1	95.4	10.04	250	250	26.1	CRW
	120207017-1	89.4	10.04			27.9	
	-2	92.2	10.00			27.1	
	-3	96.7	10.00			25.8	
	-4	94.9	10.00			26.3	
	-5	95.3	10.01			26.2	
	-6	95.5	10.09			25.9	
	-7	90.3	9.99			27.7	
	-8	90.2	10.05			27.6	
	120207027-1	88.9	10.03			28.0	
	-2	92.7	10.01			26.9	
	-3	87.0	10.03			28.6	
	-4	90.4	10.01			27.6	
	-5	93.0	10.07			26.7	
	-6	89.0	10.07			27.6	
-7	88.8	10.00			28.2		
-8	92.9	10.03			26.8		

**Total Cyanide by Semi-Automated Colorimetry**  
**Method: EPA 335.4/SM-4500-CN-E**  
**Distillation Bench Sheet**

Weak Acid Dissociable Cyanide by  
 SM 4500-CN-I (check WAD column)

Total Cyanide MS/MSD/LCS Soln: M838-03 Exp: 2/9/2013  
 Free Cyanide MS/MSD/LCS Soln: M824-05 Exp: 12/28/2012

**Method requirements:** All QC +/- 10%  
**Equipment:** Midi-vap  
**Instrument:** ALPCHEM FIA 3000  
**Absorbance:** 570nm

	Sample ID	Matrix	Preserved	Sample Amount (mL)**	Initial Multiplier*	Final Multiplier	Spike Amount (mL)	WAD? (check if yes)
1	120207014-1	soil epa	NaOH	50mL	26.1	Same		
2	17-1				27.9			
3	-1ms				+		1mL	
4	-1msd				+		+	
5	-1cs				1x		+	
6	-1bl				+			
7	-2				27.1			
8	-3				25.8			
9	-4				26.3			
10	-5	+	+	+	26.2	+		
11	120207017-6	soil epa	NaOH	50mL	25.9	Same		
12	-7				27.7			
13	-8				27.6			
14	120207027-1				28.0			
15	-2				26.9			
16	-3				28.6			
17	-4				27.6			
18	-5				26.7			
19	-6				27.6			
20	-7	+	+	+	28.2	+		

\* If soils this calculation is taken from cyanide extraction bench sheet.

\*\* If soils, mLs of extract used for distillation.

**Extraction Reagents: Reagent #:**  
 methyl red indicator A041-03  
 18 N H<sub>2</sub>SO<sub>4</sub> A043-10  
 sulfamic acid R009-12  
 0.025N NaOH R014-16  
 51% MgCl<sub>2</sub> A043-06

**Analytical Reagents: Reagent #:**  
 Barbituric Acid R038-13  
 Sodium Phosphate R026-23  
 Chloramine-t R048-09  
 Pyridine R043-03

Distillation Initials/Date Distilled: CMW 2/13/02

Analyst Initials/Date Analyzed: CMW 2/14/02

File name: T:\DATA\FLOW4\2012\EPA335.4\021412CM.RST  
 Date: February 14, 2012  
 Operator: CRW

*CRW 2/17/12*

*12013FIACNS*

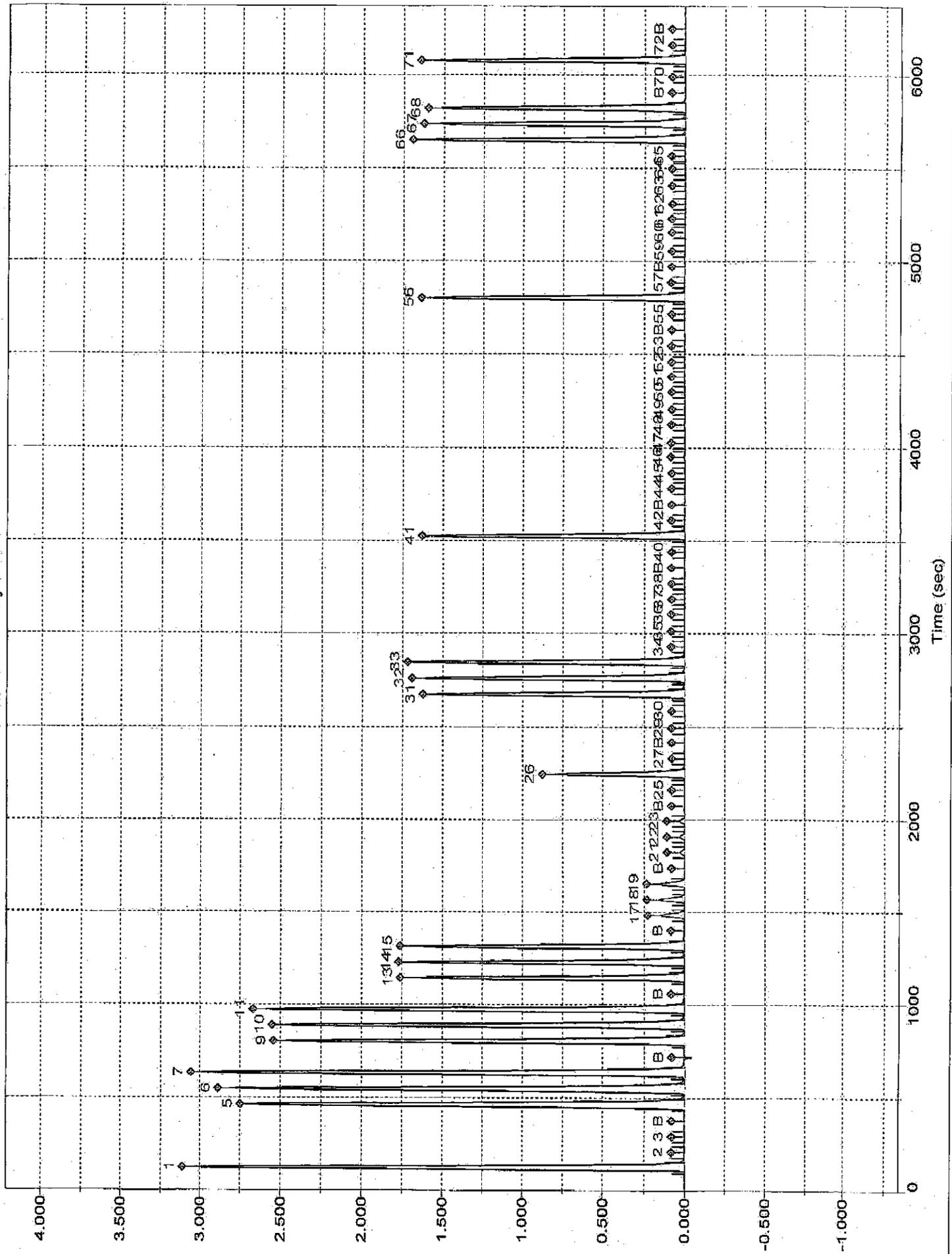
Peak	Cup	Name	Type	Dil	Wt	Area	Calc. (ppm)
1	2	Sync	SYNC		1	6240112	0.950185
2	0	Carryover	CO		1	14767	0.003458
3	0	Carryover	CO		1	4057	0.001829
B	0	Baseline	RB		1	4254	0.001859
5	2	Cal 1.00 ppm	C		1	6451998	0.982408
6	2	Cal 1.00 ppm	C		1	6376184	0.970878
7	2	Cal 1.00 ppm	C		1	6445985	0.981493
B	0	Baseline	RB		1	-564	0.001126
9	3	Cal 0.80 ppm	C		1	5240594	0.798182
10	3	Cal 0.80 ppm	C		1	5270748	0.802768
11	3	Cal 0.80 ppm	C		1	5330839	0.811906
B	0	Baseline	RB		1	1473	0.001436
13	4	Cal 0.50 ppm	C		1	3312679	0.504992
14	4	Cal 0.50 ppm	C		1	3343212	0.509635
15	4	Cal 0.50 ppm	C		1	3343269	0.509644
B	0	Baseline	RB		1	-4543	0.000521
17	5	Cal 0.05 ppm	C		1	304698	0.047549
18	5	Cal 0.05 ppm	C		1	309485	0.048277
19	5	Cal 0.05 ppm	C		1	315598	0.049207
B	0	Baseline	RB		1	-368	0.001156
21	6	Cal 0.01 ppm	C		1	62752	0.010755
22	6	Cal 0.01 ppm	C		1	60671	0.010439
23	6	Cal 0.01 ppm	C		1	56879	0.009862
B	0	Baseline	RB		1	516	0.001290
25	1	Blank	BLNK		1	3584	0.001757
26	7	ICV 0.25 ppm	CCV		1	1712997	0.261718
27	1	Blank	BLNK		1	-3191	0.000727
B	0	Baseline	RB		1	354	0.001266
29	8	120207017-BL S	U		1	-3794	0.000635
30	9	120207017-001	U	27.9	1	-2036	0.025178
31	10	120207017-001MS	U	27.9	1	3216405	13.680788
32	11	120207017-001MSD	U	27.9	1	3336514	14.190402
33	12	120207017-LCS	U	1	1	3357160	0.511756
34	13	120207017-002	U	27.1	1	6448	0.059420
35	14	120207017-003	U	25.8	1	6459	0.056612
36	15	120207017-004	U	26.3	1	2397	0.041466
37	16	120207017-005	U	26.2	1	-2330	0.022472
38	17	120207014-001	U	26.1	1	-3845	0.016375
B	0	Baseline	RB		1	-775	0.001094
40	1	Blank	BLNK		1	-7331	0.000097
41	4	CCV 0.5 ppm	CCV		1	3237268	0.493524
42	1	Blank	BLNK		1	-4489	0.000529
B	0	Read Baseline	RB		1	-2950	0.000763
44	18	120207017-006	U	25.9	1	-3475	0.017705
45	19	120207017-007	U	27.7	1	-6299	0.007038
46	20	120207017-008	U	27.6	1	5149	0.055064
47	21	120207027-001	U	28	1	-4150	0.016265
48	22	120207027-002	U	26.9	1	1200	0.037512
49	23	120207027-003	U	28.6	1	-8886	-0.003983
50	24	120207027-004	U	27.6	1	-2833	0.021563
51	25	120207027-005	U	26.7	1	1360	0.037884
52	26	120207027-006	U	27.6	1	2106	0.042294
53	27	120207027-007	U	28.2	1	915	0.038105
B	0	Baseline	RB		1	-690	0.001107
55	1	Blank	BLNK		1	1771	0.001481
56	4	CCV 0.5 ppm	CCV		1	3262052	0.497293
57	1	Blank	BLNK		1	-1100	0.001045
B	0	Read Baseline	RB		1	-4031	0.000599
59	28	RINSE	U	1	1	-5188	0.000423
60	29	RINSE	U	1	1	-10405	-0.000370
61	30	RINSE	U	1	1	-11017	-0.000463
62	31	RINSE	U	1	1	-12689	-0.000718
63	32	RINSE	U	1	1	-14595	-0.001007
64	33	120131002-BL F	U	1	1	-9775	-0.000274
65	34	120131002-001	U	1	1	-1080	0.001048
66	35	120131002-001MS	U	1	1	3270905	0.498639

Peak	Cup	Name	Type	Dil	Wt	Area	Calc. (ppm)
57	36	120131002-001MSD	U		1	3326716	0.507127
58	37	120131002-LCS	U		1	3258938	0.496819
3	0	Baseline	RB		1	-4128	0.000584
70	1	Blank	BLNK		1	-4264	0.000564
71	4	CCV 0.5 ppm	CCV		1	3238150	0.493658
72	1	Blank	BLNK		1	-3812	0.000632
3	0	Read Baseline	RB		1	-2605	0.000816

Peak	Cup	Flags
1	2	
2	0	
3	0	
3	0	BL
5	2	
5	2	
7	2	
3	0	BL
3	3	
10	3	
11	3	
3	0	BL
13	4	
14	4	
15	4	
3	0	BL
17	5	
18	5	
19	5	OL
3	0	BL
21	6	
22	6	
23	6	OL
3	0	BL
25	1	
26	7	
27	1	
3	0	BL
29	8	
30	9	
31	10	
32	11	
33	12	
34	13	
35	14	
36	15	
37	16	
38	17	
3	0	BL
10	1	
11	4	
12	1	
3	0	BL
14	18	
15	19	
16	20	
17	21	
18	22	
19	23	LO
30	24	
31	25	
32	26	
33	27	
3	0	BL
35	1	
36	4	
37	1	
3	0	BL
39	28	

Peak	Cup	Flags
60	29	LO
61	30	LO
62	31	LO
63	32	LO
64	33	LO
65	34	
66	35	
67	36	
68	37	
3	0	BL
70	1	
71	4	
72	1	
3	0	BL

Channel 1: Cyanide



File name: T:\DATA1\FLOW4\2012\EPA335.4\021412CM.RST  
Date: February 14, 2012  
Operator: CRW

* Name	Conc	Area
* Cal 1.00 ppm	1.000000	6451997.500000
* Cal 1.00 ppm	1.000000	6376183.500000
* Cal 1.00 ppm	1.000000	6445985.000000
* Cal 0.80 ppm	0.800000	5240594.500000
* Cal 0.80 ppm	0.800000	5270747.500000
* Cal 0.80 ppm	0.800000	5330839.000000
* Cal 0.50 ppm	0.500000	3312679.000000
* Cal 0.50 ppm	0.500000	3343211.750000
* Cal 0.50 ppm	0.500000	3343268.750000
* Cal 0.05 ppm	0.050000	304698.437500
* Cal 0.05 ppm	0.050000	309484.875000
* Cal 0.05 ppm	0.050000	315597.906250
* Cal 0.01 ppm	0.010000	62752.015625
* Cal 0.01 ppm	0.010000	60670.792969
* Cal 0.01 ppm	0.010000	56878.894531

Calib Coef:

y=bx+a

a: (intercept) -7.9701e+03

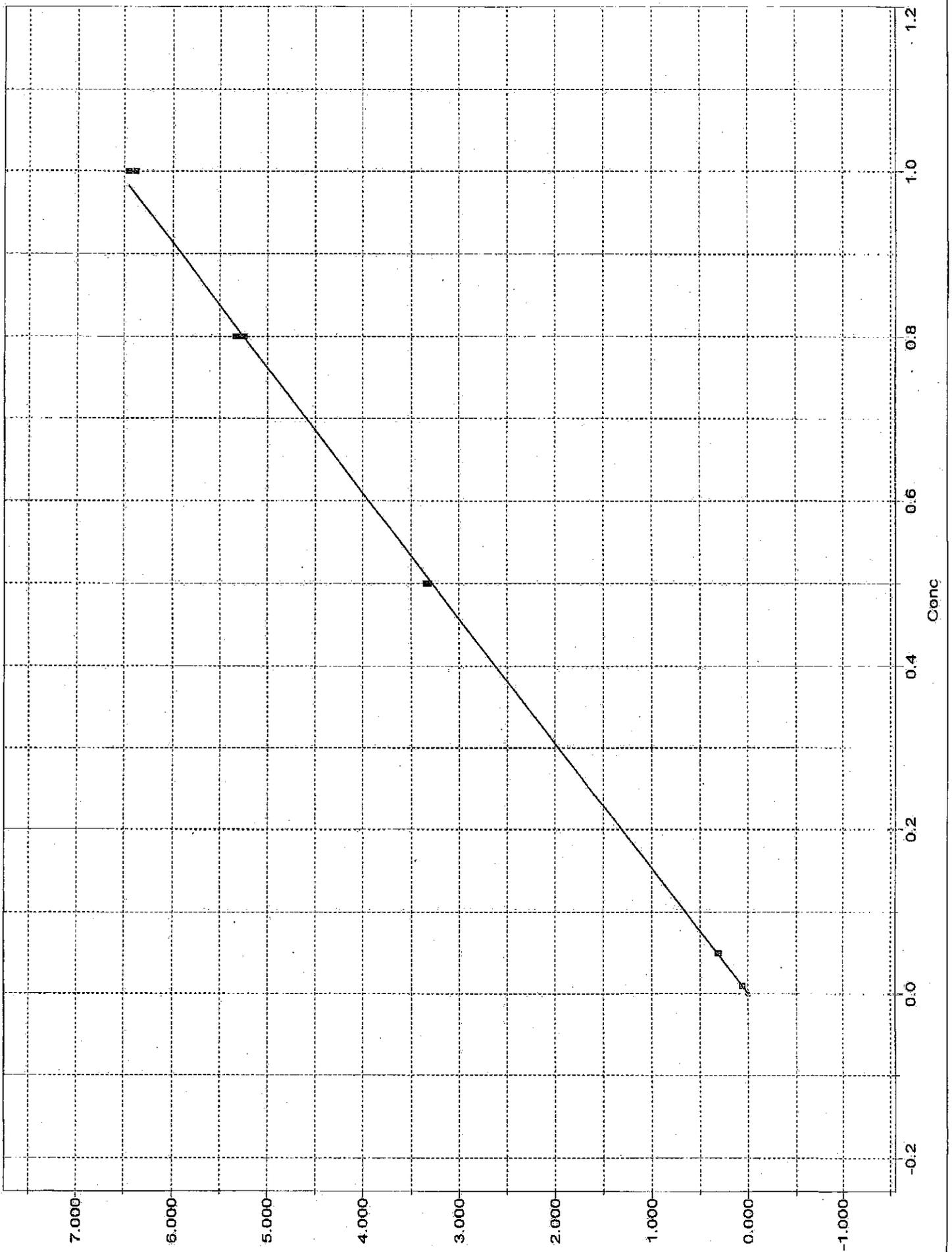
b: 6.5756e+06

Corr Coef: 0.999677

Carryover: 0.237%

No Drift Peaks

Cyanide: Calibration, Peak 5-73



# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1202153

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID	<b>MB-571</b>	SampType:	<b>MBLK</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>PBS</b>	Batch ID:	<b>571</b>	RunNo:	<b>784</b>					
Prep Date:	<b>2/3/2012</b>	Analysis Date:	<b>2/6/2012</b>	SeqNo:	<b>22392</b>	Units:	<b>mg/Kg</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.30								

Sample ID	<b>LCS-571</b>	SampType:	<b>LCS</b>	TestCode:	<b>EPA Method 300.0: Anions</b>					
Client ID:	<b>LCSS</b>	Batch ID:	<b>571</b>	RunNo:	<b>784</b>					
Prep Date:	<b>2/3/2012</b>	Analysis Date:	<b>2/6/2012</b>	SeqNo:	<b>22393</b>	Units:	<b>mg/Kg</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	1.4	0.30	1.500	0	94.3	90	110			

**Qualifiers:**

- |    |                                            |    |                                                    |
|----|--------------------------------------------|----|----------------------------------------------------|
| *X | Value exceeds Maximum Contaminant Level.   | B  | Analyte detected in the associated Method Blank    |
| E  | Value above quantitation range             | H  | Holding times for preparation or analysis exceeded |
| J  | Analyte detected below quantitation limits | ND | Not Detected at the Reporting Limit                |
| R  | RPD outside accepted recovery limits       | RL | Reporting Detection Limit                          |

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1202153

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID <b>MB-723</b>	SampType: <b>MBLK</b>		TestCode: <b>EPA Method 7471: Mercury</b>							
Client ID: <b>PBS</b>	Batch ID: <b>723</b>		RunNo: <b>963</b>							
Prep Date: <b>2/15/2012</b>	Analysis Date: <b>2/15/2012</b>		SeqNo: <b>27905</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.033								

Sample ID <b>LCS-723</b>	SampType: <b>LCS</b>		TestCode: <b>EPA Method 7471: Mercury</b>							
Client ID: <b>LCSS</b>	Batch ID: <b>723</b>		RunNo: <b>963</b>							
Prep Date: <b>2/15/2012</b>	Analysis Date: <b>2/15/2012</b>		SeqNo: <b>27906</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.18	0.033	0.1667	0	105	80	120			

**Qualifiers:**

- |                                              |                                                      |
|----------------------------------------------|------------------------------------------------------|
| *X Value exceeds Maximum Contaminant Level.  | B Analyte detected in the associated Method Blank    |
| E Value above quantitation range             | H Holding times for preparation or analysis exceeded |
| J Analyte detected below quantitation limits | ND Not Detected at the Reporting Limit               |
| R RPD outside accepted recovery limits       | RL Reporting Detection Limit                         |

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1202153

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID	MB-749	SampType:	MBLK	TestCode:	EPA Method 6010B: Soil Metals					
Client ID:	PBS	Batch ID:	749	RunNo:	1015					
Prep Date:	2/17/2012	Analysis Date:	2/19/2012	SeqNo:	29260	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.58	3.0								J
Antimony	ND	2.5								
Arsenic	ND	2.5								
Barium	ND	0.10								
Beryllium	ND	0.15								
Boron	0.16	2.0								J
Cadmium	0.029	0.10								J
Chromium	ND	0.30								
Cobalt	ND	0.30								
Copper	ND	0.30								
Molybdenum	0.074	0.40								J
Nickel	0.12	0.50								J
Selenium	1.0	2.5								J
Silver	0.041	0.25								J
Thallium	ND	2.5								
Uranium	0.93	5.0								J
Vanadium	0.043	2.5								J
Zinc	ND	2.5								

Sample ID	LCS-749	SampType:	LCS	TestCode:	EPA Method 6010B: Soil Metals					
Client ID:	LCSS	Batch ID:	749	RunNo:	1015					
Prep Date:	2/17/2012	Analysis Date:	2/19/2012	SeqNo:	29261	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	28	3.0	25.00	0.5830	111	80	120			
Antimony	24	2.5	25.00	0	97.6	80	120			
Arsenic	24	2.5	25.00	0	95.2	80	120			
Barium	24	0.10	25.00	0	97.1	80	120			
Beryllium	25	0.15	25.00	0	101	80	120			
Boron	24	2.0	25.00	0.1580	97.2	80	120			
Cadmium	24	0.10	25.00	0.02850	96.9	80	120			
Chromium	25	0.30	25.00	0	99.2	80	120			
Cobalt	24	0.30	25.00	0	94.9	80	120			
Copper	26	0.30	25.00	0	103	80	120			
Molybdenum	26	0.40	25.00	0.07350	103	80	120			
Nickel	24	0.50	25.00	0.1240	95.8	80	120			
Selenium	23	2.5	25.00	1.030	88.3	80	120			
Silver	5.0	0.25	5.000	0.04100	99.1	80	120			
Thallium	25	2.5	25.00	0	100	80	120			
Uranium	26	5.0	25.00	0.9285	100	80	120			
Vanadium	26	2.5	25.00	0.04250	103	80	120			

**Qualifiers:**

- \*X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1202153

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID	<b>LCS-749</b>	SampType:	<b>LCS</b>	TestCode:	<b>EPA Method 6010B: Soil Metals</b>					
Client ID:	<b>LCSS</b>	Batch ID:	<b>749</b>	RunNo:	<b>1015</b>					
Prep Date:	<b>2/17/2012</b>	Analysis Date:	<b>2/19/2012</b>	SeqNo:	<b>29261</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Zinc	24	2.5	25.00	0	94.2	80	120			

Sample ID	<b>1202153-001AMS</b>	SampType:	<b>MS</b>	TestCode:	<b>EPA Method 6010B: Soil Metals</b>					
Client ID:	<b>BK-9 (73-73.5)</b>	Batch ID:	<b>749</b>	RunNo:	<b>1015</b>					
Prep Date:	<b>2/17/2012</b>	Analysis Date:	<b>2/19/2012</b>	SeqNo:	<b>29271</b>	Units:	<b>mg/Kg</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	12	2.5	24.85	2.108	41.4	75	125			S
Arsenic	22	2.5	24.85	0	86.6	75	125			
Beryllium	23	0.15	24.85	0.2275	91.1	75	125			
Boron	22	2.0	24.85	0	86.8	75	125			
Cadmium	22	0.10	24.85	0.1012	88.3	75	125			
Cobalt	26	0.30	24.85	6.108	81.7	75	125			
Copper	36	0.30	24.85	18.74	71.0	75	125			S
Molybdenum	23	0.40	24.85	4.017	77.0	75	125			
Nickel	26	0.50	24.85	11.55	59.1	75	125			S
Selenium	18	2.5	24.85	0	72.1	75	125			S
Silver	4.5	0.25	4.970	0	90.3	75	125			
Thallium	ND	2.5	24.85	0	0	75	125			S
Uranium	28	5.0	24.85	5.606	89.6	75	125			
Zinc	46	2.5	24.85	26.93	75.1	75	125			

Sample ID	<b>1202153-001AMSD</b>	SampType:	<b>MSD</b>	TestCode:	<b>EPA Method 6010B: Soil Metals</b>					
Client ID:	<b>BK-9 (73-73.5)</b>	Batch ID:	<b>749</b>	RunNo:	<b>1015</b>					
Prep Date:	<b>2/17/2012</b>	Analysis Date:	<b>2/19/2012</b>	SeqNo:	<b>29272</b>	Units:	<b>mg/Kg</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	11	2.5	24.74	2.108	33.9	75	125	16.5	20	S
Arsenic	20	2.5	24.74	0	82.8	75	125	5.01	20	
Beryllium	23	0.15	24.74	0.2275	91.9	75	125	0.456	20	
Boron	21	2.0	24.74	0	83.7	75	125	4.09	20	
Cadmium	22	0.10	24.74	0.1012	86.6	75	125	2.43	20	
Cobalt	26	0.30	24.74	6.108	79.7	75	125	2.29	20	
Copper	34	0.30	24.74	18.74	60.8	75	125	7.44	20	S
Molybdenum	22	0.40	24.74	4.017	72.8	75	125	4.98	20	S
Selenium	18	2.5	24.74	0	73.6	75	125	1.67	20	S
Silver	4.3	0.25	4.948	0	87.1	75	125	4.01	20	
Thallium	ND	2.5	24.74	0	0	75	125	0	20	S
Uranium	27	5.0	24.74	5.606	87.9	75	125	1.90	20	
Zinc	45	2.5	24.74	26.93	72.9	75	125	1.36	20	S

**Qualifiers:**

\* / X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1202153

13-Apr-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID <b>MB-749</b>	SampType: <b>MBLK</b>		TestCode: <b>EPA Method 6010B: Soil Metals</b>							
Client ID: <b>PBS</b>	Batch ID: <b>749</b>		RunNo: <b>1032</b>							
Prep Date: <b>2/17/2012</b>	Analysis Date: <b>2/20/2012</b>		SeqNo: <b>29831</b>		Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Lead	ND	0.25								

Sample ID <b>LCS-749</b>	SampType: <b>LCS</b>		TestCode: <b>EPA Method 6010B: Soil Metals</b>							
Client ID: <b>LCSS</b>	Batch ID: <b>749</b>		RunNo: <b>1032</b>							
Prep Date: <b>2/17/2012</b>	Analysis Date: <b>2/20/2012</b>		SeqNo: <b>29832</b>		Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Lead	23	0.25	25.00	0	93.2	80	120			

Sample ID <b>1202153-001AMS</b>	SampType: <b>MS</b>		TestCode: <b>EPA Method 6010B: Soil Metals</b>							
Client ID: <b>BK-9 (73-73.5)</b>	Batch ID: <b>749</b>		RunNo: <b>1032</b>							
Prep Date: <b>2/17/2012</b>	Analysis Date: <b>2/20/2012</b>		SeqNo: <b>29834</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Lead	20	0.50	24.85	1.441	76.6	75	125			

Sample ID <b>1202153-001AMSD</b>	SampType: <b>MSD</b>		TestCode: <b>EPA Method 6010B: Soil Metals</b>							
Client ID: <b>BK-9 (73-73.5)</b>	Batch ID: <b>749</b>		RunNo: <b>1032</b>							
Prep Date: <b>2/17/2012</b>	Analysis Date: <b>2/20/2012</b>		SeqNo: <b>29835</b>		Units: <b>mg/Kg</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Lead	22	0.50	24.74	1.441	82.2	75	125	6.13	20	

**Qualifiers:**

- \*X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit



Hall Environmental Analysis Laboratory  
 4901 Hawkins NE  
 Albuquerque, NM 87105  
 TEL: 505-345-3975 FAX: 505-345-4105  
 Website: www.hallenvironmental.com

# Sample Log-In Check List

Client Name: Western Refining Southwest, Inc Bloomfield Work Order Number: 1202153  
 Received by/date: [Signature] 2/3/12  
 Logged By: Ashley Gallegos 2/3/2012 3:25:00 PM [Signature]  
 Completed By: Ashley Gallegos 2/3/2012 4:05:30 PM [Signature]  
 Reviewed By: UGR 2/3/12

**Chain of Custody**

- 1. Were seals intact? Yes  No  Not Present
- 2. Is Chain of Custody complete? Yes  No  Not Present
- 3. How was the sample delivered? Client

**Log In**

- 4. Coolers are present? (see 19. for cooler specific information) Yes  No  NA
- 5. Was an attempt made to cool the samples? Yes  No  NA
- 6. Were all samples received at a temperature of >0° C to 6.0°C Yes  No  NA
- 7. Sample(s) in proper container(s)? Yes  No
- 8. Sufficient sample volume for indicated test(s)? Yes  No
- 9. Are samples (except VOA and ONG) properly preserved? Yes  No
- 10. Was preservative added to bottles? Yes  No  NA
- 11. VOA vials have zero headspace? Yes  No  No VOA Vials
- 12. Were any sample containers received broken? Yes  No
- 13. Does paperwork match bottle labels? (Note discrepancies on chain of custody) Yes  No
- 14. Are matrices correctly identified on Chain of Custody? Yes  No
- 15. Is it clear what analyses were requested? Yes  No
- 16. Were all holding times able to be met? (if no, notify customer for authorization.) Yes  No

# of preserved bottles checked for pH: \_\_\_\_\_  
 (<2 or >12 unless noted)  
 Adjusted? \_\_\_\_\_  
 Checked by: \_\_\_\_\_

**Special Handling (if applicable)**

- 17. Was client notified of all discrepancies with this order? Yes  No  NA

Person Notified: \_\_\_\_\_ Date: \_\_\_\_\_  
 By Whom: \_\_\_\_\_ Via:  eMail  Phone  Fax  In Person  
 Regarding: \_\_\_\_\_  
 Client Instructions: \_\_\_\_\_

18. Additional remarks:

**19. Cooler Information**

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.3	Good	Yes			

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### Chain-of-Custody Record

Client: Western Refining Southwest, Inc  
Bloomfield Refinery  
 Mailing Address: 50 Road 4990  
Bloomfield, NM 87401  
 Phone #: 505-632-4166

email or Fax#: Kellye.Robinson@wrr.com  
 QA/QC Package:  
 Standard  Level 4 (Full Validation)  
 Accreditation  
 NELAP  Other \_\_\_\_\_  
 EDD (Type) EXCEL

Turn-Around Time:  
 Standard  Rush  
 Project Name:  
RCA BACKGROUNDS INVESTIGATION  
 Project #:  
 \_\_\_\_\_

Project Manager:  
Kelly Robinson  
 Sampler: Kelly R. & Tracy P.  
 On Ice:  Yes  No  
 Sample Temperature: 1.3  
 Container Type and #  
1 Jar None  
 HEAL No  
130253

Date: 2/1/12 Time: 9:00  
 Matrix: Soil BK-9 (13-73.5)  
 Sample Request ID:  
 \_\_\_\_\_  
 Relinquished by:  
Kelly Robinson  
 Date: 2/3/12 Time: 17:00  
 Relinquished by:  
[Signature]  
 Date: 2/3/12 Time: 15:25



**HALL ENVIRONMENTAL ANALYSIS LABORATORY**  
 www.hallenvironmental.com  
 4901 Hawkins NE - Albuquerque, NM 87109  
 Tel. 505-345-3975 Fax 505-345-4107

### Analysis Request

Analysis Request	Remarks
BTEX + MTBE + TMBs (8021)	
BTEX + MTBE + TPH (Gas only)	
TPH Method 8015B (Gas/Diesel)	
TPH (Method 418.1)	
EDB (Method 504.1)	
8310 (PNA or PAH)	
RCRA 8 Metals	
Anions (F, Cl, NO <sub>3</sub> , NO <sub>2</sub> , PO <sub>4</sub> , SO <sub>4</sub> )	
8081 Pesticides / 8082 PCBs	
8260B (VOA)	
8270 (Semi-VOA)	
Metals (See attached)	X
TPH-MRW DRO	
TPH-GRO	
Air Bubbles (Y or N)	

Remarks:  
See attached sheet for analyte list.

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

# Background

## METALS ANALYSES

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 335.3/335.2 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
Thallium	SW-846 method 6010/6020
Vanadium	SW-846 method 6010/6020
Zinc	SW-846 method 6010/6020

Includes  
~~Soil~~  
Soil Samples  
+  
GW Samples  
(both dissolved  
+ total  
analysis)

## GENERAL CHEMISTRY ANALYSES

Analyte	Analytical Method
Total Dissolved Solids	SM-2540C
Bicarbonate	SM-2320B (dissolved)
Chloride	EPA method 300.0 (dissolved & total)
Sulfate	EPA method 300.0 (dissolved & total)
Calcium	EPA method 6010/6020 (dissolved)
Magnesium	EPA method 6010/6020 (total)
Sodium	EPA method 6010/6020 (dissolved)
Potassium	EPA method 6010/6020 (dissolved)
Manganese	SW-846 method 6010/6020 (dissolved & total)
Nitrate/nitrite	EPA method 300.0 (dissolved)
Iron	SW-846 method 6010/6020 (dissolved & total)

For  
Groundwater  
Samples  
ONLY

Both lists  
for  
enclaved  
Soils and  
EBs.

KR

## SWMU No. 16 Constituent List

Analyte	Analytical Method
Aluminum	SW-846 method 6010/6020
Boron	SW-846 method 6010/6020
Copper	SW-846 method 6010/6020
Molybdenum	SW-846 method 6010/6020
Uranium	SW-846 method 6020
Fluoride	SW-846 method 300

For Soil  
and Groundwater  
Samples  
(Dissolved  
and  
Totals)



Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)

March 22, 2012

Kelly Robinson

Western Refining Southwest, Inc.

#50 CR 4990

Bloomfield, NM 87413

TEL: (505) 632-4166

FAX: (505) 632-3911

RE: RCRA Background Investigation

OrderNo.: 1202350

Dear Kelly Robinson:

Hall Environmental Analysis Laboratory received 4 sample(s) on 2/10/2012 for the analyses presented in the following report.

This report is a revised report and it replaces the original report issued February 29, 2012.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. All samples are reported as received unless otherwise indicated.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman", is written over a white background.

Andy Freeman

Laboratory Manager

4901 Hawkins NE

Albuquerque, NM 87109



Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)

## Case Narrative

WO#: 1202350  
Date: 3/22/2012

---

**CLIENT:** Western Refining Southwest, Inc.  
**Project:** RCRA Background Investigation

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The chloride and sulfate reported in fraction -004A was filtered.

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1202350

Date Reported: 3/22/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-10 (5-6')

**Project:** RCRA Background Investigation

**Collection Date:** 2/7/2012 7:53:00 AM

**Lab ID:** 1202350-001

**Matrix:** SOIL

**Received Date:** 2/10/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	3.0	0.30		mg/Kg	1	2/10/2012 12:52:44 PM
Chloride	210	30		mg/Kg	20	2/10/2012 1:05:08 PM
Sulfate	2,300	30		mg/Kg	20	2/10/2012 1:05:08 PM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>ELS</b>
Mercury	ND	0.033		mg/kg	1	2/14/2012 9:59:23 AM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	7,900	1,500		mg/Kg	500	2/17/2012 8:39:38 AM
Antimony	1.1	5.0	J	mg/Kg	2	2/13/2012 8:23:16 AM
Arsenic	ND	5.0		mg/Kg	2	2/13/2012 8:23:16 AM
Barium	150	0.50		mg/Kg	5	2/17/2012 8:37:43 AM
Beryllium	0.25	0.30	J	mg/Kg	2	2/13/2012 8:23:16 AM
Boron	3.8	4.0	J	mg/Kg	2	2/13/2012 8:23:16 AM
Cadmium	0.065	0.20	J	mg/Kg	2	2/13/2012 8:23:16 AM
Chromium	4.6	0.60		mg/Kg	2	2/13/2012 8:23:16 AM
Cobalt	2.6	0.60		mg/Kg	2	2/13/2012 8:23:16 AM
Copper	3.5	0.60		mg/Kg	2	2/17/2012 8:35:40 AM
Iron	9,100	500		mg/Kg	500	3/18/2012 12:59:27 PM
Lead	2.6	0.50		mg/Kg	2	2/17/2012 8:35:40 AM
Manganese	180	0.48		mg/Kg	5	3/18/2012 12:57:27 PM
Molybdenum	0.33	0.80	J	mg/Kg	2	2/13/2012 8:23:16 AM
Nickel	3.8	1.0		mg/Kg	2	2/13/2012 8:23:16 AM
Selenium	1.1	5.0	J	mg/Kg	2	2/13/2012 8:23:16 AM
Silver	ND	0.50		mg/Kg	2	2/13/2012 8:23:16 AM
Thallium	ND	5.0		mg/Kg	2	2/13/2012 8:23:16 AM
Uranium	ND	10		mg/Kg	2	2/13/2012 8:23:16 AM
Vanadium	15	5.0		mg/Kg	2	2/13/2012 8:23:16 AM
Zinc	16	5.0		mg/Kg	2	2/13/2012 8:23:16 AM
<b>CYANIDE-TOTAL</b>						Analyst: <b>Anat</b>
Cyanide	ND	0.30		mg/Kg	1	2/15/2012

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1202350

Date Reported: 3/22/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-10 (5-6') DUP

**Project:** RCRA Background Investigation

**Collection Date:** 2/7/2012 7:53:00 AM

**Lab ID:** 1202350-002

**Matrix:** SOIL

**Received Date:** 2/10/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	2.9	0.30		mg/Kg	1	2/10/2012 1:17:33 PM
Chloride	220	30		mg/Kg	20	2/10/2012 1:29:57 PM
Sulfate	2,200	30		mg/Kg	20	2/10/2012 1:29:57 PM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>ELS</b>
Mercury	ND	0.033		mg/kg	1	2/14/2012 10:04:46 AM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	8,300	1,500		mg/Kg	500	2/17/2012 8:43:28 AM
Antimony	3.0	12	J	mg/Kg	5	2/17/2012 8:41:35 AM
Arsenic	ND	12		mg/Kg	5	2/17/2012 8:41:35 AM
Barium	110	0.50		mg/Kg	5	2/17/2012 8:41:35 AM
Beryllium	0.33	0.75	J	mg/Kg	5	2/17/2012 8:41:35 AM
Boron	5.0	10	J	mg/Kg	5	2/17/2012 8:41:35 AM
Cadmium	ND	0.50		mg/Kg	5	2/17/2012 8:41:35 AM
Chromium	5.1	1.5		mg/Kg	5	2/17/2012 8:41:35 AM
Cobalt	3.0	1.5		mg/Kg	5	2/17/2012 8:41:35 AM
Copper	3.8	1.5		mg/Kg	5	2/17/2012 8:41:35 AM
Iron	9,900	500		mg/Kg	500	3/18/2012 1:07:39 PM
Lead	3.8	1.2		mg/Kg	5	2/17/2012 8:41:35 AM
Manganese	190	0.50		mg/Kg	5	3/18/2012 1:05:41 PM
Molybdenum	0.40	2.0	J	mg/Kg	5	2/17/2012 8:41:35 AM
Nickel	4.3	2.5		mg/Kg	5	2/17/2012 8:41:35 AM
Selenium	ND	12		mg/Kg	5	2/17/2012 8:41:35 AM
Silver	ND	1.2		mg/Kg	5	2/17/2012 8:41:35 AM
Thallium	ND	12		mg/Kg	5	2/17/2012 8:41:35 AM
Uranium	ND	25		mg/Kg	5	2/17/2012 8:41:35 AM
Vanadium	17	12		mg/Kg	5	2/17/2012 8:41:35 AM
Zinc	19	12		mg/Kg	5	2/17/2012 8:41:35 AM
<b>CYANIDE-TOTAL</b>						Analyst: <b>Anat</b>
Cyanide	ND	0.30		mg/Kg	1	2/15/2012

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1202350

Date Reported: 3/22/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-10 (40-42')

**Project:** RCRA Background Investigation

**Collection Date:** 2/7/2012 10:43:00 AM

**Lab ID:** 1202350-003

**Matrix:** SOIL

**Received Date:** 2/10/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	2.8	6.0	J	mg/Kg	20	2/10/2012 1:42:21 PM
Chloride	ND	30		mg/Kg	20	2/10/2012 1:42:21 PM
Sulfate	210	30		mg/Kg	20	2/10/2012 1:42:21 PM
<b>EPA METHOD 7471: MERCURY</b>						Analyst: <b>ELS</b>
Mercury	ND	0.033		mg/kg	1	2/14/2012 10:06:32 AM
<b>EPA METHOD 6010B: SOIL METALS</b>						Analyst: <b>ELS</b>
Aluminum	20,000	1,500		mg/Kg	500	2/17/2012 8:47:28 AM
Antimony	3.1	13	J	mg/Kg	5	2/17/2012 8:45:28 AM
Arsenic	ND	13		mg/Kg	5	2/17/2012 8:45:28 AM
Barium	24	0.50		mg/Kg	5	2/17/2012 8:45:28 AM
Beryllium	0.96	0.75		mg/Kg	5	2/17/2012 8:45:28 AM
Boron	2.5	10	J	mg/Kg	5	2/17/2012 8:45:28 AM
Cadmium	ND	0.50		mg/Kg	5	2/17/2012 8:45:28 AM
Chromium	11	1.5		mg/Kg	5	2/17/2012 8:45:28 AM
Cobalt	4.5	1.5		mg/Kg	5	2/17/2012 8:45:28 AM
Copper	8.8	1.5		mg/Kg	5	2/17/2012 8:45:28 AM
Iron	14,000	500		mg/Kg	500	3/18/2012 1:12:13 PM
Lead	2.4	1.3		mg/Kg	5	2/17/2012 8:45:28 AM
Manganese	90	0.50		mg/Kg	5	3/18/2012 1:10:11 PM
Molybdenum	0.55	2.0	J	mg/Kg	5	2/17/2012 8:45:28 AM
Nickel	6.7	2.5		mg/Kg	5	2/17/2012 8:45:28 AM
Selenium	ND	13		mg/Kg	5	2/17/2012 8:45:28 AM
Silver	ND	1.3		mg/Kg	5	2/17/2012 8:45:28 AM
Thallium	ND	13		mg/Kg	5	2/17/2012 8:45:28 AM
Uranium	4.0	25	J	mg/Kg	5	2/17/2012 8:45:28 AM
Vanadium	28	13		mg/Kg	5	2/17/2012 8:45:28 AM
Zinc	36	13		mg/Kg	5	2/17/2012 8:45:28 AM
<b>CYANIDE-TOTAL</b>						Analyst: <b>Anat</b>
Cyanide	ND	0.30		mg/Kg	1	2/15/2012

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1202350

Date Reported: 3/22/2012

CLIENT: Western Refining Southwest, Inc.

Client Sample ID: BK-EB-020812

Project: RCRA Background Investigation

Collection Date: 2/8/2012 1:40:00 PM

Lab ID: 1202350-004

Matrix: AQUEOUS

Received Date: 2/10/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Chloride	ND	0.50		mg/L	1	2/10/2012 1:00:31 PM
Sulfate	ND	0.50		mg/L	1	2/10/2012 1:00:31 PM
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Chloride	1.4	0.50		mg/L	1	2/10/2012 11:53:11 AM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	2/10/2012 11:53:11 AM
Nitrogen, Nitrate (As N)	0.033	0.10	J	mg/L	1	2/10/2012 11:53:11 AM
Sulfate	0.35	0.50	J	mg/L	1	2/10/2012 11:53:11 AM
<b>EPA METHOD 200.7: DISSOLVED METALS</b>						Analyst: <b>RAG</b>
Aluminum	ND	0.020		mg/L	1	2/10/2012 4:33:41 PM
Barium	0.00034	0.0020	J	mg/L	1	2/10/2012 4:33:41 PM
Beryllium	ND	0.0020		mg/L	1	2/10/2012 4:33:41 PM
Boron	ND	0.040		mg/L	1	2/10/2012 4:33:41 PM
Cadmium	ND	0.0020		mg/L	1	2/10/2012 4:33:41 PM
Calcium	0.084	1.0	J	mg/L	1	2/10/2012 4:33:41 PM
Chromium	ND	0.0060		mg/L	1	2/10/2012 4:33:41 PM
Cobalt	0.00047	0.0060	J	mg/L	1	2/10/2012 4:33:41 PM
Copper	ND	0.0060		mg/L	1	2/10/2012 4:33:41 PM
Iron	0.0083	0.020	J	mg/L	1	2/13/2012 4:04:53 PM
Lead	ND	0.0050		mg/L	1	2/10/2012 4:33:41 PM
Manganese	ND	0.0020		mg/L	1	2/10/2012 4:33:41 PM
Molybdenum	ND	0.0080		mg/L	1	2/10/2012 4:33:41 PM
Nickel	ND	0.010		mg/L	1	2/10/2012 4:33:41 PM
Potassium	ND	1.0		mg/L	1	2/13/2012 4:04:53 PM
Silver	ND	0.0050		mg/L	1	2/10/2012 4:33:41 PM
Sodium	0.19	1.0	J	mg/L	1	2/13/2012 4:04:53 PM
Vanadium	ND	0.050		mg/L	1	2/10/2012 4:33:41 PM
Zinc	0.063	0.010		mg/L	1	2/13/2012 4:04:53 PM
<b>EPA METHOD 200.7: TOTAL METALS</b>						Analyst: <b>RAG</b>
Aluminum	0.031	0.020		mg/L	1	2/14/2012 2:21:40 PM
Barium	ND	0.0020		mg/L	1	2/14/2012 2:21:40 PM
Beryllium	ND	0.0020		mg/L	1	2/14/2012 2:21:40 PM
Boron	ND	0.040		mg/L	1	2/15/2012 4:30:40 PM
Cadmium	0.00044	0.0020	J	mg/L	1	2/14/2012 2:21:40 PM
Chromium	0.0012	0.0060	J	mg/L	1	2/14/2012 2:21:40 PM
Cobalt	ND	0.0060		mg/L	1	2/14/2012 2:21:40 PM
Copper	0.0058	0.0060	J	mg/L	1	2/14/2012 2:21:40 PM
Iron	0.088	0.10	J	mg/L	5	2/14/2012 2:42:04 PM
Lead	ND	0.0050		mg/L	1	2/14/2012 2:21:40 PM
Magnesium	0.057	5.0	J	mg/L	5	2/14/2012 2:42:04 PM
Manganese	0.0019	0.0020	J	mg/L	1	2/14/2012 2:21:40 PM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1202350

Date Reported: 3/22/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** BK-EB-020812

**Project:** RCRA Background Investigation

**Collection Date:** 2/8/2012 1:40:00 PM

**Lab ID:** 1202350-004

**Matrix:** AQUEOUS

**Received Date:** 2/10/2012 9:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 200.7: TOTAL METALS</b>						Analyst: <b>RAG</b>
Molybdenum	ND	0.0080		mg/L	1	2/14/2012 2:21:40 PM
Nickel	0.00076	0.010	J	mg/L	1	2/14/2012 2:21:40 PM
Silver	ND	0.0050		mg/L	1	2/14/2012 2:21:40 PM
Vanadium	ND	0.050		mg/L	1	2/14/2012 2:21:40 PM
Zinc	0.0019	0.010	J	mg/L	1	2/14/2012 2:21:40 PM
<b>EPA 200.8: DISSOLVED METALS</b>						Analyst: <b>SNV</b>
Antimony	ND	0.0010		mg/L	1	2/13/2012 4:41:44 PM
Arsenic	ND	0.0010		mg/L	1	2/13/2012 4:41:44 PM
Selenium	ND	0.0010		mg/L	1	2/13/2012 4:41:44 PM
Thallium	ND	0.0010		mg/L	1	2/13/2012 4:41:44 PM
Uranium	ND	0.0010		mg/L	1	2/13/2012 4:41:44 PM
<b>200.8 ICPMS METALS:TOTAL</b>						Analyst: <b>SNV</b>
Antimony	ND	0.0025		mg/L	2.5	2/20/2012 1:22:36 PM
Arsenic	ND	0.0025		mg/L	2.5	2/20/2012 1:22:36 PM
Selenium	ND	0.0025		mg/L	2.5	2/20/2012 1:22:36 PM
Thallium	ND	0.0025		mg/L	2.5	2/20/2012 1:22:36 PM
Uranium	ND	0.0025		mg/L	2.5	2/20/2012 1:22:36 PM
<b>EPA METHOD 7470: MERCURY</b>						Analyst: <b>JLF</b>
Mercury	ND	0.00020		mg/L	1	2/14/2012 2:40:39 PM
<b>EPA 335.4: CYANIDE SUBBED</b>						Analyst: <b>Anat</b>
Cyanide	ND	0.010		mg/L	1	2/15/2012
<b>SM2320B: ALKALINITY</b>						Analyst: <b>JLF</b>
Bicarbonate (As CaCO3)	ND	20		mg/L CaCO3	1	2/14/2012 5:57:50 PM
Carbonate (As CaCO3)	ND	2.0		mg/L CaCO3	1	2/14/2012 5:57:50 PM
Total Alkalinity (as CaCO3)	ND	20		mg/L CaCO3	1	2/14/2012 5:57:50 PM
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>						Analyst: <b>KS</b>
Total Dissolved Solids	ND	20.0		mg/L	1	2/15/2012 4:34:00 PM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

**CASE NARRATIVE**

February 27, 2012

Lab Name: Anatek Labs, Inc. 1282 Alturas Drive, Moscow, ID 83843 [www.anateklabs.com](http://www.anateklabs.com) FL NELAP E87893, NV ID13-2004-31, WA DOE C126, OR ELAP ID200001, MT 0028, ID, CO, NM.

Project Tracking No.: 1202350

Anatek Batch: 120214032

**Project Summary:** Three (3) soil samples were and one water sample were received on 2/14/2012 for Total Cyanide (EPA 335.4) analysis. All samples were received with the appropriate chain of custody. Samples were received at 4.5C.

<u>Client Sample ID</u>	<u>Anatek Sample ID</u>	<u>Method/Prep Method</u>
1202350-001B BK-10 (5-6')	120214032-001	EPA 335.4
1202350-002B BK-10 (5-6') DUP	120214032-002	EPA 335.4
1202350-003B BK-10 (40-42')	120214032-003	EPA 335.4
1202350-004E BK-EB-020812 (water)	120214032-004	EPA 335.4

**QA/QC Checks**

<u>Parameters</u>	<u>Yes / No</u>	<u>Exceptions / Deviations</u>
Sample Holding Time Valid?	Y	NA
Surrogate Recoveries Valid?	NA	NA
QC Sample(s) Recoveries Valid?	Y	NA
Method Blank(s) Valid?	Y	NA
Tune(s) Valid?	NA	NA
Internal Standard Responses Valid?	NA	NA
Initial Calibration Curve(s) Valid?	Y	NA
Continuing Calibration(s) Valid?	Y	NA
Comments:	Y	NA

**1. Holding Time Requirements**

No problems encountered.

**2. GC/MS Tune Requirements**

N/A

**3. Calibration Requirements**

No problems encountered.

**4. Surrogate Recovery Requirements**

N/A.

**5. QC Sample (LCS/MS/MSD) Recovery Requirements**

No problems encountered.

**6. Method Blank Requirements**

No problems encountered.

**7. Internal Standard(s) Response Requirements**

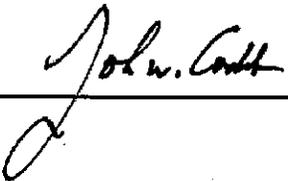
N/A.

**8. Comments**

None.

**I certify that this data package is in compliance with the terms and conditions of the contract. Release of the data contained in this data package has been authorized by the Laboratory Manager or his designee.**

Approved by:

  
\_\_\_\_\_

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**Client:** HALL ENVIRONMENTAL ANALYSIS LAB      **Batch #:** 120214032  
**Address:** 4901 HAWKINS NE SUITE D      **Project Name:** 1202350  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

## Analytical Results Report

**Sample Number** 120214032-001      **Sampling Date** 2/7/2012      **Date/Time Received** 2/14/2012 12:17 PM  
**Client Sample ID** 1202350-001B / BK-10 (5-6')      **Sampling Time** 7:53 AM  
**Matrix** Soil  
**Comments**

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/Kg	0.3	2/15/2012	CRW	EPA 335.4	
%moisture	4.4	Percent		2/17/2012	CRW	%moisture	

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**Client:** HALL ENVIRONMENTAL ANALYSIS LAB  
**Address:** 4901 HAWKINS NE SUITE D  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

**Batch #:** 120214032  
**Project Name:** 1202350

## Analytical Results Report

<b>Sample Number</b>	120214032-002	<b>Sampling Date</b>	2/7/2012	<b>Date/Time Received</b>	2/14/2012 12:17 PM
<b>Client Sample ID</b>	1202350-002B / BK-10 (5-6') DUP			<b>Sampling Time</b>	7:53 AM
<b>Matrix</b>	Soil				
<b>Comments</b>					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/Kg	0.3	2/15/2012	CRW	EPA 335.4	
%moisture	4.1	Percent		2/17/2012	CRW	%moisture	

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**Client:** HALL ENVIRONMENTAL ANALYSIS LAB  
**Address:** 4901 HAWKINS NE SUITE D  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

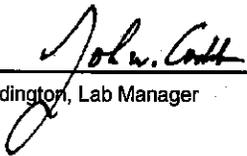
**Batch #:** 120214032  
**Project Name:** 1202350

## Analytical Results Report

<b>Sample Number</b>	120214032-003	<b>Sampling Date</b>	2/7/2012	<b>Date/Time Received</b>	2/14/2012 12:17 PM
<b>Client Sample ID</b>	1202350-003B / BK-10 (40-42')			<b>Sampling Time</b>	10:43 AM
<b>Matrix</b>	Soil				
<b>Comments</b>					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/Kg	0.3	2/15/2012	CRW	EPA 335.4	
%moisture	8.4	Percent		2/17/2012	CRW	%moisture	

Authorized Signature

  
John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level  
ND Not Detected  
PQL Practical Quantitation Limit

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The results reported relate only to the samples indicated.  
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

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Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

Monday, February 27, 2012

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**Client:** HALL ENVIRONMENTAL ANALYSIS LAB  
**Address:** 4901 HAWKINS NE SUITE D  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

**Batch #:** 120214032  
**Project Name:** 1202350

## Analytical Results Report Quality Control Data

### Lab Control Sample

Parameter	LCS Result	Units	LCS Spike	%Rec	AR %Rec	Prep Date	Analysis Date
Cyanide	0.518	mg/kg	0.5	103.6	80-120	2/15/2012	2/15/2012

### Matrix Spike

Sample Number	Parameter	Sample Result	MS Result	Units	MS Spike	%Rec	AR %Rec	Prep Date	Analysis Date
120207027-008	Cyanide	ND	13.1	mg/kg	13.4	97.8	60-140	2/15/2012	2/15/2012

### Matrix Spike Duplicate

Parameter	MSD Result	Units	MSD Spike	%Rec	%RPD	AR %RPD	Prep Date	Analysis Date
Cyanide	13.2	mg/kg	13.4	98.5	0.8	0-25	2/15/2012	2/15/2012

### Method Blank

Parameter	Result	Units	PQL	Prep Date	Analysis Date
Cyanide	ND	mg/Kg	0.3	2/15/2012	2/15/2012

AR Acceptable Range  
ND Not Detected  
PQL Practical Quantitation Limit  
RPD Relative Percentage Difference

### Comments:

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595  
Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

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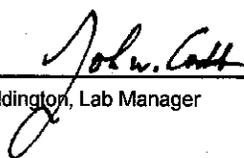
**Client:** HALL ENVIRONMENTAL ANALYSIS LAB      **Batch #:** 120214032  
**Address:** 4901 HAWKINS NE SUITE D      **Project Name:** 1202350  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

## Analytical Results Report

**Sample Number** 120214032-004      **Sampling Date** 2/8/2012      **Date/Time Received** 2/14/2012 12:17 PM  
**Client Sample ID** 1202350-004E / BK-EB-020812      **Sampling Time** 1:40 PM  
**Matrix** Water  
**Comments**

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/L	0.01	2/21/2012	CRW	EPA 335.4	

Authorized Signature

  
\_\_\_\_\_  
John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level  
ND Not Detected  
PQL Practical Quantitation Limit

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Soil/solid results are reported on a dry-weight basis unless otherwise noted.

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Certifications held by Anatek Labs WA: EPA:WA00169; CA:Cert2632; ID:WA00169; WA:C585; MT:Cert0095

Monday, February 27, 2012

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**Client:** HALL ENVIRONMENTAL ANALYSIS LAB  
**Address:** 4901 HAWKINS NE SUITE D  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

**Batch #:** 120214032  
**Project Name:** 1202350

## Analytical Results Report Quality Control Data

### Lab Control Sample

Parameter	LCS Result	Units	LCS Spike	%Rec	AR %Rec	Prep Date	Analysis Date
Cyanide	0.489	mg/L	0.5	97.8	90-110	2/21/2012	2/21/2012

### Matrix Spike

Sample Number	Parameter	Sample Result	MS Result	Units	MS Spike	%Rec	AR %Rec	Prep Date	Analysis Date
120217018-006	Cyanide	ND	0.476	mg/L	0.5	95.2	80-120	2/21/2012	2/21/2012

### Matrix Spike Duplicate

Parameter	MSD Result	Units	MSD Spike	%Rec	%RPD	AR %RPD	Prep Date	Analysis Date
Cyanide	0.498	mg/L	0.5	99.6	4.5	0-25	2/21/2012	2/21/2012

### Method Blank

Parameter	Result	Units	PQL	Prep Date	Analysis Date
Cyanide	ND	mg/L	0.01	2/21/2012	2/21/2012

AR Acceptable Range  
ND Not Detected  
PQL Practical Quantitation Limit  
RPD Relative Percentage Difference

### Comments:

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; IN:C-ID-01; KY:90142; MT: CERT0028; NM: ID00013; OR:ID200001-002; WA:C595  
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## Login Report

**Customer Name:** HALL ENVIRONMENTAL ANALYSIS LAB

**Order ID:** 120214032

4901 HAWKINS NE SUITE D

**Order Date:** 2/14/2012

ALBUQUERQUE

NM

87109

**Contact Name:** ANDY FREEMAN

**Project Name:** 1202350

**Comment:**

**Sample #:** 120214032-001 **Customer Sample #:** 1202350-001B / BK-10 (5-6')

**Recv'd:**  **Collector:** **Date Collected:** 2/7/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 2/14/2012 12:17:00 P  
**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/24/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/24/2012	<u>Normal (6-10 Days)</u>

**Sample #:** 120214032-002 **Customer Sample #:** 1202350-002B / BK-10 (5-6') DUP

**Recv'd:**  **Collector:** **Date Collected:** 2/7/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 2/14/2012 12:17:00 P  
**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/24/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/24/2012	<u>Normal (6-10 Days)</u>

**Sample #:** 120214032-003 **Customer Sample #:** 1202350-003B / BK-10 (40-42')

**Recv'd:**  **Collector:** **Date Collected:** 2/7/2012  
**Quantity:** 1 **Matrix:** Soil **Date Received:** 2/14/2012 12:17:00 P  
**Comment:**

Test	Lab	Method	Due Date	Priority
%Moisture	M	%moisture	2/24/2012	<u>Normal (6-10 Days)</u>
CYANIDE TOTAL EPA	M	EPA 335.4	2/24/2012	<u>Normal (6-10 Days)</u>

**Customer Name:** HALL ENVIRONMENTAL ANALYSIS LAB  
4901 HAWKINS NE SUITE D  
ALBUQUERQUE NM 87109

**Order ID:** 120214032  
**Order Date:** 2/14/2012

**Contact Name:** ANDY FREEMAN

**Project Name:** 1202350

**Comment:**

---

**Sample #:** 120214032-004 **Customer Sample #:** 1202350-004E / BK-EB-020812

**Recv'd:**  **Collector:** **Date Collected:** 2/8/2012  
**Quantity:** 1 **Matrix:** Water **Date Received:** 2/14/2012 12:17:00 P

**Comment:**

Test	Lab	Method	Due Date	Priority
CYANIDE TOTAL EPA	M	EPA 335.4	2/24/2012	<b><u>Normal (6-10 Days)</u></b>

---

### SAMPLE CONDITION RECORD

---

Samples received in a cooler?	Yes
Samples received intact?	Yes
What is the temperature inside the cooler?	4.5
Samples received with a COC?	Yes
Samples received within holding time?	Yes
Are all sample bottles properly preserved?	Yes
Are VOC samples free of headspace?	N/A
Is there a trip blank to accompany VOC samples?	N/A
Labels and chain agree?	Yes



CHAIN OF CUSTODY RECORD

PAGE: 1 OF 1

Hall Environmental Analytical Laboratory  
 120214 032 HALL Last Due 2/24/2012  
 1st SAMP 2/7/2012 1st RCVD 2/4/2012  
 1202350

SUB CONTRACTOR: **Anatek Labs** COMPANY: **Anatek Labs, Inc.** PHONE: **(208) 883-2839** FAX: **(208) 882-9246**  
 ADDRESS: **1282 Akurra Dr** ACCOUNT #: \_\_\_\_\_ EMAIL: \_\_\_\_\_  
 CITY, STATE, ZIP: **Moscow, ID 83843**

ITEM	SAMPLE	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	COLLECTION DATE	# CONTAINERS	ANALYTICAL COMMENTS
1	1202350-001B	BK-10 (5-6')	4OZGU	Soil	2/7/2012 7:53:00 AM	1	TOTAL CYANIDE
2	1202350-002B	BK-10 (5-6') DUP	4OZGU	Soil	2/7/2012 7:53:00 AM	1	TOTAL CYANIDE
3	1202350-003B	BK-10 (40-42')	4OZGU	Soil	2/7/2012 10:43:00 AM	1	TOTAL CYANIDE
4	1202350-004E	BK-EB-020812	500AMBHP E.M.A.O.H	Aqueous	2/8/2012 1:40:00 PM	1	TOTAL CYANIDE
5						0	
6						0	
7						0	MURS
8						0	
9						0	
10						0	

SPECIAL INSTRUCTIONS/COMMENTS

\*\*\*LEVEL 4 PLEASE PROVIDE QC\*\*\* Please include the LAB ID and the CLIENT SAMPLE ID on all final reports. Please e-mail results to lab@hallenvironmental.com. Please return all coolers and blue ice. Thank you.

Relinquished By: \_\_\_\_\_ Date: 2/10/2012 Time: 10:24 AM Received By: \_\_\_\_\_ Date: \_\_\_\_\_  
 Relinquished By: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_ Received By: \_\_\_\_\_ Date: \_\_\_\_\_  
 Relinquished By: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_ Received By: \_\_\_\_\_ Date: \_\_\_\_\_

TAT: Standard  RUSH  Next BD  2nd BD  3rd

**ANATEK LABS RECEIVING LIST** TEMP: 7.5 °C

RECEIVED INTACT LABELS & CHAINS AGREE  
 NO HEADSPACE  
 ICE / ICE-PACKS PRESENT  
 CUSTODY SEALS PRESENT: Y  
 PRESERVATIVES: NaOH  
 NUMBER OF CONTAINERS: 4 SHIPPED VIA: C  
 DATE & TIME: 2-14-12 12/17 INSPECTED BY: BT

12021FIACNW

CRW 2/22/12

Peak	Cup	Name	Type	Dil	Wt	Area	Calc. (ppm)
1	2	Sync	SYNC		1	5699854	0.980929
2	0	Carryover	CO		1	2080	0.000752
3	0	Carryover	CO		1	-2666	-0.000064
3	0	Baseline	RB		1	-5180	-0.000497
5	2	Cal 1.00 ppm	C		1	5895348	1.014559
6	2	Cal 1.00 ppm	C		1	5857978	1.008130
7	2	Cal 1.00 ppm	C		1	5814036	1.000571
3	0	Baseline	RB		1	7594	0.001701
9	3	Cal 0.80 ppm	C		1	4724392	0.813122
10	3	Cal 0.80 ppm	C		1	4687798	0.806827
11	3	Cal 0.80 ppm	C		1	4793075	0.824937
3	0	Baseline	RB		1	1712	0.000689
13	4	Cal 0.50 ppm	C		1	2898468	0.499012
14	4	Cal 0.50 ppm	C		1	2908341	0.500710
15	4	Cal 0.50 ppm	C		1	2897045	0.498767
3	0	Baseline	RB		1	-4819	-0.000435
17	5	Cal 0.05 ppm	C		1	261123	0.045315
18	5	Cal 0.05 ppm	C		1	267215	0.046363
19	5	Cal 0.05 ppm	C		1	276648	0.047986
3	0	Baseline	RB		1	-817	0.000254
21	6	Cal 0.01 ppm	C		1	57502	0.010286
22	6	Cal 0.01 ppm	C		1	64834	0.011548
23	6	Cal 0.01 ppm	C		1	65410	0.011647
3	0	Baseline	RB		1	3642	0.001021
25	1	Blank	BLNK		1	-2898	-0.000104
26	7	ICV 0.25 ppm	CCV		1	1521704	0.262170
27	1	Blank	BLNK		1	-4159	-0.000321
3	0	Baseline	RB		1	-1798	0.000085
29	8	120207028-001 R U	U		30.2	11376	0.071013
30	9	120207028-001MS U	U		30.2	2954055	15.358950
31	10	120207028-001MSD U	U		30.2	2969649	15.439961
32	11	120207028-LCS U	U		1	3063630	0.527424
33	12	120207028-BL U	U		1	-6385	-0.000704
34	13	120207028-002 U	U		28.1	-13282	-0.053119
35	14	120214032-004 U	U		1	-10990	-0.001496
36	15	120214037-001 U	U		1	-4989	-0.000464
37	16	120217018-001 U	U		1	7655	0.001711
38	17	120217032-001 U	U		1	22	0.000398
3	0	Baseline	RB		1	-527	0.000304
10	1	Blank	BLNK		1	3277	0.000958
11	4	CCV 0.5 ppm	CCV		1	2934942	0.505287
12	1	Blank	BLNK		1	-269	0.000348
3	0	Read Baseline	RB		1	-2143	0.000026
14	18	120217018-003 U	U		1	2212	0.000775
15	19	120217018-004 U	U		1	251989	0.043744
16	20	120217018-005 U	U		1	13768	0.002763
17	21	120217018-006 U	U		1	18204	0.003526
18	22	120217032-006 WW U	U		1	36686	0.006706
19	23	120217032-006MS U	U		1	2766943	0.476386
30	24	120217032-006MSD U	U		1	2892484	0.497982
31	25	120217032-LCS U	U		1	2839514	0.488870
32	26	120217032-BL U	U		1	31941	0.005889
33	27	120217033-001 U	U		1	38679	0.007048
3	0	Baseline	RB		1	5361	0.001317
35	1	Blank	BLNK		1	-3802	-0.000260
36	4	CCV 0.5 ppm	CCV		1	2950465	0.507957
37	1	Blank	BLNK		1	2733	0.000865
3	0	Read Baseline	RB		1	-872	0.000244
39	28	120215006-006 DW U	U		1	-6498	-0.000723
30	29	120215006-006MS U	U		1	2864499	0.493168
31	30	120215006-006MSD U	U		1	2834083	0.487936
32	31	120215006-LCS U	U		1	2942564	0.506598
33	32	120215006-BL U	U		1	-12568	-0.001768
34	33	120215008-006 U	U		1	-22587	-0.003491
35	34	120215009-006 U	U		1	-18203	-0.002737
36	35	120215010-006 U	U		1	-375	0.000330

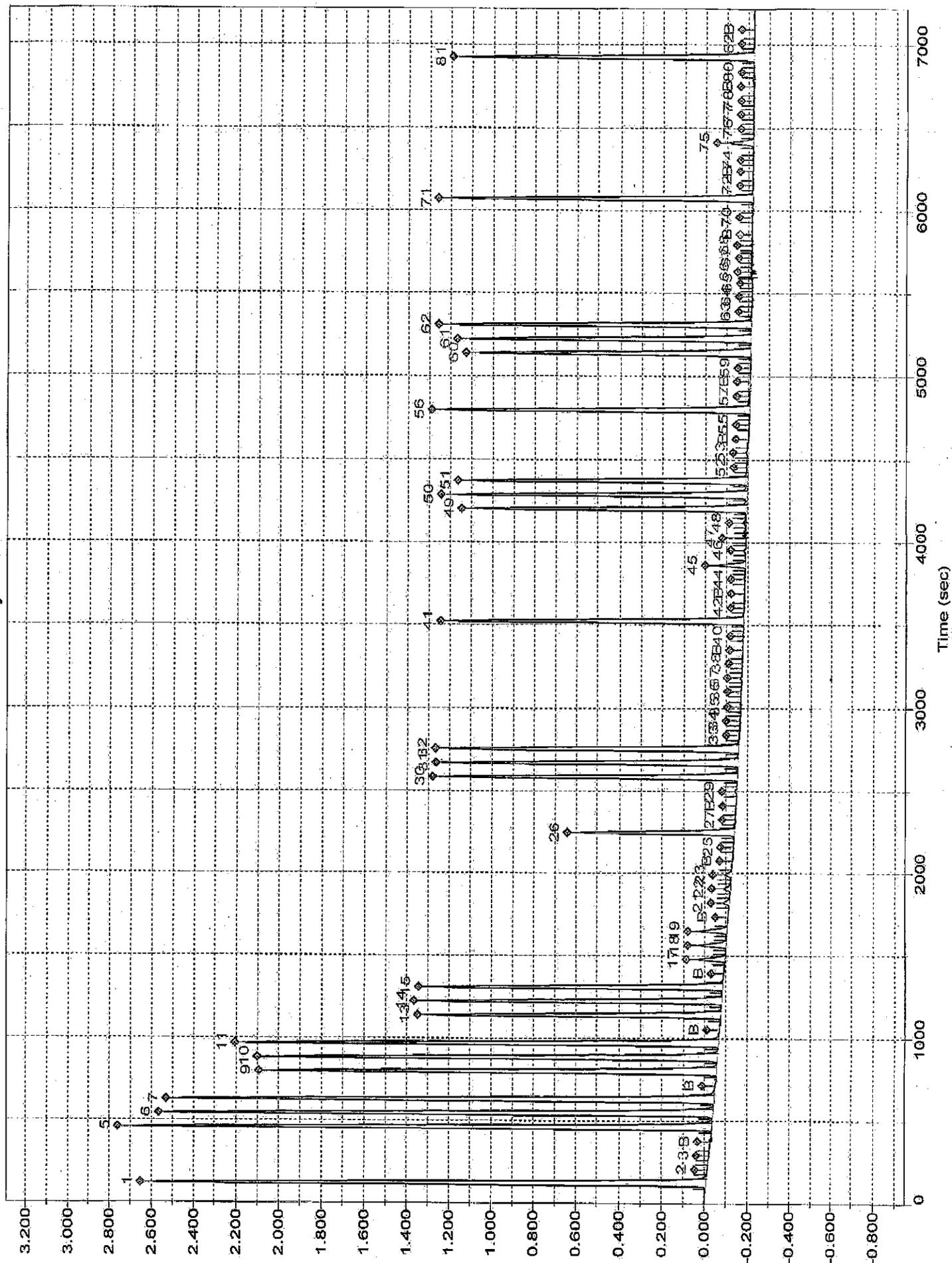
Peak	Cup	Name	Type	Dil	Wt	Area	Calc. (ppm)
37	36	# 120215011-006	U		1	14948	0.002966
38	37	# 120215012-006	U		1	12010	0.002460
39	0	Baseline	RB		1	17024	0.003323
40	1	Blank	BLNK		1	10958	0.002280
41	4	CCV 0.5 ppm	CCV		1	2955563	0.508834
42	1	Blank	BLNK		1	3165	0.000939
43	0	Read Baseline	RB		1	-3585	-0.000222
44	38	RINSE	U		1	-5636	-0.000575
45	39	120217018-004	U		1	238291	0.041387
46	40	RINSE	U		1	-13913	-0.001999
47	41	RINSE	U		1	-13806	-0.001981
48	42	RINSE	U		1	-16870	-0.002508
49	0	Baseline	RB		1	-15369	-0.002249
50	1	Blank	BLNK		1	-8322	-0.001037
51	4	CCV 0.5 ppm	CCV		1	3062064	0.527155
52	1	Blank	BLNK		1	1190	0.000599
53	0	Read Baseline	RB		1	-924	0.000236

Verify

Peak	Cup	Flags
	2	
	0	
	0	LO
	0	BL
	2	
	2	
	0	BL
	3	
0	3	
1	3	
	0	BL
3	4	
4	4	
5	4	
	0	BL
7	5	
8	5	
9	5	OL
	0	BL
1	6	OL
2	6	
3	6	
	0	BL
5	1	LO
6	7	
7	1	LO
	0	BL
9	8	
0	9	
1	10	
2	11	
3	12	LO
4	13	LO
5	14	LO
6	15	LO
7	16	
8	17	
	0	BL
0	1	
1	4	
2	1	
	0	BL
4	18	
5	19	
6	20	
7	21	
8	22	
9	23	

Peak	Cup	Flags
50	24	
51	25	
52	26	
53	27	
B	0	BL
55	1	LO
56	4	
57	1	
B	0	BL UM
59	28	LO
60	29	
61	30	
62	31	
63	32	LO
64	33	LO
65	34	LO
66	35	
67	36	
68	37	
3	0	BL UM
70	1	
71	4	
72	1	
3	0	BL
74	38	LO
75	39	
76	40	LO
77	41	LO
78	42	LO
3	0	BL
30	1	LO
31	4	
32	1	
3	0	BL

Channel 1: Cyanide



File name: T:\DATA1\FLOW4\2012\EPA335.4\022112CN.RST  
Date: February 21, 2012  
Operator: JTT

* Name	Conc	Area
* Cal 1.00 ppm	1.000000	5895348.000000
* Cal 1.00 ppm	1.000000	5857977.500000
* Cal 1.00 ppm	1.000000	5814036.000000
* Cal 0.80 ppm	0.800000	4724392.500000
* Cal 0.80 ppm	0.800000	4687798.500000
* Cal 0.80 ppm	0.800000	4793075.000000
* Cal 0.50 ppm	0.500000	2898468.500000
* Cal 0.50 ppm	0.500000	2908340.750000
* Cal 0.50 ppm	0.500000	2897045.000000
* Cal 0.05 ppm	0.050000	261122.890625
* Cal 0.05 ppm	0.050000	267214.531250
* Cal 0.05 ppm	0.050000	276648.062500
* Cal 0.01 ppm	0.010000	57502.253906
* Cal 0.01 ppm	0.010000	64833.636719
* Cal 0.01 ppm	0.010000	65410.171875

Calib Coef:

y=bx+a

a: (intercept) -2.2928e+03

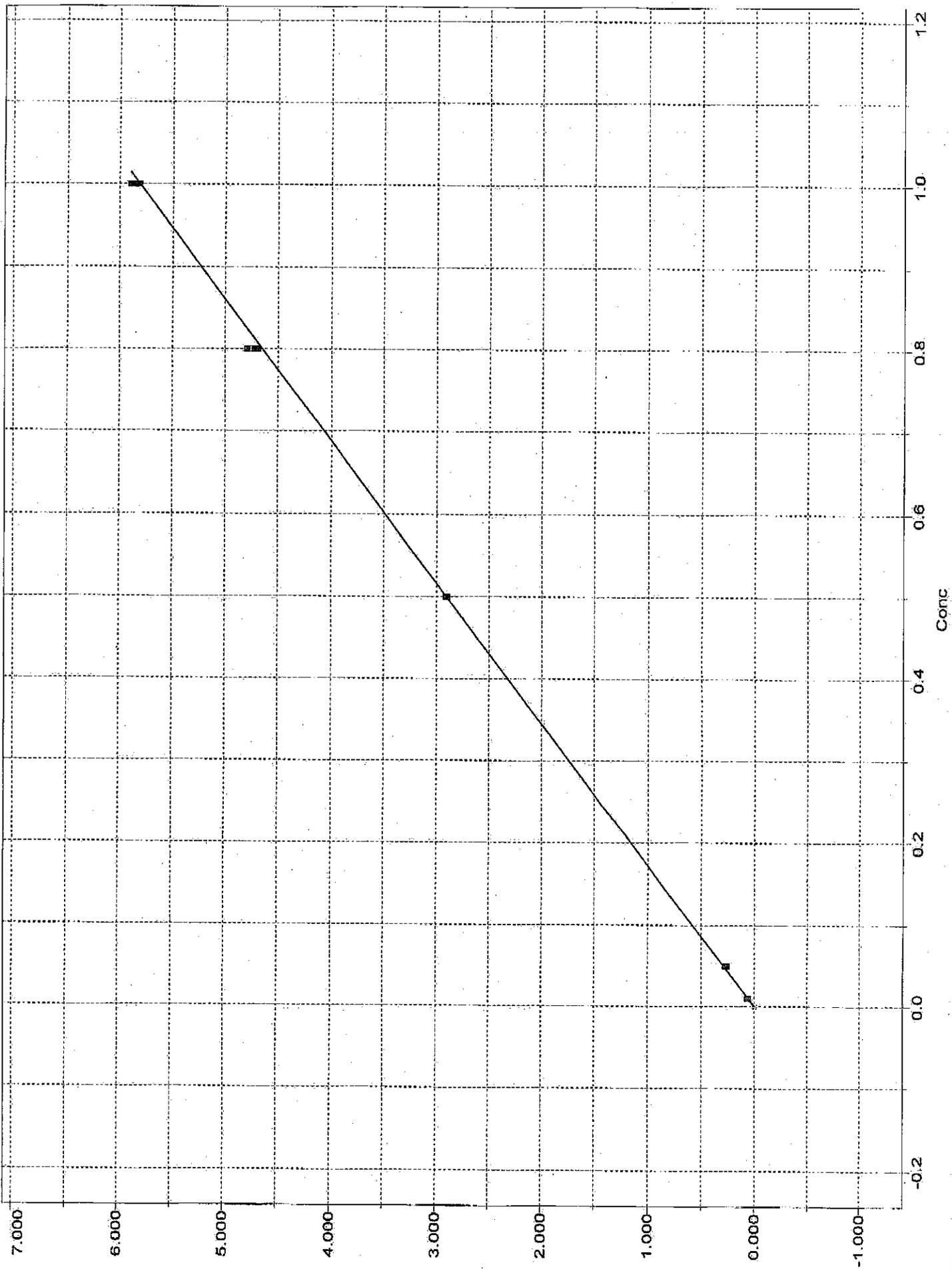
b: 5.8130e+06

Corr Coef: 0.999885

Carryover: 0.0365%

No Drift Peaks

Cyanide: Calibration, Peak 5-83





**Total Cyanide by Semi-Automated Colorimetry**  
**Method: EPA 335.4\SM-4500-CN-E**  
**Distillation Bench Sheet**

Weak Acid Dissociable Cyanide by  
 SM 4500-CN-I (check WAD column)

Total Cyanide MS/MSD/LCS Soln: M838-03 Exp: 2/9/2013  
 Free Cyanide MS/MSD/LCS Soln: M824-05 Exp: 12/28/2012

Method requirements: All QC +/- 10%  
 Equipment: Midi-vap  
 Instrument: ALPCHEM FIA 3000  
 Absorbance: 570nm

	Sample ID	Matrix	Preserved	Sample Amount (mL)**	Initial Multiplier*	Final Multiplier	Spike Amount (mL)	WAD? (check if yes)
1	120207027-8	epa soil	NaOH	50ml	26.8	same		
2					↓		1ml	
3					↓		↓	
4					1x			
5					↓			
6	120207012-1				27.1			
7	-2				25.6			
8	-3				26.2			
9	-4				27.6			
10	-5	+	+	+	27.7	+		
11	120208030-1	epa soil	NaOH	50ml	27.4	same		
12	-2				27.8			
13	-3				27.3			
14	-4				30.8			
15	-5				25.6			
16	-6				29.4			
17	120214032-1				26.0			
18	-2				26.0			
19	-3	+	+	+	27.2	+		
20								

\* If soils this calculation is taken from cyanide extraction bench sheet.

\*\* If soils, mLs of extract used for distillation.

Extraction Reagents: Reagent #:  
 methyl red indicator A041-03  
 18 N H<sub>2</sub>SO<sub>4</sub> A043-10  
 sulfamic acid R009-12  
 0.025N NaOH R014-16  
 51% MgCl<sub>2</sub> A043-06

Analytical Reagents: Reagent #:  
 Barbituric Acid R038-13  
 Sodium Phosphate R026-23  
 Chloramine-t R048-09  
 Pyridine R043-03

Distillation Initials/Date Distilled: CMW 2/15/12

Analyst Initials/Date Analyzed: CMW 2/15/12

CMW 2/17/12

120215 FIA CNS

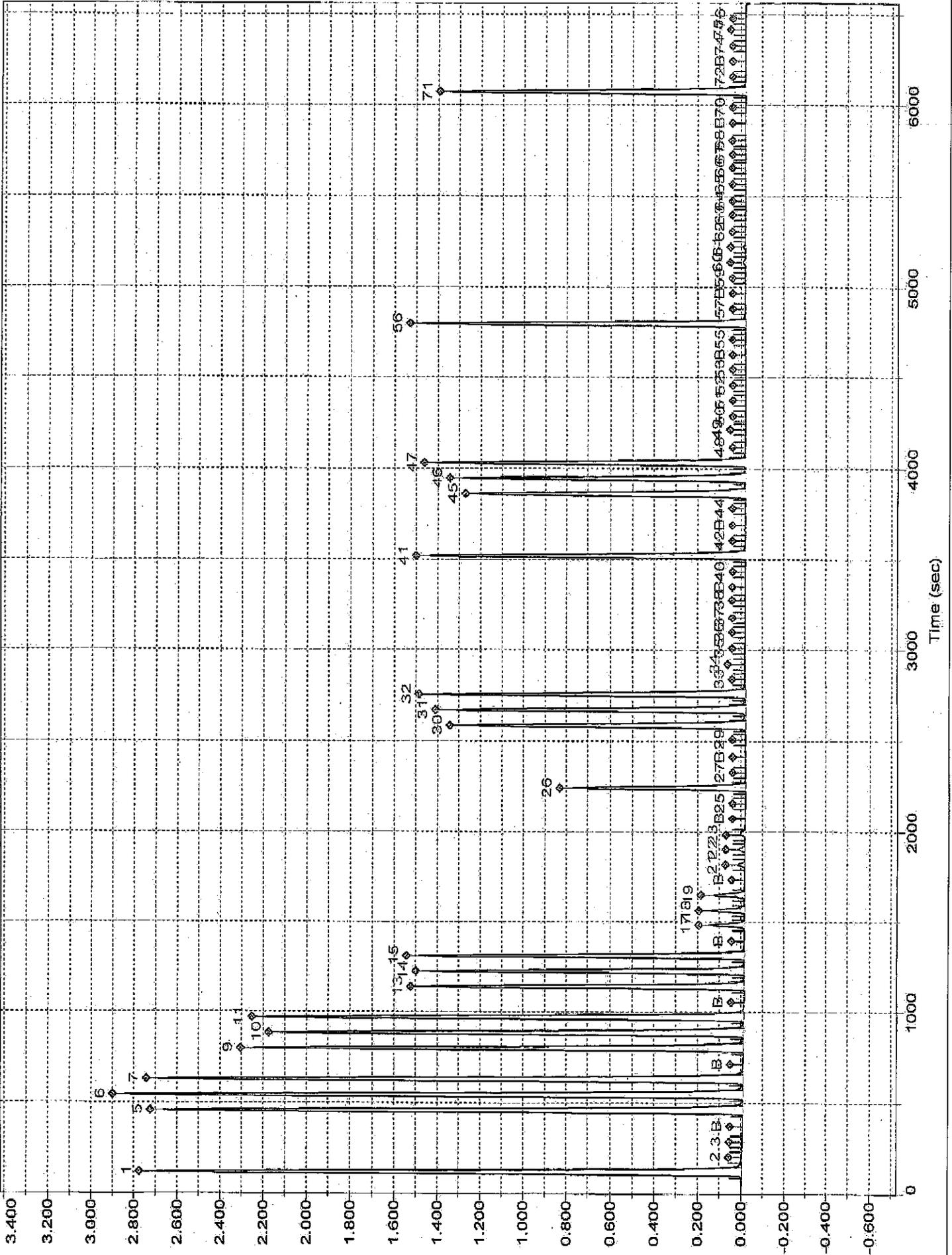
Peak	Cup	Name	Type	Dil	Wt	Area	Calc. (ppm)
1	2	Sync	SYNC		1	5825412	1.023780
2	0	Carryover	CO		1	22125	0.004010
3	0	Carryover	CO		1	6865	0.001329
B	0	Baseline	RB		1	-159	0.000095
5	2	Cal 1.00 ppm	C		1	5800565	1.019414
6	2	Cal 1.00 ppm	C		1	5938287	1.043615
7	2	Cal 1.00 ppm	C		1	5805906	1.020352
B	0	Baseline	RB		1	1019	0.000302
9	3	Cal 0.80 ppm	C		1	4707213	0.827287
10	3	Cal 0.80 ppm	C		1	4758870	0.836364
11	3	Cal 0.80 ppm	C		1	4788800	0.841624
B	0	Baseline	RB		1	-1310	-0.000108
13	4	Cal 0.50 ppm	C		1	2926831	0.514433
14	4	Cal 0.50 ppm	C		1	2944859	0.517601
15	4	Cal 0.50 ppm	C		1	2923532	0.513854
B	0	Baseline	RB		1	-96	0.000105
17	5	Cal 0.05 ppm	C		1	279029	0.049154
18	5	Cal 0.05 ppm	C		1	278124	0.048995
19	5	Cal 0.05 ppm	C		1	279436	0.049226
B	0	Baseline	RB		1	-825	-0.000023
21	6	Cal 0.01 ppm	C		1	57916	0.010299
22	6	Cal 0.01 ppm	C		1	58423	0.010389
23	6	Cal 0.01 ppm	C		1	58837	0.010461
B	0	Baseline	RB		1	-409	0.000051
25	1	Blank	BLNK		1	-3308	-0.000459
26	7	ICV 0.25 ppm	CCV		1	1537964	0.270378
27	1	Blank	BLNK		1	508	0.000212
B	0	Baseline	RB		1	1092	0.000314
29	8	120203013-001 DW	U		1	7941	0.001518
30	9	120203013-001MS	U		1	2796078	0.491457
31	10	120203013-001MSD	U		1	2855622	0.501920
32	11	120203013-LCS	U		1	2959570	0.520186
33	12	120203013-BL	U		1	6321	0.001233
34	13	120208026-006	U		1	18965	0.003455
35	14	120208027-006	U		1	7761	0.001486
36	15	120208028-006	U		1	4100	0.000843
37	16	120208029-006	U		1	3261	0.000695
38	17	120210022-006	U		1	4007	0.000827
B	0	Baseline	RB		1	-187	0.000090
10	1	Blank	BLNK		1	-1906	-0.000212
11	4	CCV 0.5 ppm	CCV		1	2965604	0.521247
12	1	Blank	BLNK		1	-10723	-0.001762
B	0	Read Baseline	RB		1	-699	0.000000
14	18	120207027-008 S	U	26.8	1	-827	-0.000615
15	19	120207027-008MS	U	26.8	1	2779246	13.091780
16	20	120207027-008MSD	U	26.8	1	2810774	13.240262
17	21	120207027-LCS	U	1	1	2949645	0.518442
18	22	120207027-BL	U	1	1	-7029	-0.001113
19	23	120207012-001	U	27.1	1	5832	0.031092
20	24	120207012-002	U	25.6	1	99	0.003579
21	25	120207012-003	U	26.2	1	107	0.003698
22	26	120207012-004	U	27.6	1	-4643	-0.019140
23	27	120207012-005	U	27.7	1	-2045	-0.006563
B	0	Baseline	RB		1	-1413	-0.000126
25	1	Blank	BLNK		1	786	0.000260
26	4	CCV 0.5 ppm	CCV		1	2965979	0.521313
27	1	Blank	BLNK		1	-5832	-0.000902
B	0	Read Baseline	RB		1	1650	0.000412
29	28	120208030-001	U	27.4	1	7278	0.038397
30	29	120208030-002	U	27.8	1	23450	0.117961
31	30	120208030-003	U	27.3	1	18157	0.090448
32	31	120208030-004	U	30.8	1	-659	0.000204
33	32	120208030-005	U	25.6	1	-885	-0.000849
34	33	120208030-006	U	25.4	1	-3446	-0.012271
35	34	120214032-001	U	26	1	-1682	-0.004502
36	35	120214032-002	U	26	1	-867	-0.000780

Peak	Cup	Name	Type	Dil	Wt	Area	Calc. (ppm)	
67	36	# 120214032-003	U		27.2	1	-2669	-0.009427
68	37	RINSE	U		1	1	-1605	-0.000160
B	0	Baseline	RB		1	1	-507	0.000033
70	1	Blank	BLNK		1	1	-5655	-0.000871
71	4	CCV 0.5 ppm	CCV		1	1	2910344	0.511536
72	1	Blank	BLNK		1	1	-7377	-0.001174
B	0	Read Baseline	RB		1	1	-513	0.000032
74	38		U		1	1	-1829	-0.000199
75	39		U		1	1	-1762	-0.000187
76	40		U		1	1	-5162	-0.000785

Peak	Cup	Flags
1	2	
2	0	
3	0	
B	0	BL
5	2	
6	2	
7	2	
3	0	BL
9	3	
10	3	
11	3	
B	0	BL
13	4	
14	4	
15	4	
B	0	BL
17	5	
18	5	
19	5	
B	0	BL
21	6	
22	6	
23	6	
B	0	BL
25	1	LO
26	7	
27	1	
B	0	BL
29	8	
30	9	
31	10	
32	11	
33	12	
34	13	
35	14	
36	15	
37	16	
38	17	
B	0	BL
40	1	LO
41	4	
42	1	LO
B	0	BL
44	18	LO
45	19	
46	20	
47	21	
48	22	LO
49	23	
50	24	
51	25	
52	26	LO
53	27	LO
B	0	BL
55	1	
56	4	

Peak	Cup	Flags
57	1	LO
B	0	BL
59	28	
60	29	
61	30	
62	31	
63	32	LO
64	33	LO
65	34	LO
66	35	LO
67	36	LO
68	37	LO
B	0	BL
70	1	LO
71	4	
72	1	LO
3	0	BL
74	38	LO
75	39	LO
76	40	LO

Channel 1: Cyanide



File name: T:\DATA1\FLOW4\2012\EPA335.4\021512CM.RST  
Date: February 15, 2012  
Operator: JTT

* Name	Conc	Area
* Cal 1.00 ppm	1.000000	5800565.000000
* Cal 1.00 ppm	1.000000	5938287.000000
* Cal 1.00 ppm	1.000000	5805906.000000
* Cal 0.80 ppm	0.800000	4707213.000000
* Cal 0.80 ppm	0.800000	4758870.000000
* Cal 0.80 ppm	0.800000	4788800.500000
* Cal 0.50 ppm	0.500000	2926830.750000
* Cal 0.50 ppm	0.500000	2944859.000000
* Cal 0.50 ppm	0.500000	2923532.000000
* Cal 0.05 ppm	0.050000	279028.687500
* Cal 0.05 ppm	0.050000	278124.031250
* Cal 0.05 ppm	0.050000	279435.531250
* Cal 0.01 ppm	0.010000	57915.500000
* Cal 0.01 ppm	0.010000	58423.179688
* Cal 0.01 ppm	0.010000	58836.558594

Calib Coef:

y=bx+a

a: (intercept) -6.9667e+02

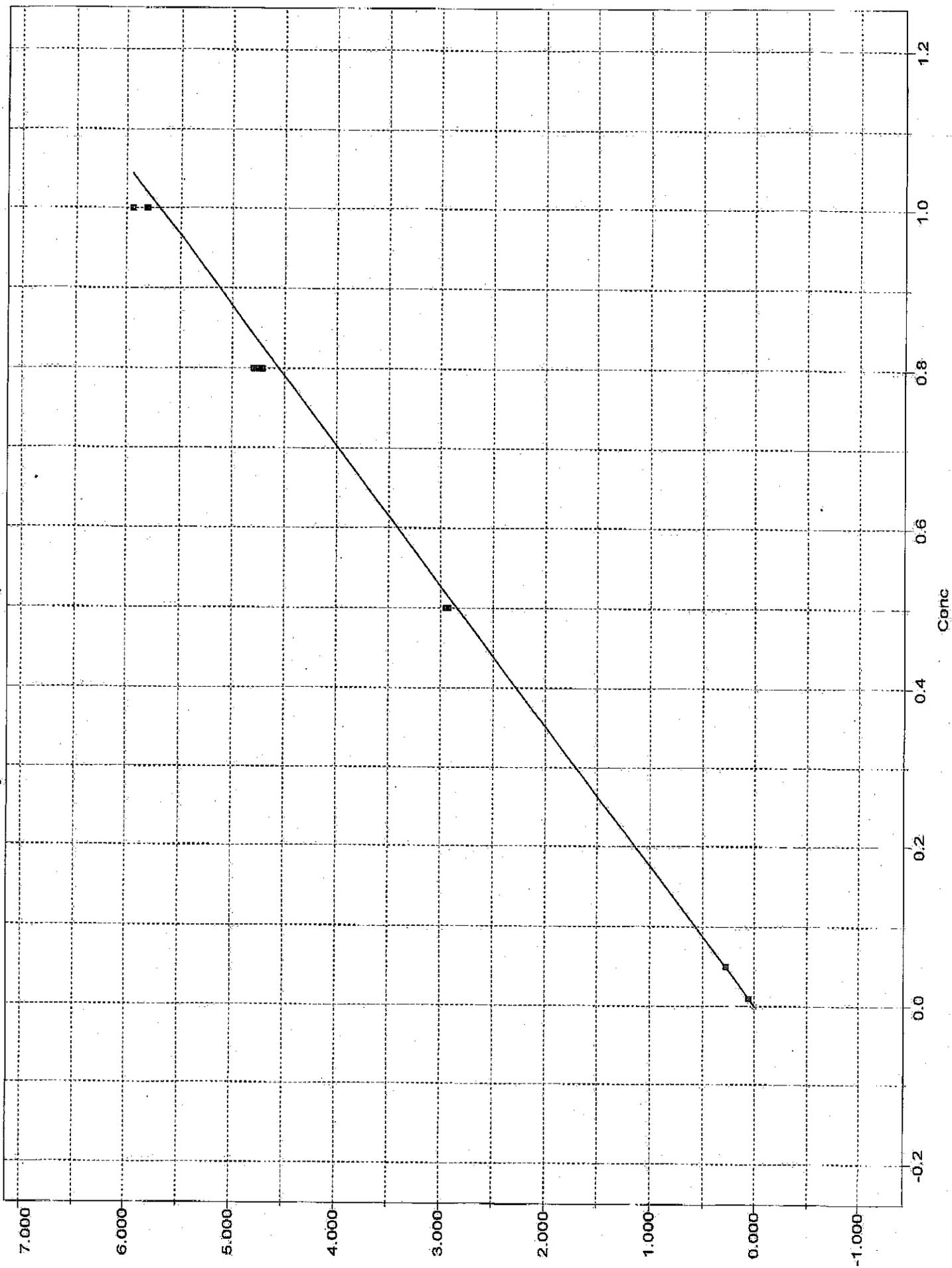
b: 5.6908e+06

Corr Coef: 0.999837

Carryover: 0.38%

No Drift Peaks

Cyanide: Calibration, Peak 5-78



# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1202350

22-Mar-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID: <b>MB</b>	SampType: <b>MBLK</b>		TestCode: <b>EPA Method 200.7: Dissolved Metals</b>							
Client ID: <b>PBW</b>	Batch ID: <b>R901</b>		RunNo: <b>901</b>							
Prep Date:	Analysis Date: <b>2/10/2012</b>		SeqNo: <b>25640</b>		Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020								
Barium	ND	0.0020								
Beryllium	ND	0.0020								
Boron	ND	0.040								
Cadmium	ND	0.0020								
Calcium	ND	1.0								
Chromium	ND	0.0060								
Cobalt	ND	0.0060								
Copper	ND	0.0060								
Lead	ND	0.0050								
Manganese	ND	0.0020								
Molybdenum	ND	0.0080								
Nickel	ND	0.010								
Silver	ND	0.0050								
Vanadium	ND	0.050								

Sample ID: <b>LCS</b>	SampType: <b>LCS</b>		TestCode: <b>EPA Method 200.7: Dissolved Metals</b>							
Client ID: <b>LCSW</b>	Batch ID: <b>R901</b>		RunNo: <b>901</b>							
Prep Date:	Analysis Date: <b>2/10/2012</b>		SeqNo: <b>25641</b>		Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.56	0.020	0.5000	0	112	85	115			
Barium	0.49	0.0020	0.5000	0	97.5	85	115			
Beryllium	0.50	0.0020	0.5000	0	101	85	115			
Boron	0.51	0.040	0.5000	0	103	85	115			
Cadmium	0.49	0.0020	0.5000	0	98.9	85	115			
Calcium	51	1.0	50.00	0	102	85	115			
Chromium	0.49	0.0060	0.5000	0	98.3	85	115			
Cobalt	0.47	0.0060	0.5000	0	94.1	85	115			
Copper	0.48	0.0060	0.5000	0	96.7	85	115			
Lead	0.48	0.0050	0.5000	0	96.2	85	115			
Manganese	0.48	0.0020	0.5000	0	95.5	85	115			
Molybdenum	0.51	0.0080	0.5000	0	101	85	115			
Nickel	0.47	0.010	0.5000	0	93.2	85	115			
Silver	0.10	0.0050	0.1000	0	100	85	115			
Vanadium	0.51	0.050	0.5000	0	102	85	115			

Sample ID: <b>MB</b>	SampType: <b>MBLK</b>		TestCode: <b>EPA Method 200.7: Dissolved Metals</b>							
Client ID: <b>PBW</b>	Batch ID: <b>R921</b>		RunNo: <b>921</b>							
Prep Date:	Analysis Date: <b>2/13/2012</b>		SeqNo: <b>26476</b>		Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

**Qualifiers:**

- \*X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1202350

22-Mar-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID: <b>MB</b>	SampType: <b>MBLK</b>	TestCode: <b>EPA Method 200.7: Dissolved Metals</b>								
Client ID: <b>PBW</b>	Batch ID: <b>R921</b>	RunNo: <b>921</b>								
Prep Date:	Analysis Date: <b>2/13/2012</b>	SeqNo: <b>26476</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	0.0032	0.020								J
Potassium	ND	1.0								
Sodium	ND	1.0								
Zinc	ND	0.010								

Sample ID: <b>LCS</b>	SampType: <b>LCS</b>	TestCode: <b>EPA Method 200.7: Dissolved Metals</b>								
Client ID: <b>LCSW</b>	Batch ID: <b>R921</b>	RunNo: <b>921</b>								
Prep Date:	Analysis Date: <b>2/13/2012</b>	SeqNo: <b>26477</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	0.49	0.020	0.5000	0.003150	98.2	85	115			
Potassium	48	1.0	50.00	0	96.9	85	115			
Sodium	49	1.0	50.00	0	98.4	85	115			
Zinc	0.50	0.010	0.5000	0	99.7	85	115			

**Qualifiers:**

\*X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1202350

22-Mar-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID: <b>MB-685</b>		SampType: <b>MBLK</b>		TestCode: <b>EPA Method 200.7: Total Metals</b>						
Client ID: <b>PBW</b>		Batch ID: <b>685</b>		RunNo: <b>934</b>						
Prep Date: <b>2/13/2012</b>		Analysis Date: <b>2/14/2012</b>		SeqNo: <b>27010</b>			Units: <b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020								
Barium	ND	0.0020								
Beryllium	ND	0.0020								
Cadmium	0.00039	0.0020								J
Chromium	0.00064	0.0060								J
Cobalt	ND	0.0060								
Copper	0.0028	0.0060								J
Iron	ND	0.020								
Lead	ND	0.0050								
Magnesium	0.0072	1.0								J
Manganese	ND	0.0020								
Molybdenum	0.0034	0.0080								J
Nickel	ND	0.010								
Silver	ND	0.0050								
Vanadium	ND	0.050								
Zinc	0.0011	0.010								J

Sample ID: <b>LCS-685</b>		SampType: <b>LCS</b>		TestCode: <b>EPA Method 200.7: Total Metals</b>						
Client ID: <b>LCSW</b>		Batch ID: <b>685</b>		RunNo: <b>934</b>						
Prep Date: <b>2/13/2012</b>		Analysis Date: <b>2/14/2012</b>		SeqNo: <b>27011</b>			Units: <b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.54	0.020	0.5000	0	108	85	115			
Barium	0.47	0.0020	0.5000	0	94.0	85	115			
Beryllium	0.51	0.0020	0.5000	0	101	85	115			
Cadmium	0.48	0.0020	0.5000	0.0003900	96.5	85	115			
Chromium	0.48	0.0060	0.5000	0.0006400	95.4	85	115			
Cobalt	0.46	0.0060	0.5000	0	92.3	85	115			
Copper	0.47	0.0060	0.5000	0.002820	94.3	85	115			
Iron	0.47	0.020	0.5000	0	94.4	85	115			
Lead	0.47	0.0050	0.5000	0	93.7	85	115			
Magnesium	51	1.0	50.00	0.007190	103	85	115			
Manganese	0.46	0.0020	0.5000	0	92.2	85	115			
Molybdenum	0.50	0.0080	0.5000	0.003360	98.9	85	115			
Nickel	0.46	0.010	0.5000	0	91.1	85	115			
Silver	0.097	0.0050	0.1000	0	97.0	85	115			
Vanadium	0.49	0.050	0.5000	0	98.6	85	115			
Zinc	0.47	0.010	0.5000	0.001100	92.8	85	115			

**Qualifiers:**

- \*X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1202350

22-Mar-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID: 1202350-004CMS		SampType: MS		TestCode: EPA Method 200.7: Total Metals						
Client ID: BK-EB-020812		Batch ID: 685		RunNo: 934						
Prep Date: 2/13/2012		Analysis Date: 2/14/2012		SeqNo: 27015		Units: mg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.58	0.020	0.5000	0.03108	110	70	130			
Barium	0.46	0.0020	0.5000	0	91.6	70	130			
Beryllium	0.49	0.0020	0.5000	0	97.7	70	130			
Cadmium	0.48	0.0020	0.5000	0.0004400	95.2	70	130			
Chromium	0.47	0.0060	0.5000	0.001160	94.2	70	130			
Cobalt	0.46	0.0060	0.5000	0	91.2	70	130			
Copper	0.46	0.0060	0.5000	0.005760	91.2	70	130			
Lead	0.46	0.0050	0.5000	0	92.8	70	130			
Manganese	0.45	0.0020	0.5000	0.001940	89.5	70	130			
Molybdenum	0.49	0.0080	0.5000	0	98.0	70	130			
Nickel	0.45	0.010	0.5000	0.0007600	89.8	70	130			
Silver	0.094	0.0050	0.1000	0	94.5	70	130			
Vanadium	0.48	0.050	0.5000	0	96.1	70	130			
Zinc	0.45	0.010	0.5000	0.001860	89.1	70	130			

Sample ID: 1202350-004CMSD		SampType: MSD		TestCode: EPA Method 200.7: Total Metals						
Client ID: BK-EB-020812		Batch ID: 685		RunNo: 934						
Prep Date: 2/13/2012		Analysis Date: 2/14/2012		SeqNo: 27085		Units: mg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.58	0.020	0.5000	0.03108	111	70	130	0.701	20	
Barium	0.46	0.0020	0.5000	0	92.1	70	130	0.562	20	
Beryllium	0.49	0.0020	0.5000	0	98.7	70	130	0.957	20	
Cadmium	0.46	0.0020	0.5000	0.0004400	92.8	70	130	2.51	20	
Chromium	0.46	0.0060	0.5000	0.001160	91.7	70	130	2.63	20	
Cobalt	0.44	0.0060	0.5000	0	88.7	70	130	2.76	20	
Copper	0.46	0.0060	0.5000	0.005760	91.2	70	130	0.00217	20	
Lead	0.45	0.0050	0.5000	0	90.5	70	130	2.45	20	
Manganese	0.45	0.0020	0.5000	0.001940	90.3	70	130	0.817	20	
Molybdenum	0.48	0.0080	0.5000	0	95.4	70	130	2.70	20	
Nickel	0.44	0.010	0.5000	0.0007600	88.3	70	130	1.66	20	
Silver	0.095	0.0050	0.1000	0	94.6	70	130	0.148	20	
Vanadium	0.48	0.050	0.5000	0	96.8	70	130	0.728	20	
Zinc	0.45	0.010	0.5000	0.001860	89.9	70	130	0.852	20	

Sample ID: 1202350-004CMS		SampType: MS		TestCode: EPA Method 200.7: Total Metals						
Client ID: BK-EB-020812		Batch ID: 685		RunNo: 934						
Prep Date: 2/13/2012		Analysis Date: 2/14/2012		SeqNo: 27087		Units: mg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	0.56	0.10	0.5000	0.08790	94.1	70	130			
Magnesium	51	5.0	50.00	0.05675	102	70	130			

**Qualifiers:**

- \* / X Value exceeds Maximum Contaminant Level.
- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1202350

22-Mar-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID: <b>1202350-004CMSD</b>	SampType: <b>MSD</b>	TestCode: <b>EPA Method 200.7: Total Metals</b>								
Client ID: <b>BK-EB-020812</b>	Batch ID: <b>685</b>	RunNo: <b>934</b>								
Prep Date: <b>2/13/2012</b>	Analysis Date: <b>2/14/2012</b>	SeqNo: <b>27088</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	0.58	0.10	0.5000	0.08790	98.2	70	130	3.61	20	
Magnesium	51	5.0	50.00	0.05675	103	70	130	0.614	20	

Sample ID: <b>MB-685</b>	SampType: <b>MBLK</b>	TestCode: <b>EPA Method 200.7: Total Metals</b>								
Client ID: <b>PBW</b>	Batch ID: <b>685</b>	RunNo: <b>959</b>								
Prep Date: <b>2/13/2012</b>	Analysis Date: <b>2/15/2012</b>	SeqNo: <b>27822</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	ND	0.040								

Sample ID: <b>LCS-685</b>	SampType: <b>LCS</b>	TestCode: <b>EPA Method 200.7: Total Metals</b>								
Client ID: <b>LCSW</b>	Batch ID: <b>685</b>	RunNo: <b>959</b>								
Prep Date: <b>2/13/2012</b>	Analysis Date: <b>2/15/2012</b>	SeqNo: <b>27823</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.49	0.040	0.5000	0	98.9	85	115			

Sample ID: <b>1202350-004CMS</b>	SampType: <b>MS</b>	TestCode: <b>EPA Method 200.7: Total Metals</b>								
Client ID: <b>BK-EB-020812</b>	Batch ID: <b>685</b>	RunNo: <b>959</b>								
Prep Date: <b>2/13/2012</b>	Analysis Date: <b>2/15/2012</b>	SeqNo: <b>28184</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.47	0.040	0.5000	0	93.5	70	130			

Sample ID: <b>1202350-004CMSD</b>	SampType: <b>MSD</b>	TestCode: <b>EPA Method 200.7: Total Metals</b>								
Client ID: <b>BK-EB-020812</b>	Batch ID: <b>685</b>	RunNo: <b>959</b>								
Prep Date: <b>2/13/2012</b>	Analysis Date: <b>2/15/2012</b>	SeqNo: <b>28188</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.47	0.040	0.5000	0	94.4	70	130	0.949	20	

**Qualifiers:**

- \*X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1202350

22-Mar-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID: <b>MB</b>	SampType: <b>MBLK</b>	TestCode: <b>EPA 200.8: Dissolved Metals</b>								
Client ID: <b>PBW</b>	Batch ID: <b>R922</b>	RunNo: <b>922</b>								
Prep Date:	Analysis Date: <b>2/13/2012</b>	SeqNo: <b>26622</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	ND	0.0010								
Arsenic	ND	0.0010								
Selenium	ND	0.0010								
Thallium	ND	0.0010								
Uranium	ND	0.0010								

Sample ID: <b>LCS</b>	SampType: <b>LCS</b>	TestCode: <b>EPA 200.8: Dissolved Metals</b>								
Client ID: <b>LCSW</b>	Batch ID: <b>R922</b>	RunNo: <b>922</b>								
Prep Date:	Analysis Date: <b>2/13/2012</b>	SeqNo: <b>26623</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.024	0.0010	0.02500	0	97.8	85	115			
Arsenic	0.026	0.0010	0.02500	0	104	85	115			
Selenium	0.027	0.0010	0.02500	0	109	85	115			
Thallium	0.025	0.0010	0.02500	0	100	85	115			
Uranium	0.024	0.0010	0.02500	0	95.2	85	115			

**Qualifiers:**

\* / X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1202350

22-Mar-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID: <b>MB-685</b>	SampType: <b>MBLK</b>	TestCode: <b>200.8 ICPMS Metals:Total</b>								
Client ID: <b>PBW</b>	Batch ID: <b>685</b>	RunNo: <b>948</b>								
Prep Date: <b>2/13/2012</b>	Analysis Date: <b>2/14/2012</b>	SeqNo: <b>27416</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	0.0025								
Selenium	ND	0.0025								
Uranium	0.000031	0.0025								J

Sample ID: <b>MB-685</b>	SampType: <b>MBLK</b>	TestCode: <b>200.8 ICPMS Metals:Total</b>								
Client ID: <b>PBW</b>	Batch ID: <b>685</b>	RunNo: <b>1028</b>								
Prep Date: <b>2/13/2012</b>	Analysis Date: <b>2/20/2012</b>	SeqNo: <b>29709</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	ND	0.0025								
Arsenic	ND	0.0025								
Selenium	ND	0.0025								
Thallium	ND	0.0025								
Uranium	ND	0.0025								

**Qualifiers:**

\*X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
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 R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1202350

22-Mar-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID: <b>MB-674</b>	SampType: <b>MBLK</b>	TestCode: <b>EPA Method 300.0: Anions</b>								
Client ID: <b>PBS</b>	Batch ID: <b>674</b>	RunNo: <b>898</b>								
Prep Date: <b>2/10/2012</b>	Analysis Date: <b>2/10/2012</b>	SeqNo: <b>25516</b>	Units: <b>mg/Kg</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.30								
Chloride	ND	1.5								
Sulfate	ND	1.5								

Sample ID: <b>LCS-674</b>	SampType: <b>LCS</b>	TestCode: <b>EPA Method 300.0: Anions</b>								
Client ID: <b>LCSS</b>	Batch ID: <b>674</b>	RunNo: <b>898</b>								
Prep Date: <b>2/10/2012</b>	Analysis Date: <b>2/10/2012</b>	SeqNo: <b>25517</b>	Units: <b>mg/Kg</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	1.5	0.30	1.500	0	100	90	110			
Chloride	14	1.5	15.00	0	92.3	90	110			
Sulfate	28	1.5	30.00	0	93.9	90	110			

**Qualifiers:**

\*X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1202350

22-Mar-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID: <b>MB</b>	SampType: <b>MBLK</b>	TestCode: <b>EPA Method 300.0: Anions</b>								
Client ID: <b>PBW</b>	Batch ID: <b>R904</b>	RunNo: <b>904</b>								
Prep Date:	Analysis Date: <b>2/10/2012</b>	SeqNo: <b>25863</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								
Nitrogen, Nitrite (As N)	ND	0.10								
Nitrogen, Nitrate (As N)	ND	0.10								
Sulfate	ND	0.50								

Sample ID: <b>LCS</b>	SampType: <b>LCS</b>	TestCode: <b>EPA Method 300.0: Anions</b>								
Client ID: <b>LCSW</b>	Batch ID: <b>R904</b>	RunNo: <b>904</b>								
Prep Date:	Analysis Date: <b>2/10/2012</b>	SeqNo: <b>25864</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.6	0.50	5.000	0	92.6	90	110			
Nitrogen, Nitrite (As N)	0.97	0.10	1.000	0	97.0	90	110			
Nitrogen, Nitrate (As N)	2.4	0.10	2.500	0	94.2	90	110			
Sulfate	9.6	0.50	10.00	0	95.7	90	110			

**Qualifiers:**

\* / X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1202350

22-Mar-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID: <b>MB-689</b>	SampType: <b>MBLK</b>	TestCode: <b>EPA Method 7471: Mercury</b>								
Client ID: <b>PBS</b>	Batch ID: <b>689</b>	RunNo: <b>926</b>								
Prep Date: <b>2/13/2012</b>	Analysis Date: <b>2/14/2012</b>	SeqNo: <b>26731</b>	Units: <b>mg/kg</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.033								

Sample ID: <b>LCS-689</b>	SampType: <b>LCS</b>	TestCode: <b>EPA Method 7471: Mercury</b>								
Client ID: <b>LCSS</b>	Batch ID: <b>689</b>	RunNo: <b>926</b>								
Prep Date: <b>2/13/2012</b>	Analysis Date: <b>2/14/2012</b>	SeqNo: <b>26732</b>	Units: <b>mg/kg</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.17	0.033	0.1667	0	99.7	80	120			

Sample ID: <b>1202350-001AMS</b>	SampType: <b>MS</b>	TestCode: <b>EPA Method 7471: Mercury</b>								
Client ID: <b>BK-10 (5-6')</b>	Batch ID: <b>689</b>	RunNo: <b>926</b>								
Prep Date: <b>2/13/2012</b>	Analysis Date: <b>2/14/2012</b>	SeqNo: <b>26749</b>	Units: <b>mg/kg</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.16	0.033	0.1647	0	98.8	75	125			

Sample ID: <b>1202350-001AMSD</b>	SampType: <b>MSD</b>	TestCode: <b>EPA Method 7471: Mercury</b>								
Client ID: <b>BK-10 (5-6')</b>	Batch ID: <b>689</b>	RunNo: <b>926</b>								
Prep Date: <b>2/13/2012</b>	Analysis Date: <b>2/14/2012</b>	SeqNo: <b>26750</b>	Units: <b>mg/kg</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.17	0.033	0.1657	0	103	75	125	4.39	20	

**Qualifiers:**

- \* / X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1202350

22-Mar-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID: <b>MB-707</b>	SampType: <b>MBLK</b>	TestCode: <b>EPA Method 7470: Mercury</b>								
Client ID: <b>PBW</b>	Batch ID: <b>707</b>	RunNo: <b>935</b>								
Prep Date: <b>2/14/2012</b>	Analysis Date: <b>2/14/2012</b>	SeqNo: <b>27024</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.00020								

Sample ID: <b>LCS-707</b>	SampType: <b>LCS</b>	TestCode: <b>EPA Method 7470: Mercury</b>								
Client ID: <b>LCSW</b>	Batch ID: <b>707</b>	RunNo: <b>935</b>								
Prep Date: <b>2/14/2012</b>	Analysis Date: <b>2/14/2012</b>	SeqNo: <b>27025</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0055	0.00020	0.005000	0	109	80	120			

Sample ID: <b>1202350-004CMS</b>	SampType: <b>MS</b>	TestCode: <b>EPA Method 7470: Mercury</b>								
Client ID: <b>BK-EB-020812</b>	Batch ID: <b>707</b>	RunNo: <b>935</b>								
Prep Date: <b>2/14/2012</b>	Analysis Date: <b>2/14/2012</b>	SeqNo: <b>27027</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0055	0.00020	0.005000	0	109	75	125			

Sample ID: <b>1202350-004CMSD</b>	SampType: <b>MSD</b>	TestCode: <b>EPA Method 7470: Mercury</b>								
Client ID: <b>BK-EB-020812</b>	Batch ID: <b>707</b>	RunNo: <b>935</b>								
Prep Date: <b>2/14/2012</b>	Analysis Date: <b>2/14/2012</b>	SeqNo: <b>27028</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0055	0.00020	0.005000	0	111	75	125	1.40	20	

**Qualifiers:**

- \*X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1202350

22-Mar-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID: <b>MB-677</b>		SampType: <b>MBLK</b>		TestCode: <b>EPA Method 6010B: Soil Metals</b>						
Client ID: <b>PBS</b>		Batch ID: <b>677</b>		RunNo: <b>900</b>						
Prep Date: <b>2/10/2012</b>		Analysis Date: <b>2/13/2012</b>		SeqNo: <b>25543</b>			Units: <b>mg/Kg</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.67	3.0								J
Antimony	0.53	2.5								J
Arsenic	ND	2.5								
Barium	ND	0.10								
Beryllium	ND	0.15								
Boron	0.16	2.0								J
Cadmium	0.026	0.10								J
Chromium	0.094	0.30								J
Cobalt	ND	0.30								
Molybdenum	ND	0.40								
Nickel	0.20	0.50								J
Selenium	1.4	2.5								J
Silver	ND	0.25								
Thallium	ND	2.5								
Uranium	0.54	5.0								J
Vanadium	ND	2.5								
Zinc	0.94	2.5								J

Sample ID: <b>LCS-677</b>		SampType: <b>LCS</b>		TestCode: <b>EPA Method 6010B: Soil Metals</b>						
Client ID: <b>LCSS</b>		Batch ID: <b>677</b>		RunNo: <b>900</b>						
Prep Date: <b>2/10/2012</b>		Analysis Date: <b>2/13/2012</b>		SeqNo: <b>25544</b>			Units: <b>mg/Kg</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	28	3.0	25.00	0.6685	110	80	120			
Antimony	26	2.5	25.00	0.5325	102	80	120			
Arsenic	23	2.5	25.00	0	90.6	80	120			
Barium	24	0.10	25.00	0	95.9	80	120			
Beryllium	25	0.15	25.00	0	98.7	80	120			
Boron	24	2.0	25.00	0.1635	95.3	80	120			
Cadmium	24	0.10	25.00	0.02550	94.8	80	120			
Chromium	24	0.30	25.00	0.09450	95.7	80	120			
Cobalt	23	0.30	25.00	0	93.4	80	120			
Molybdenum	25	0.40	25.00	0	102	80	120			
Nickel	23	0.50	25.00	0.2015	90.1	80	120			
Selenium	24	2.5	25.00	1.418	89.9	80	120			
Silver	4.8	0.25	5.000	0	96.3	80	120			
Thallium	24	2.5	25.00	0	95.9	80	120			
Uranium	25	5.0	25.00	0.5410	99.4	80	120			
Vanadium	25	2.5	25.00	0	100	80	120			
Zinc	23	2.5	25.00	0.9425	90.0	80	120			

**Qualifiers:**

- \*/X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1202350

22-Mar-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID: <b>MB-677</b>	SampType: <b>MBLK</b>	TestCode: <b>EPA Method 6010B: Soil Metals</b>								
Client ID: <b>PBS</b>	Batch ID: <b>677</b>	RunNo: <b>909</b>								
Prep Date: <b>2/10/2012</b>	Analysis Date: <b>2/13/2012</b>	SeqNo: <b>26102</b>	Units: <b>mg/Kg</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Copper	ND	0.30								
Lead	ND	0.25								

Sample ID: <b>LCS-677</b>	SampType: <b>LCS</b>	TestCode: <b>EPA Method 6010B: Soil Metals</b>								
Client ID: <b>LCSS</b>	Batch ID: <b>677</b>	RunNo: <b>909</b>								
Prep Date: <b>2/10/2012</b>	Analysis Date: <b>2/13/2012</b>	SeqNo: <b>26103</b>	Units: <b>mg/Kg</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Copper	25	0.30	25.00	0	101	80	120			
Lead	24	0.25	25.00	0	94.9	80	120			

Sample ID: <b>MB-677</b>	SampType: <b>MBLK</b>	TestCode: <b>EPA Method 6010B: Soil Metals</b>								
Client ID: <b>PBS</b>	Batch ID: <b>677</b>	RunNo: <b>994</b>								
Prep Date: <b>2/10/2012</b>	Analysis Date: <b>2/17/2012</b>	SeqNo: <b>28799</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Copper	0.17	0.30								J
Lead	ND	0.25								

Sample ID: <b>LCS-677</b>	SampType: <b>LCS</b>	TestCode: <b>EPA Method 6010B: Soil Metals</b>								
Client ID: <b>LCSS</b>	Batch ID: <b>677</b>	RunNo: <b>994</b>								
Prep Date: <b>2/10/2012</b>	Analysis Date: <b>2/17/2012</b>	SeqNo: <b>28800</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Copper	25	0.30	25.00	0.1690	97.9	80	120			
Lead	23	0.25	25.00	0	92.8	80	120			

Sample ID: <b>MB-1127</b>	SampType: <b>MBLK</b>	TestCode: <b>EPA Method 6010B: Soil Metals</b>								
Client ID: <b>PBS</b>	Batch ID: <b>1127</b>	RunNo: <b>1527</b>								
Prep Date: <b>3/17/2012</b>	Analysis Date: <b>3/18/2012</b>	SeqNo: <b>42804</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	ND	1.0								
Manganese	ND	0.10								

Sample ID: <b>LCS-1127</b>	SampType: <b>LCS</b>	TestCode: <b>EPA Method 6010B: Soil Metals</b>								
Client ID: <b>LCSS</b>	Batch ID: <b>1127</b>	RunNo: <b>1527</b>								
Prep Date: <b>3/17/2012</b>	Analysis Date: <b>3/18/2012</b>	SeqNo: <b>42805</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	26	1.0	25.00	0	105	80	120			
Manganese	24	0.10	25.00	0	97.4	80	120			

**Qualifiers:**

- \*X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1202350

22-Mar-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID: <b>mb-1</b>	SampType: <b>MBLK</b>		TestCode: <b>SM2320B: Alkalinity</b>							
Client ID: <b>PBW</b>	Batch ID: <b>R947</b>		RunNo: <b>947</b>							
Prep Date:	Analysis Date: <b>2/14/2012</b>		SeqNo: <b>27332</b>		Units: <b>mg/L CaCO3</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	ND	20								

Sample ID: <b>ics-1</b>	SampType: <b>LCS</b>		TestCode: <b>SM2320B: Alkalinity</b>							
Client ID: <b>LCSW</b>	Batch ID: <b>R947</b>		RunNo: <b>947</b>							
Prep Date:	Analysis Date: <b>2/14/2012</b>		SeqNo: <b>27333</b>		Units: <b>mg/L CaCO3</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	79	20	80.00	0	98.8	88.1	104			

Sample ID: <b>mb-2</b>	SampType: <b>MBLK</b>		TestCode: <b>SM2320B: Alkalinity</b>							
Client ID: <b>PBW</b>	Batch ID: <b>R947</b>		RunNo: <b>947</b>							
Prep Date:	Analysis Date: <b>2/14/2012</b>		SeqNo: <b>27357</b>		Units: <b>mg/L CaCO3</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	ND	20								

Sample ID: <b>ics-2</b>	SampType: <b>LCS</b>		TestCode: <b>SM2320B: Alkalinity</b>							
Client ID: <b>LCSW</b>	Batch ID: <b>R947</b>		RunNo: <b>947</b>							
Prep Date:	Analysis Date: <b>2/14/2012</b>		SeqNo: <b>27358</b>		Units: <b>mg/L CaCO3</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	80	20	80.00	0	99.5	88.1	104			

**Qualifiers:**

- \*/X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1202350

22-Mar-12

**Client:** Western Refining Southwest, Inc.

**Project:** RCRA Background Investigation

Sample ID: <b>MB-709</b>	SampType: <b>MBLK</b>	TestCode: <b>SM2540C MOD: Total Dissolved Solids</b>								
Client ID: <b>PBW</b>	Batch ID: <b>709</b>	RunNo: <b>962</b>								
Prep Date: <b>2/14/2012</b>	Analysis Date: <b>2/15/2012</b>	SeqNo: <b>27879</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	ND	20.0								

Sample ID: <b>LCS-709</b>	SampType: <b>LCS</b>	TestCode: <b>SM2540C MOD: Total Dissolved Solids</b>								
Client ID: <b>LCSW</b>	Batch ID: <b>709</b>	RunNo: <b>962</b>								
Prep Date: <b>2/14/2012</b>	Analysis Date: <b>2/15/2012</b>	SeqNo: <b>27880</b>	Units: <b>mg/L</b>							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	1,010	20.0	1,000	0	101	80	120			

**Qualifiers:**

\*X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit



Hall Environmental Analysis Laboratory  
 4901 Hawkins NE  
 Albuquerque, NM 87105  
 TEL: 505-345-3975 FAX: 505-345-4107  
 Website: www.hallenvironmental.com

# Sample Log-In Check List

Client Name: Western Refining Southwest, Inc Bloomfield      Work Order Number: 1202350  
 Received by/date: AG 2/10/12  
 Logged By: Lindsay Mangin      2/10/2012 9:30:00 AM      *[Signature]*  
 Completed By: Lindsay Mangin      2/10/2012 9:54:01 AM      *[Signature]*  
 Reviewed By: *[Signature]*      2/10/12

**Chain of Custody**

- 1. Were seals intact?      Yes  No  Not Present
- 2. Is Chain of Custody complete?      Yes  No  Not Present
- 3. How was the sample delivered?      UPS

**Log In**

- 4. Coolers are present? (see 19. for cooler specific information)      Yes  No  NA
- 5. Was an attempt made to cool the samples?      Yes  No  NA
- 6. Were all samples received at a temperature of >0° C to 6.0°C      Yes  No  NA
- 7. Sample(s) in proper container(s)?      Yes  No
- 8. Sufficient sample volume for indicated test(s)?      Yes  No
- 9. Are samples (except VOA and ONG) properly preserved?      Yes  No
- 10. Was preservative added to bottles?      Yes  No  NA
- 11. VOA vials have zero headspace?      Yes  No  No VOA Vials
- 12. Were any sample containers received broken?      Yes  No
- 13. Does paperwork match bottle labels? (Note discrepancies on chain of custody)      Yes  No
- 14. Are matrices correctly identified on Chain of Custody?      Yes  No
- 15. Is it clear what analyses were requested?      Yes  No
- 16. Were all holding times able to be met? (If no, notify customer for authorization.)      Yes  No

# of preserved bottles checked for pH: 31  
 (<2 or >12 unless noted)  
 Adjusted? \_\_\_\_\_  
 Checked by: *[Signature]*

**Special Handling (if applicable)**

- 17. Was client notified of all discrepancies with this order?      Yes  No  NA

Person Notified: \_\_\_\_\_ Date: \_\_\_\_\_  
 By Whom: \_\_\_\_\_ Via:  eMail  Phone  Fax  In Person  
 Regarding: \_\_\_\_\_  
 Client Instructions: \_\_\_\_\_

18. Additional remarks:

**19. Cooler Information**

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	2.4	Good	Yes			



### METALS ANALYSES

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 335.3/335.2 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
Thallium	SW-846 method 6010/6020
Vanadium	SW-846 method 6010/6020
Zinc	SW-846 method 6010/6020

Includes  
Soil  
Soil Samples  
+  
GW Samples  
(both dissolved  
& total  
analyses)

### GENERAL CHEMISTRY ANALYSES

Analyte	Analytical Method
Total Dissolved Solids	SM-2540C
Bicarbonate	SM-2320B (dissolved)
Chloride	EPA method 300.0 (dissolved & total)
Sulfate	EPA method 300.0 (dissolved & total)
Calcium	EPA method 6010/6020 (dissolved)
Magnesium	EPA method 6010/6020 (total)
Sodium	EPA method 6010/6020 (dissolved)
Potassium	EPA method 6010/6020 (dissolved)
Manganese	SW-846 method 6010/6020 (dissolved & total)
Nitrate/nitrite	EPA method 300.0 (dissolved)
Iron	SW-846 method 6010/6020 (dissolved & total)

For  
Groundwater  
Samples  
ONLY

### SWMU No. 16 Constituent List

Analyte	Analytical Method
Aluminum	SW-846 method 6010/6020
Boron	SW-846 method 6010/6020
Copper	SW-846 method 6010/6020
Molybdenum	SW-846 method 6010/6020
Uranium	SW-846 method 6020
Fluoride	SW-846 method 300

For Soil  
and Groundwater  
Samples  
(Dissolved  
and  
Totals)



Hall Environmental Analysis Laboratory  
4901 Hawkins NE  
Albuquerque, NM 87109  
TEL: 505-345-3975 FAX: 505-345-4107  
Website: [www.hallenvironmental.com](http://www.hallenvironmental.com)

June 26, 2012

Kelly Robinson

Western Refining Southwest, Inc.

#50 CR 4990

Bloomfield, NM 87413

TEL: (505) 632-4135

FAX (505) 632-3911

RE: Background Investigation

OrderNo.: 1206661

Dear Kelly Robinson:

Hall Environmental Analysis Laboratory received 8 sample(s) on 6/15/2012 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to [www.hallenvironmental.com](http://www.hallenvironmental.com) or the state specific web sites. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. All samples are reported as received unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman", is written in a cursive style.

Andy Freeman

Laboratory Manager

4901 Hawkins NE

Albuquerque, NM 87109

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1206661

Date Reported: 6/26/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** EB-061412

**Project:** Background Investigation

**Collection Date:** 6/14/2012 9:30:00 AM

**Lab ID:** 1206661-001

**Matrix:** AQUEOUS

**Received Date:** 6/15/2012 9:50:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	ND	0.10		mg/L	1	6/16/2012 12:09:54 AM
Chloride	ND	0.50		mg/L	1	6/16/2012 12:09:54 AM
Sulfate	ND	0.50		mg/L	1	6/16/2012 12:09:54 AM
Nitrate+Nitrite as N	ND	1.0		mg/L	5	6/19/2012 5:57:10 PM
<b>EPA METHOD 200.7: DISSOLVED METALS</b>						Analyst: <b>ELS</b>
Aluminum	ND	0.020		mg/L	1	6/20/2012 9:45:23 AM
Barium	ND	0.0020		mg/L	1	6/20/2012 9:45:23 AM
Beryllium	ND	0.0020		mg/L	1	6/20/2012 9:45:23 AM
Boron	ND	0.040		mg/L	1	6/20/2012 9:45:23 AM
Cadmium	ND	0.0020		mg/L	1	6/20/2012 9:45:23 AM
Calcium	ND	1.0		mg/L	1	6/21/2012 9:00:53 AM
Chromium	ND	0.0060		mg/L	1	6/20/2012 9:45:23 AM
Cobalt	ND	0.0060		mg/L	1	6/20/2012 9:45:23 AM
Copper	ND	0.0060		mg/L	1	6/20/2012 9:45:23 AM
Iron	ND	0.020		mg/L	1	6/21/2012 12:49:57 PM
Magnesium	ND	1.0		mg/L	1	6/21/2012 9:00:53 AM
Manganese	ND	0.0020		mg/L	1	6/20/2012 9:45:23 AM
Molybdenum	ND	0.0080		mg/L	1	6/21/2012 9:00:53 AM
Nickel	ND	0.010		mg/L	1	6/21/2012 9:00:53 AM
Potassium	ND	1.0		mg/L	1	6/21/2012 9:00:53 AM
Silver	ND	0.0050		mg/L	1	6/20/2012 9:45:23 AM
Sodium	ND	1.0		mg/L	1	6/21/2012 9:00:53 AM
Vanadium	ND	0.050		mg/L	1	6/20/2012 9:45:23 AM
Zinc	0.025	0.010		mg/L	1	6/20/2012 9:45:23 AM
<b>EPA METHOD 200.7: TOTAL METALS</b>						Analyst: <b>ELS</b>
Aluminum	ND	0.020		mg/L	1	6/20/2012 9:14:54 AM
Barium	ND	0.0020		mg/L	1	6/20/2012 9:14:54 AM
Beryllium	ND	0.0020		mg/L	1	6/20/2012 9:14:54 AM
Boron	ND	0.040		mg/L	1	6/20/2012 9:14:54 AM
Cadmium	ND	0.0020		mg/L	1	6/20/2012 9:14:54 AM
Chromium	ND	0.0060		mg/L	1	6/20/2012 9:14:54 AM
Cobalt	ND	0.0060		mg/L	1	6/20/2012 9:14:54 AM
Copper	ND	0.0060		mg/L	1	6/20/2012 9:14:54 AM
Iron	ND	0.020		mg/L	1	6/21/2012 12:11:03 PM
Magnesium	ND	1.0		mg/L	1	6/21/2012 12:11:03 PM
Manganese	ND	0.0020		mg/L	1	6/20/2012 9:14:54 AM
Molybdenum	ND	0.0080		mg/L	1	6/21/2012 2:07:06 PM
Nickel	ND	0.010		mg/L	1	6/21/2012 12:11:03 PM
Silver	ND	0.0050		mg/L	1	6/20/2012 9:14:54 AM
Vanadium	ND	0.050		mg/L	1	6/20/2012 9:14:54 AM
Zinc	0.010	0.010		mg/L	1	6/20/2012 9:14:54 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit  
 U Samples with CalcVal < MDL

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1206661

Date Reported: 6/26/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** EB-061412

**Project:** Background Investigation

**Collection Date:** 6/14/2012 9:30:00 AM

**Lab ID:** 1206661-001

**Matrix:** AQUEOUS

**Received Date:** 6/15/2012 9:50:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA 200.8: DISSOLVED METALS</b>						Analyst: <b>SNV</b>
Antimony	ND	0.0010		mg/L	1	6/19/2012 4:49:26 PM
Arsenic	ND	0.0010		mg/L	1	6/19/2012 4:49:26 PM
Lead	ND	0.0010		mg/L	1	6/19/2012 4:49:26 PM
Selenium	ND	0.0010		mg/L	1	6/19/2012 4:49:26 PM
Thallium	ND	0.0010		mg/L	1	6/19/2012 4:49:26 PM
Uranium	ND	0.0010		mg/L	1	6/19/2012 4:49:26 PM
<b>200.8 ICPMS METALS:TOTAL</b>						Analyst: <b>SNV</b>
Antimony	ND	0.0025		mg/L	2.5	6/20/2012 4:59:16 PM
Arsenic	ND	0.0025		mg/L	2.5	6/20/2012 4:59:16 PM
Lead	ND	0.0025		mg/L	2.5	6/20/2012 4:59:16 PM
Selenium	ND	0.0025		mg/L	2.5	6/20/2012 4:59:16 PM
Thallium	ND	0.0025		mg/L	2.5	6/20/2012 4:59:16 PM
Uranium	ND	0.0025		mg/L	2.5	6/20/2012 4:59:16 PM
<b>EPA METHOD 245.1: MERCURY</b>						Analyst: <b>RAG</b>
Mercury	ND	0.00020		mg/L	1	6/19/2012 4:53:35 PM
<b>SM2320B: ALKALINITY</b>						Analyst: <b>DBD</b>
Bicarbonate (As CaCO3)	ND	20		mg/L CaCO3	1	6/18/2012 9:47:24 AM
Carbonate (As CaCO3)	ND	2.0		mg/L CaCO3	1	6/18/2012 9:47:24 AM
Total Alkalinity (as CaCO3)	ND	20		mg/L CaCO3	1	6/18/2012 9:47:24 AM
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>						Analyst: <b>KS</b>
Total Dissolved Solids	ND	20.0		mg/L	1	6/20/2012

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit  
 U Samples with CalcVal < MDL

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1206661

Date Reported: 6/26/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** MW-BCK2

**Project:** Background Investigation

**Collection Date:** 6/14/2012 12:00:00 PM

**Lab ID:** 1206661-002

**Matrix:** AQUEOUS

**Received Date:** 6/15/2012 9:50:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	ND	2.0		mg/L	20	6/16/2012 12:47:09 AM
Chloride	21	10		mg/L	20	6/16/2012 12:47:09 AM
Sulfate	7900	500		mg/L	1000	6/22/2012 5:37:20 AM
Nitrate+Nitrite as N	ND	2.0		mg/L	10	6/19/2012 6:09:34 PM
<b>EPA METHOD 200.7: DISSOLVED METALS</b>						Analyst: <b>ELS</b>
Aluminum	3.8	0.10	*	mg/L	5	6/21/2012 11:18:21 AM
Barium	0.035	0.0020		mg/L	1	6/21/2012 11:25:27 AM
Beryllium	ND	0.0020		mg/L	1	6/21/2012 11:25:27 AM
Boron	0.67	0.040		mg/L	1	6/21/2012 11:25:27 AM
Cadmium	ND	0.0020		mg/L	1	6/21/2012 11:25:27 AM
Calcium	390	5.0		mg/L	5	6/21/2012 11:18:21 AM
Chromium	ND	0.0060		mg/L	1	6/21/2012 11:25:27 AM
Cobalt	0.0068	0.0060		mg/L	1	6/21/2012 11:25:27 AM
Copper	ND	0.0060		mg/L	1	6/21/2012 11:25:27 AM
Iron	0.94	0.020	*	mg/L	1	6/21/2012 11:25:27 AM
Magnesium	47	1.0		mg/L	1	6/21/2012 11:25:27 AM
Manganese	1.1	0.010	*	mg/L	5	6/21/2012 11:18:21 AM
Molybdenum	0.024	0.0080		mg/L	1	6/21/2012 2:22:16 PM
Nickel	ND	0.010		mg/L	1	6/21/2012 11:25:27 AM
Potassium	18	1.0		mg/L	1	6/21/2012 11:25:27 AM
Silver	ND	0.0050		mg/L	1	6/21/2012 11:25:27 AM
Sodium	3700	50		mg/L	50	6/21/2012 10:55:20 AM
Vanadium	ND	0.050		mg/L	1	6/21/2012 11:25:27 AM
Zinc	0.030	0.010		mg/L	1	6/21/2012 11:25:27 AM
<b>EPA METHOD 200.7: TOTAL METALS</b>						Analyst: <b>ELS</b>
Aluminum	33	1.0	*	mg/L	50	6/21/2012 10:44:20 AM
Barium	0.12	0.0020		mg/L	1	6/20/2012 9:21:24 AM
Beryllium	0.0023	0.0020		mg/L	1	6/20/2012 9:21:24 AM
Boron	0.60	0.040		mg/L	1	6/20/2012 9:21:24 AM
Cadmium	ND	0.0020		mg/L	1	6/20/2012 9:21:24 AM
Chromium	0.025	0.0060		mg/L	1	6/20/2012 9:21:24 AM
Cobalt	0.019	0.0060		mg/L	1	6/20/2012 9:21:24 AM
Copper	0.010	0.0060		mg/L	1	6/20/2012 9:21:24 AM
Iron	29	1.0	*	mg/L	50	6/21/2012 10:44:20 AM
Magnesium	52	1.0		mg/L	1	6/21/2012 11:36:54 AM
Manganese	1.9	0.010	*	mg/L	5	6/20/2012 9:24:07 AM
Molybdenum	0.017	0.0080		mg/L	1	6/21/2012 2:09:03 PM
Nickel	0.015	0.010		mg/L	1	6/21/2012 11:36:54 AM
Silver	ND	0.0050		mg/L	1	6/20/2012 9:21:24 AM
Vanadium	ND	0.050		mg/L	1	6/20/2012 9:21:24 AM
Zinc	0.089	0.010		mg/L	1	6/20/2012 9:21:24 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit  
 U Samples with CalcVal < MDL

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1206661

Date Reported: 6/26/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** MW-BCK2

**Project:** Background Investigation

**Collection Date:** 6/14/2012 12:00:00 PM

**Lab ID:** 1206661-002

**Matrix:** AQUEOUS

**Received Date:** 6/15/2012 9:50:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA 200.8: DISSOLVED METALS</b>						Analyst: <b>SNV</b>
Antimony	ND	0.0050		mg/L	5	6/20/2012 2:18:17 PM
Arsenic	0.0027	0.0010		mg/L	1	6/19/2012 4:57:17 PM
Lead	ND	0.0050		mg/L	5	6/20/2012 2:18:17 PM
Selenium	0.0079	0.0010		mg/L	1	6/19/2012 4:57:17 PM
Thallium	ND	0.0050		mg/L	5	6/20/2012 2:18:17 PM
Uranium	ND	0.0050		mg/L	5	6/21/2012 11:39:03 AM
<b>200.8 ICPMS METALS:TOTAL</b>						Analyst: <b>SNV</b>
Antimony	ND	0.0025		mg/L	2.5	6/20/2012 5:03:12 PM
Arsenic	0.0047	0.0025		mg/L	2.5	6/20/2012 5:03:12 PM
Lead	0.025	0.0025	*	mg/L	2.5	6/20/2012 5:03:12 PM
Selenium	0.0041	0.0025		mg/L	2.5	6/20/2012 5:03:12 PM
Thallium	ND	0.0025		mg/L	2.5	6/20/2012 5:03:12 PM
Uranium	0.0040	0.0025		mg/L	2.5	6/20/2012 5:03:12 PM
<b>EPA METHOD 245.1: MERCURY</b>						Analyst: <b>RAG</b>
Mercury	ND	0.0010		mg/L	5	6/19/2012 5:02:36 PM
<b>SM2320B: ALKALINITY</b>						Analyst: <b>DBD</b>
Bicarbonate (As CaCO3)	110	20		mg/L CaCO3	1	6/18/2012 9:52:31 AM
Carbonate (As CaCO3)	ND	2.0		mg/L CaCO3	1	6/18/2012 9:52:31 AM
Total Alkalinity (as CaCO3)	110	20		mg/L CaCO3	1	6/18/2012 9:52:31 AM
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>						Analyst: <b>KS</b>
Total Dissolved Solids	12700	200		mg/L	1	6/20/2012

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit  
 U Samples with CalcVal < MDL

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1206661

Date Reported: 6/26/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** MW-BCK2 (DUP)

**Project:** Background Investigation

**Collection Date:** 6/14/2012 12:00:00 PM

**Lab ID:** 1206661-003

**Matrix:** AQUEOUS

**Received Date:** 6/15/2012 9:50:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	ND	2.0		mg/L	20	6/16/2012 1:11:58 AM
Chloride	20	10		mg/L	20	6/16/2012 1:11:58 AM
Sulfate	7800	500		mg/L	1000	6/22/2012 6:02:10 AM
Nitrate+Nitrite as N	ND	2.0		mg/L	10	6/19/2012 5:19:55 PM
<b>EPA METHOD 200.7: DISSOLVED METALS</b>						Analyst: <b>ELS</b>
Aluminum	ND	0.020		mg/L	1	6/21/2012 11:30:13 AM
Barium	0.020	0.0020		mg/L	1	6/21/2012 11:30:13 AM
Beryllium	ND	0.0020		mg/L	1	6/21/2012 11:30:13 AM
Boron	0.71	0.040		mg/L	1	6/21/2012 11:30:13 AM
Cadmium	ND	0.0020		mg/L	1	6/21/2012 11:30:13 AM
Calcium	380	5.0		mg/L	5	6/21/2012 11:21:51 AM
Chromium	ND	0.0060		mg/L	1	6/21/2012 11:30:13 AM
Cobalt	ND	0.0060		mg/L	1	6/21/2012 11:30:13 AM
Copper	ND	0.0060		mg/L	1	6/21/2012 11:30:13 AM
Iron	0.099	0.020		mg/L	1	6/21/2012 11:30:13 AM
Magnesium	46	1.0		mg/L	1	6/21/2012 11:30:13 AM
Manganese	1.1	0.010	*	mg/L	5	6/21/2012 11:21:51 AM
Molybdenum	0.015	0.0080		mg/L	1	6/21/2012 2:24:12 PM
Nickel	ND	0.010		mg/L	1	6/21/2012 11:30:13 AM
Potassium	16	1.0		mg/L	1	6/21/2012 11:30:13 AM
Silver	ND	0.0050		mg/L	1	6/21/2012 11:30:13 AM
Sodium	3700	50		mg/L	50	6/21/2012 10:58:36 AM
Vanadium	ND	0.050		mg/L	1	6/21/2012 11:30:13 AM
Zinc	0.023	0.010		mg/L	1	6/21/2012 11:30:13 AM
<b>EPA METHOD 200.7: TOTAL METALS</b>						Analyst: <b>ELS</b>
Aluminum	25	1.0	*	mg/L	50	6/21/2012 10:47:27 AM
Barium	0.13	0.0020		mg/L	1	6/20/2012 9:33:36 AM
Beryllium	ND	0.0020		mg/L	1	6/20/2012 9:33:36 AM
Boron	0.63	0.040		mg/L	1	6/20/2012 9:33:36 AM
Cadmium	ND	0.0020		mg/L	1	6/20/2012 9:33:36 AM
Chromium	0.017	0.0060		mg/L	1	6/20/2012 9:33:36 AM
Cobalt	0.013	0.0060		mg/L	1	6/20/2012 9:33:36 AM
Copper	0.011	0.0060		mg/L	1	6/20/2012 9:33:36 AM
Iron	21	1.0	*	mg/L	50	6/21/2012 10:47:27 AM
Magnesium	50	1.0		mg/L	1	6/21/2012 11:39:36 AM
Manganese	1.7	0.010	*	mg/L	5	6/20/2012 9:36:20 AM
Molybdenum	0.016	0.0080		mg/L	1	6/21/2012 2:10:57 PM
Nickel	ND	0.010		mg/L	1	6/21/2012 11:39:36 AM
Silver	ND	0.0050		mg/L	1	6/20/2012 9:33:36 AM
Vanadium	ND	0.050		mg/L	1	6/20/2012 9:33:36 AM
Zinc	0.066	0.010		mg/L	1	6/20/2012 9:33:36 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit  
 U Samples with CalcVal < MDL

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1206661

Date Reported: 6/26/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** MW-BCK2 (DUP)

**Project:** Background Investigation

**Collection Date:** 6/14/2012 12:00:00 PM

**Lab ID:** 1206661-003

**Matrix:** AQUEOUS

**Received Date:** 6/15/2012 9:50:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA 200.8: DISSOLVED METALS</b>						Analyst: <b>SNV</b>
Antimony	ND	0.0050		mg/L	5	6/20/2012 2:30:09 PM
Arsenic	0.0032	0.0010		mg/L	1	6/19/2012 5:01:13 PM
Lead	ND	0.0050		mg/L	5	6/20/2012 2:30:09 PM
Selenium	0.011	0.0010		mg/L	1	6/19/2012 5:01:13 PM
Thallium	ND	0.0050		mg/L	5	6/20/2012 2:30:09 PM
Uranium	ND	0.0050		mg/L	5	6/21/2012 11:40:55 AM
<b>200.8 ICPMS METALS:TOTAL</b>						Analyst: <b>SNV</b>
Antimony	ND	0.0025		mg/L	2.5	6/20/2012 5:07:08 PM
Arsenic	0.0042	0.0025		mg/L	2.5	6/20/2012 5:07:08 PM
Lead	0.016	0.0025	*	mg/L	2.5	6/20/2012 5:07:08 PM
Selenium	0.0054	0.0025		mg/L	2.5	6/20/2012 5:07:08 PM
Thallium	ND	0.0025		mg/L	2.5	6/20/2012 5:07:08 PM
Uranium	0.0026	0.0025		mg/L	2.5	6/20/2012 5:07:08 PM
<b>EPA METHOD 245.1: MERCURY</b>						Analyst: <b>RAG</b>
Mercury	ND	0.0010		mg/L	5	6/19/2012 5:39:57 PM
<b>SM2320B: ALKALINITY</b>						Analyst: <b>DBD</b>
Bicarbonate (As CaCO3)	100	20		mg/L CaCO3	1	6/18/2012 10:02:45 AM
Carbonate (As CaCO3)	ND	2.0		mg/L CaCO3	1	6/18/2012 10:02:45 AM
Total Alkalinity (as CaCO3)	100	20		mg/L CaCO3	1	6/18/2012 10:02:45 AM
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>						Analyst: <b>KS</b>
Total Dissolved Solids	12500	200		mg/L	1	6/20/2012

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit  
 U Samples with CalcVal < MDL

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1206661

Date Reported: 6/26/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** MW-BCK1

**Project:** Background Investigation

**Collection Date:** 6/14/2012 1:00:00 PM

**Lab ID:** 1206661-004

**Matrix:** AQUEOUS

**Received Date:** 6/15/2012 9:50:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	0.25	0.10		mg/L	1	6/15/2012 2:32:41 PM
Chloride	35	10		mg/L	20	6/15/2012 2:43:54 PM
Sulfate	4100	50		mg/L	100	6/19/2012 3:28:13 PM
Nitrate+Nitrite as N	ND	1.0		mg/L	5	6/19/2012 5:32:20 PM
<b>EPA METHOD 200.7: DISSOLVED METALS</b>						Analyst: <b>ELS</b>
Aluminum	0.11	0.020		mg/L	1	6/21/2012 11:33:28 AM
Barium	0.022	0.0020		mg/L	1	6/21/2012 11:33:28 AM
Beryllium	ND	0.0020		mg/L	1	6/21/2012 11:33:28 AM
Boron	0.23	0.040		mg/L	1	6/21/2012 11:33:28 AM
Cadmium	ND	0.0020		mg/L	1	6/21/2012 11:33:28 AM
Calcium	420	10		mg/L	10	6/21/2012 11:01:50 AM
Chromium	ND	0.0060		mg/L	1	6/21/2012 11:33:28 AM
Cobalt	ND	0.0060		mg/L	1	6/21/2012 11:33:28 AM
Copper	ND	0.0060		mg/L	1	6/21/2012 11:33:28 AM
Iron	0.10	0.020		mg/L	1	6/21/2012 11:33:28 AM
Magnesium	64	1.0		mg/L	1	6/21/2012 11:33:28 AM
Manganese	0.39	0.0020	*	mg/L	1	6/21/2012 11:33:28 AM
Molybdenum	0.026	0.0080		mg/L	1	6/21/2012 2:26:06 PM
Nickel	ND	0.010		mg/L	1	6/21/2012 11:33:28 AM
Potassium	4.4	1.0		mg/L	1	6/21/2012 11:33:28 AM
Silver	ND	0.0050		mg/L	1	6/21/2012 11:33:28 AM
Sodium	950	10		mg/L	10	6/21/2012 11:01:50 AM
Vanadium	ND	0.050		mg/L	1	6/21/2012 11:33:28 AM
Zinc	0.012	0.010		mg/L	1	6/21/2012 11:33:28 AM
<b>EPA METHOD 200.7: TOTAL METALS</b>						Analyst: <b>ELS</b>
Aluminum	31	1.0	*	mg/L	50	6/21/2012 10:50:35 AM
Barium	0.28	0.0020		mg/L	1	6/20/2012 9:39:43 AM
Beryllium	0.0020	0.0020		mg/L	1	6/20/2012 9:39:43 AM
Boron	0.19	0.040		mg/L	1	6/20/2012 9:39:43 AM
Cadmium	ND	0.0020		mg/L	1	6/20/2012 9:39:43 AM
Chromium	0.032	0.0060		mg/L	1	6/20/2012 9:39:43 AM
Cobalt	0.029	0.0060		mg/L	1	6/20/2012 9:39:43 AM
Copper	0.050	0.0060		mg/L	1	6/20/2012 9:39:43 AM
Iron	41	1.0	*	mg/L	50	6/21/2012 10:50:35 AM
Magnesium	67	1.0		mg/L	1	6/21/2012 11:42:19 AM
Manganese	1.4	0.010	*	mg/L	5	6/20/2012 9:42:45 AM
Molybdenum	0.019	0.0080		mg/L	1	6/21/2012 2:12:51 PM
Nickel	0.032	0.010		mg/L	1	6/21/2012 11:42:19 AM
Silver	ND	0.0050		mg/L	1	6/20/2012 9:39:43 AM
Vanadium	ND	0.050		mg/L	1	6/20/2012 9:39:43 AM
Zinc	0.12	0.010		mg/L	1	6/20/2012 9:39:43 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit  
 U Samples with CalcVal < MDL

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1206661

Date Reported: 6/26/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** MW-BCK1

**Project:** Background Investigation

**Collection Date:** 6/14/2012 1:00:00 PM

**Lab ID:** 1206661-004

**Matrix:** AQUEOUS

**Received Date:** 6/15/2012 9:50:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA 200.8: DISSOLVED METALS</b>						Analyst: <b>SNV</b>
Antimony	ND	0.0010		mg/L	1	6/19/2012 5:05:09 PM
Arsenic	0.0014	0.0010		mg/L	1	6/19/2012 5:05:09 PM
Lead	ND	0.0010		mg/L	1	6/19/2012 5:05:09 PM
Selenium	0.0069	0.0010		mg/L	1	6/19/2012 5:05:09 PM
Thallium	ND	0.0010		mg/L	1	6/19/2012 5:05:09 PM
Uranium	0.012	0.0010		mg/L	1	6/19/2012 5:05:09 PM
<b>200.8 ICPMS METALS:TOTAL</b>						Analyst: <b>SNV</b>
Antimony	ND	0.0025		mg/L	2.5	6/20/2012 5:18:59 PM
Arsenic	0.0084	0.0025		mg/L	2.5	6/20/2012 5:18:59 PM
Lead	0.033	0.0025	*	mg/L	2.5	6/20/2012 5:18:59 PM
Selenium	0.0060	0.0025		mg/L	2.5	6/21/2012 3:03:07 PM
Thallium	ND	0.0025		mg/L	2.5	6/20/2012 5:18:59 PM
Uranium	0.014	0.0025		mg/L	2.5	6/20/2012 5:18:59 PM
<b>EPA METHOD 245.1: MERCURY</b>						Analyst: <b>RAG</b>
Mercury	ND	0.0010		mg/L	5	6/19/2012 5:06:08 PM
<b>SM2320B: ALKALINITY</b>						Analyst: <b>DBD</b>
Bicarbonate (As CaCO3)	150	20		mg/L CaCO3	1	6/18/2012 10:12:38 AM
Carbonate (As CaCO3)	ND	2.0		mg/L CaCO3	1	6/18/2012 10:12:38 AM
Total Alkalinity (as CaCO3)	150	20		mg/L CaCO3	1	6/18/2012 10:12:38 AM
<b>SM2540C MOD: TOTAL DISSOLVED SOLIDS</b>						Analyst: <b>KS</b>
Total Dissolved Solids	4470	100		mg/L	1	6/20/2012

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits  
 S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit  
 U Samples with CalcVal < MDL

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1206661

Date Reported: 6/26/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** EB-061412-Filtered

**Project:** Background Investigation

**Collection Date:** 6/14/2012 9:30:00 AM

**Lab ID:** 1206661-005

**Matrix:** AQUEOUS

**Received Date:** 6/15/2012 9:50:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	ND	0.10		mg/L	1	6/15/2012 2:55:08 PM
Chloride	ND	0.50		mg/L	1	6/15/2012 2:55:08 PM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	6/15/2012 2:55:08 PM
Nitrogen, Nitrate (As N)	ND	0.10		mg/L	1	6/15/2012 2:55:08 PM
Sulfate	ND	0.50		mg/L	1	6/15/2012 2:55:08 PM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
E Value above quantitation range  
J Analyte detected below quantitation limits  
R RPD outside accepted recovery limits  
S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
RL Reporting Detection Limit  
U Samples with CalcVal < MDL

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1206661

Date Reported: 6/26/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** MW-BCK2 Filtered

**Project:** Background Investigation

**Collection Date:** 6/14/2012 12:00:00 PM

**Lab ID:** 1206661-006

**Matrix:** AQUEOUS

**Received Date:** 6/15/2012 9:50:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	ND	2.0		mg/L	20	6/15/2012 3:51:18 PM
Chloride	23	10		mg/L	20	6/15/2012 3:51:18 PM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	6/15/2012 3:40:04 PM
Nitrogen, Nitrate (As N)	ND	2.0		mg/L	20	6/15/2012 3:51:18 PM
Sulfate	8100	500		mg/L	1000	6/26/2012 1:39:53 PM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
E Value above quantitation range  
J Analyte detected below quantitation limits  
R RPD outside accepted recovery limits  
S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
RL Reporting Detection Limit  
U Samples with CalcVal < MDL

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1206661

Date Reported: 6/26/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** MW-BCK 2 (Dup) Filtered

**Project:** Background Investigation

**Collection Date:** 6/14/2012 12:00:00 PM

**Lab ID:** 1206661-007

**Matrix:** AQUEOUS

**Received Date:** 6/15/2012 9:50:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	ND	2.0		mg/L	20	6/15/2012 4:36:13 PM
Chloride	21	5.0		mg/L	10	6/20/2012 12:21:49 AM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	6/15/2012 4:24:59 PM
Nitrogen, Nitrate (As N)	ND	2.0		mg/L	20	6/15/2012 4:36:13 PM
Sulfate	8600	500		mg/L	1000	6/26/2012 5:33:28 AM

**Qualifiers:**

- \* / X Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit
- U Samples with CalcVal < MDL

# Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1206661

Date Reported: 6/26/2012

**CLIENT:** Western Refining Southwest, Inc.

**Client Sample ID:** MW-BCK1 Filtered

**Project:** Background Investigation

**Collection Date:** 6/14/2012 1:00:00 PM

**Lab ID:** 1206661-008

**Matrix:** AQUEOUS

**Received Date:** 6/15/2012 9:50:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b>EPA METHOD 300.0: ANIONS</b>						Analyst: <b>BRM</b>
Fluoride	0.24	0.10		mg/L	1	6/15/2012 4:47:27 PM
Chloride	34	5.0		mg/L	10	6/20/2012 12:46:40 AM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	6/15/2012 4:47:27 PM
Nitrogen, Nitrate (As N)	0.15	0.10		mg/L	1	6/15/2012 4:47:27 PM
Sulfate	3200	50		mg/L	100	6/20/2012 12:59:04 AM

**Qualifiers:** \*/X Value exceeds Maximum Contaminant Level.  
E Value above quantitation range  
J Analyte detected below quantitation limits  
R RPD outside accepted recovery limits  
S Spike Recovery outside accepted recovery limits

B Analyte detected in the associated Method Blank  
H Holding times for preparation or analysis exceeded  
ND Not Detected at the Reporting Limit  
RL Reporting Detection Limit  
U Samples with CalcVal < MDL

# Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com  
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

**Client:** HALL ENVIRONMENTAL ANALYSIS LAB      **Batch #:** 120619027  
**Address:** 4901 HAWKINS NE SUITE D      **Project Name:** 1206661  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

## Analytical Results Report

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<b>Sample Number</b>	120619027-001	<b>Sampling Date</b>	6/14/2012	<b>Date/Time Received</b>	6/19/2012	11:30 AM
<b>Client Sample ID</b>	1206661-001D / EB-061412	<b>Sampling Time</b>	9:30 AM			
<b>Matrix</b>	Water	<b>Sample Location</b>				
<b>Comments</b>						

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Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/L	0.01	6/20/2012	CRW	EPA 335.4	

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<b>Sample Number</b>	120619027-002	<b>Sampling Date</b>	6/14/2012	<b>Date/Time Received</b>	6/19/2012	11:30 AM
<b>Client Sample ID</b>	1206661-002D / MW-BK2	<b>Sampling Time</b>	12:00 PM			
<b>Matrix</b>	Water	<b>Sample Location</b>				
<b>Comments</b>						

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Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/L	0.01	6/20/2012	CRW	EPA 335.4	

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<b>Sample Number</b>	120619027-003	<b>Sampling Date</b>	6/14/2012	<b>Date/Time Received</b>	6/19/2012	11:30 AM
<b>Client Sample ID</b>	1206661-003D / MW-BK2 (DUP)	<b>Sampling Time</b>	12:00 PM			
<b>Matrix</b>	Water	<b>Sample Location</b>				
<b>Comments</b>						

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Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/L	0.01	6/20/2012	CRW	EPA 335.4	

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**Client:** HALL ENVIRONMENTAL ANALYSIS LAB  
**Address:** 4901 HAWKINS NE SUITE D  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

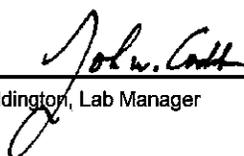
**Batch #:** 120619027  
**Project Name:** 1206661

## Analytical Results Report

<b>Sample Number</b>	120619027-004	<b>Sampling Date</b>	6/14/2012	<b>Date/Time Received</b>	6/19/2012 11:30 AM
<b>Client Sample ID</b>	1206661-004D / MW-BCK1	<b>Sampling Time</b>	1:00 PM		
<b>Matrix</b>	Water	<b>Sample Location</b>			
<b>Comments</b>					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide	ND	mg/L	0.01	6/20/2012	CRW	EPA 335.4	

Authorized Signature

  
\_\_\_\_\_  
John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level  
ND Not Detected  
PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.  
The results reported relate only to the samples indicated.  
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

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**Client:** HALL ENVIRONMENTAL ANALYSIS LAB      **Batch #:** 120619027  
**Address:** 4901 HAWKINS NE SUITE D      **Project Name:** 1206661  
ALBUQUERQUE, NM 87109  
**Attn:** ANDY FREEMAN

## Analytical Results Report Quality Control Data

### Lab Control Sample

Parameter	LCS Result	Units	LCS Spike	%Rec	AR %Rec	Prep Date	Analysis Date
Cyanide	0.496	mg/L	0.5	99.2	90-110	6/20/2012	6/20/2012

### Matrix Spike

Sample Number	Parameter	Sample Result	MS Result	Units	MS Spike	%Rec	AR %Rec	Prep Date	Analysis Date
120619027-001	Cyanide	ND	0.472	mg/L	0.5	94.4	80-120	6/20/2012	6/20/2012

### Matrix Spike Duplicate

Parameter	MSD Result	Units	MSD Spike	%Rec	%RPD	AR %RPD	Prep Date	Analysis Date
Cyanide	0.491	mg/L	0.5	98.2	3.9	0-25	6/20/2012	6/20/2012

### Method Blank

Parameter	Result	Units	PQL	Prep Date	Analysis Date
Cyanide	ND	mg/L	0.01	6/20/2012	6/20/2012

AR      Acceptable Range  
ND      Not Detected  
PQL     Practical Quantitation Limit  
RPD     Relative Percentage Difference

### Comments:

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E67893; ID:ID00013; IN:C-ID-01; KY:90142; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595  
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1206661

26-Jun-12

**Client:** Western Refining Southwest, Inc.

**Project:** Background Investigation

Sample ID: <b>MB</b>	SampType: <b>MBLK</b>	TestCode: <b>EPA Method 200.7: Dissolved Metals</b>
Client ID: <b>PBW</b>	Batch ID: <b>R3580</b>	RunNo: <b>3580</b>
Prep Date:	Analysis Date: <b>6/21/2012</b>	SeqNo: <b>100997</b> Units: <b>mg/L</b>

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	ND	0.0020								
Beryllium	ND	0.0020								
Cadmium	ND	0.0020								
Calcium	ND	1.0								
Chromium	ND	0.0060								
Magnesium	ND	1.0								
Manganese	ND	0.0020								
Molybdenum	ND	0.0080								
Nickel	ND	0.010								
Potassium	ND	1.0								
Silver	ND	0.0050								
Sodium	ND	1.0								
Vanadium	ND	0.050								
Zinc	ND	0.010								

**Qualifiers:**

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 R RPD outside accepted recovery limits

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 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1206661

26-Jun-12

**Client:** Western Refining Southwest, Inc.

**Project:** Background Investigation

Sample ID: <b>MB-2437</b>	SampType: <b>MBLK</b>	TestCode: <b>EPA Method 200.7: Total Metals</b>
Client ID: <b>PBW</b>	Batch ID: <b>2437</b>	RunNo: <b>3558</b>
Prep Date: <b>6/18/2012</b>	Analysis Date: <b>6/20/2012</b>	SeqNo: <b>100447</b> Units: <b>mg/L</b>

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020								
Barium	ND	0.0020								
Beryllium	ND	0.0020								
Boron	ND	0.040								
Cadmium	ND	0.0020								
Chromium	ND	0.0060								
Cobalt	ND	0.0060								
Copper	ND	0.0060								
Iron	ND	0.020								
Magnesium	ND	1.0								
Manganese	ND	0.0020								
Silver	ND	0.0050								
Vanadium	ND	0.050								
Zinc	ND	0.010								

**Qualifiers:**

\* / X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1206661

26-Jun-12

**Client:** Western Refining Southwest, Inc.

**Project:** Background Investigation

Sample ID	<b>1206661-001CMS</b>	SampType:	<b>MS</b>	TestCode:	<b>EPA 200.8: Dissolved Metals</b>					
Client ID:	<b>EB-061412</b>	Batch ID:	<b>R3538</b>	RunNo:	<b>3538</b>					
Prep Date:		Analysis Date:	<b>6/19/2012</b>	SeqNo:	<b>99655</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.026	0.0010	0.02500	0	103	70	130			
Arsenic	0.025	0.0010	0.02500	0	99.7	70	130			
Lead	0.025	0.0010	0.02500	0	102	70	130			
Selenium	0.024	0.0010	0.02500	0	97.8	70	130			
Thallium	0.026	0.0010	0.02500	0	102	70	130			
Uranium	0.023	0.0010	0.02500	0	93.3	70	130			

Sample ID	<b>MB</b>	SampType:	<b>MBLK</b>	TestCode:	<b>EPA 200.8: Dissolved Metals</b>					
Client ID:	<b>PBW</b>	Batch ID:	<b>R3538</b>	RunNo:	<b>3538</b>					
Prep Date:		Analysis Date:	<b>6/19/2012</b>	SeqNo:	<b>99660</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	ND	0.0010								
Arsenic	ND	0.0010								
Lead	ND	0.0010								
Selenium	ND	0.0010								
Thallium	ND	0.0010								
Uranium	ND	0.0010								

Sample ID	<b>MB</b>	SampType:	<b>MBLK</b>	TestCode:	<b>EPA 200.8: Dissolved Metals</b>					
Client ID:	<b>PBW</b>	Batch ID:	<b>R3579</b>	RunNo:	<b>3579</b>					
Prep Date:		Analysis Date:	<b>6/20/2012</b>	SeqNo:	<b>100985</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	ND	0.0010								
Lead	ND	0.0010								
Thallium	ND	0.0010								

Sample ID	<b>MB</b>	SampType:	<b>MBLK</b>	TestCode:	<b>EPA 200.8: Dissolved Metals</b>					
Client ID:	<b>PBW</b>	Batch ID:	<b>R3592</b>	RunNo:	<b>3592</b>					
Prep Date:		Analysis Date:	<b>6/21/2012</b>	SeqNo:	<b>101453</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Uranium	ND	0.0010								

**Qualifiers:**

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 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1206661

26-Jun-12

**Client:** Western Refining Southwest, Inc.

**Project:** Background Investigation

Sample ID	<b>MB-2437</b>	SampType:	<b>MBLK</b>	TestCode:	<b>200.8 ICPMS Metals:Total</b>					
Client ID:	<b>PBW</b>	Batch ID:	<b>2437</b>	RunNo:	<b>3586</b>					
Prep Date:	<b>6/18/2012</b>	Analysis Date:	<b>6/20/2012</b>	SeqNo:	<b>101232</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	ND	0.0025								
Arsenic	ND	0.0025								
Lead	ND	0.0025								
Selenium	ND	0.0025								
Thallium	ND	0.0025								
Uranium	ND	0.0025								

**Qualifiers:**

\*X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1206661

26-Jun-12

**Client:** Western Refining Southwest, Inc.

**Project:** Background Investigation

Sample ID	<b>MB-2463</b>	SampType:	<b>MBLK</b>	TestCode:	<b>EPA Method 245.1: Mercury</b>					
Client ID:	<b>PBW</b>	Batch ID:	<b>2463</b>	RunNo:	<b>3543</b>					
Prep Date:	<b>6/19/2012</b>	Analysis Date:	<b>6/19/2012</b>	SeqNo:	<b>99864</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.00020								

Sample ID	<b>1206661-001BMS</b>	SampType:	<b>MS</b>	TestCode:	<b>EPA Method 245.1: Mercury</b>					
Client ID:	<b>EB-061412</b>	Batch ID:	<b>2463</b>	RunNo:	<b>3543</b>					
Prep Date:	<b>6/19/2012</b>	Analysis Date:	<b>6/19/2012</b>	SeqNo:	<b>99867</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0058	0.00020	0.005000	0	116	75	125			

Sample ID	<b>1206661-001BMSD</b>	SampType:	<b>MSD</b>	TestCode:	<b>EPA Method 245.1: Mercury</b>					
Client ID:	<b>EB-061412</b>	Batch ID:	<b>2463</b>	RunNo:	<b>3543</b>					
Prep Date:	<b>6/19/2012</b>	Analysis Date:	<b>6/19/2012</b>	SeqNo:	<b>99868</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0055	0.00020	0.005000	0	109	75	125	5.73	20	

**Qualifiers:**

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- E Value above quantitation range
- J Analyte detected below quantitation limits
- R RPD outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1206661

26-Jun-12

**Client:** Western Refining Southwest, Inc.

**Project:** Background Investigation

Sample ID <b>MB</b>	SampType: <b>MBLK</b>		TestCode: <b>EPA Method 300.0: Anions</b>							
Client ID: <b>PBW</b>	Batch ID: <b>R3480</b>		RunNo: <b>3480</b>							
Prep Date:	Analysis Date: <b>6/15/2012</b>		SeqNo: <b>97695</b>		Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.10								
Chloride	ND	0.50								
Sulfate	ND	0.50								

Sample ID <b>MB</b>	SampType: <b>MBLK</b>		TestCode: <b>EPA Method 300.0: Anions</b>							
Client ID: <b>PBW</b>	Batch ID: <b>R3489</b>		RunNo: <b>3489</b>							
Prep Date:	Analysis Date: <b>6/15/2012</b>		SeqNo: <b>98017</b>		Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.10								
Chloride	ND	0.50								
Nitrogen, Nitrite (As N)	ND	0.10								
Nitrogen, Nitrate (As N)	ND	0.10								
Sulfate	ND	0.50								

Sample ID <b>1206661-005AMS</b>	SampType: <b>MS</b>		TestCode: <b>EPA Method 300.0: Anions</b>							
Client ID: <b>EB-061412-Filtered</b>	Batch ID: <b>R3489</b>		RunNo: <b>3489</b>							
Prep Date:	Analysis Date: <b>6/15/2012</b>		SeqNo: <b>98022</b>		Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.62	0.10	0.5000	0	125	76.6	110			S
Chloride	6.0	0.50	5.000	0.1042	118	87.8	111			S
Nitrogen, Nitrite (As N)	1.2	0.10	1.000	0	118	72.5	111			S
Nitrogen, Nitrate (As N)	3.1	0.10	2.500	0	124	90.4	113			S
Sulfate	12	0.50	10.00	0.1853	119	84.6	122			

Sample ID <b>1206661-005AMSD</b>	SampType: <b>MSD</b>		TestCode: <b>EPA Method 300.0: Anions</b>							
Client ID: <b>EB-061412-Filtered</b>	Batch ID: <b>R3489</b>		RunNo: <b>3489</b>							
Prep Date:	Analysis Date: <b>6/15/2012</b>		SeqNo: <b>98023</b>		Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.54	0.10	0.5000	0	107	76.6	110	15.1	20	
Chloride	5.0	0.50	5.000	0.1042	97.2	87.8	111	18.7	20	
Nitrogen, Nitrite (As N)	1.0	0.10	1.000	0	99.6	72.5	111	17.0	20	
Nitrogen, Nitrate (As N)	2.6	0.10	2.500	0	103	90.4	113	18.7	20	
Sulfate	10	0.50	10.00	0.1853	99.4	84.6	122	18.0	20	

Sample ID <b>MB</b>	SampType: <b>MBLK</b>		TestCode: <b>EPA Method 300.0: Anions</b>							
Client ID: <b>PBW</b>	Batch ID: <b>R3489</b>		RunNo: <b>3489</b>							
Prep Date:	Analysis Date: <b>6/16/2012</b>		SeqNo: <b>98080</b>		Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

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- R RPD outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1206661

26-Jun-12

**Client:** Western Refining Southwest, Inc.

**Project:** Background Investigation

Sample ID <b>MB</b>	SampType: <b>MBLK</b>	TestCode: <b>EPA Method 300.0: Anions</b>								
Client ID: <b>PBW</b>	Batch ID: <b>R3489</b>	RunNo: <b>3489</b>								
Prep Date:	Analysis Date: <b>6/16/2012</b>	SeqNo: <b>98080</b>			Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.10								
Chloride	ND	0.50								
Nitrogen, Nitrite (As N)	ND	0.10								
Nitrogen, Nitrate (As N)	ND	0.10								

Sample ID <b>MB</b>	SampType: <b>MBLK</b>	TestCode: <b>EPA Method 300.0: Anions</b>								
Client ID: <b>PBW</b>	Batch ID: <b>R3540</b>	RunNo: <b>3540</b>								
Prep Date:	Analysis Date: <b>6/19/2012</b>	SeqNo: <b>99670</b>			Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								
Sulfate	ND	0.50								
Nitrate+Nitrite as N	ND	0.20								

Sample ID <b>MB</b>	SampType: <b>MBLK</b>	TestCode: <b>EPA Method 300.0: Anions</b>								
Client ID: <b>PBW</b>	Batch ID: <b>R3540</b>	RunNo: <b>3540</b>								
Prep Date:	Analysis Date: <b>6/20/2012</b>	SeqNo: <b>99759</b>			Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								
Sulfate	ND	0.50								
Nitrate+Nitrite as N	ND	0.20								

Sample ID <b>MB</b>	SampType: <b>MBLK</b>	TestCode: <b>EPA Method 300.0: Anions</b>								
Client ID: <b>PBW</b>	Batch ID: <b>R3610</b>	RunNo: <b>3610</b>								
Prep Date:	Analysis Date: <b>6/21/2012</b>	SeqNo: <b>101849</b>			Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	ND	0.50								

Sample ID <b>MB</b>	SampType: <b>MBLK</b>	TestCode: <b>EPA Method 300.0: Anions</b>								
Client ID: <b>PBW</b>	Batch ID: <b>R3610</b>	RunNo: <b>3610</b>								
Prep Date:	Analysis Date: <b>6/22/2012</b>	SeqNo: <b>101925</b>			Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	ND	0.50								

Sample ID <b>MB</b>	SampType: <b>MBLK</b>	TestCode: <b>EPA Method 300.0: Anions</b>								
Client ID: <b>PBW</b>	Batch ID: <b>R3674</b>	RunNo: <b>3674</b>								
Prep Date:	Analysis Date: <b>6/25/2012</b>	SeqNo: <b>103580</b>			Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

**Qualifiers:**

- |                                                |                                                      |
|------------------------------------------------|------------------------------------------------------|
| * / X Value exceeds Maximum Contaminant Level. | B Analyte detected in the associated Method Blank    |
| E Value above quantitation range               | H Holding times for preparation or analysis exceeded |
| J Analyte detected below quantitation limits   | ND Not Detected at the Reporting Limit               |
| R RPD outside accepted recovery limits         | RL Reporting Detection Limit                         |

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1206661

26-Jun-12

**Client:** Western Refining Southwest, Inc.

**Project:** Background Investigation

Sample ID <b>MB</b>	SampType: <b>MBLK</b>		TestCode: <b>EPA Method 300.0: Anions</b>							
Client ID: <b>PBW</b>	Batch ID: <b>R3674</b>		RunNo: <b>3674</b>							
Prep Date:	Analysis Date: <b>6/25/2012</b>		SeqNo: <b>103580</b>		Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	ND	0.50								

Sample ID <b>MB</b>	SampType: <b>MBLK</b>		TestCode: <b>EPA Method 300.0: Anions</b>							
Client ID: <b>PBW</b>	Batch ID: <b>R3687</b>		RunNo: <b>3687</b>							
Prep Date:	Analysis Date: <b>6/26/2012</b>		SeqNo: <b>104078</b>		Units: <b>mg/L</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	ND	0.50								

**Qualifiers:**

\*X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1206661

26-Jun-12

**Client:** Western Refining Southwest, Inc.

**Project:** Background Investigation

Sample ID <b>mb-1</b>	SampType: <b>MBLK</b>		TestCode: <b>SM2320B: Alkalinity</b>							
Client ID: <b>PBW</b>	Batch ID: <b>R3500</b>		RunNo: <b>3500</b>							
Prep Date:	Analysis Date: <b>6/18/2012</b>		SeqNo: <b>98353</b>		Units: <b>mg/L CaCO3</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	ND	20								

Sample ID <b>1206661-004A ms</b>	SampType: <b>MS</b>		TestCode: <b>SM2320B: Alkalinity</b>							
Client ID: <b>MW-BCK1</b>	Batch ID: <b>R3500</b>		RunNo: <b>3500</b>							
Prep Date:	Analysis Date: <b>6/18/2012</b>		SeqNo: <b>98363</b>		Units: <b>mg/L CaCO3</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	210	20	80.00	149.8	79.7	62.6	110			

Sample ID <b>1206661-004A msd</b>	SampType: <b>MSD</b>		TestCode: <b>SM2320B: Alkalinity</b>							
Client ID: <b>MW-BCK1</b>	Batch ID: <b>R3500</b>		RunNo: <b>3500</b>							
Prep Date:	Analysis Date: <b>6/18/2012</b>		SeqNo: <b>98364</b>		Units: <b>mg/L CaCO3</b>					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	210	20	80.00	149.8	70.2	59.9	111	3.64	10	

**Qualifiers:**

\* / X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

# QC SUMMARY REPORT

## Hall Environmental Analysis Laboratory, Inc.

WO#: 1206661

26-Jun-12

**Client:** Western Refining Southwest, Inc.

**Project:** Background Investigation

Sample ID	<b>MB-2466</b>	SampType:	<b>MBLK</b>	TestCode:	<b>SM2540C MOD: Total Dissolved Solids</b>					
Client ID:	<b>PBW</b>	Batch ID:	<b>2466</b>	RunNo:	<b>3568</b>					
Prep Date:	<b>6/19/2012</b>	Analysis Date:	<b>6/20/2012</b>	SeqNo:	<b>100603</b>	Units:	<b>mg/L</b>			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	ND	20.0								

**Qualifiers:**

\*X Value exceeds Maximum Contaminant Level.  
 E Value above quantitation range  
 J Analyte detected below quantitation limits  
 R RPD outside accepted recovery limits

B Analyte detected in the associated Method Blank  
 H Holding times for preparation or analysis exceeded  
 ND Not Detected at the Reporting Limit  
 RL Reporting Detection Limit

**Sample Log-In Check List**

Client Name: Western Refining Southwest, Inc Bloomfield Work Order Number: 1206661  
 Received by/date: LM 06/15/12  
 Logged By: Michelle Garcia 6/15/2012 9:50:00 AM *Michelle Garcia*  
 Completed By: Michelle Garcia 6/15/2012 10:17:28 AM *Michelle Garcia*  
 Reviewed By: *[Signature]* 06/15/12

**Chain of Custody**

- 1. Were seals intact? Yes  No  Not Present
- 2. Is Chain of Custody complete? Yes  No  Not Present
- 3. How was the sample delivered? FedEx

**Log In**

- 4. Coolers are present? (see 19. for cooler specific information) Yes  No  NA
- 5. Was an attempt made to cool the samples? Yes  No  NA
- 6. Were all samples received at a temperature of >0° C to 6.0°C Yes  No  NA
- 7. Sample(s) in proper container(s)? Yes  No
- 8. Sufficient sample volume for indicated test(s)? Yes  No
- 9. Are samples (except VOA and ONG) properly preserved? Yes  No
- 10. Was preservative added to bottles? Yes  No  NA
- 11. VOA vials have zero headspace? Yes  No  No VOA Vials
- 12. Were any sample containers received broken? Yes  No
- 13. Does paperwork match bottle labels? (Note discrepancies on chain of custody) Yes  No
- 14. Are matrices correctly identified on Chain of Custody? Yes  No
- 15. Is it clear what analyses were requested? Yes  No
- 16. Were all holding times able to be met? (If no, notify customer for authorization.) Yes  No

# of preserved bottles checked for pH: \_\_\_\_\_  
 (<2 or >12 unless noted)  
 Adjusted? \_\_\_\_\_  
 Checked by: \_\_\_\_\_

**Special Handling (if applicable)**

- 17. Was client notified of all discrepancies with this order? Yes  No  NA

Person Notified: \_\_\_\_\_ Date: \_\_\_\_\_  
 By Whom: \_\_\_\_\_ Via:  eMail  Phone  Fax  In Person  
 Regarding: \_\_\_\_\_  
 Client Instructions: \_\_\_\_\_

18. Additional remarks:

**19. Cooler Information**

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	4.9	Good	Yes			



202

**Chain-of-Custody Record**

Client: Western Refining  
Bloomfield Refinery  
 Mailing Address: 50 Road 4990  
Bloomfield, NM 87413  
 Phone #: 505-801-5616  
 email or Fax#: Kelly.Robinson@wrr.com  
 QA/QC Package:  
 Standard  Level 4 (Full Validation)  
 Accreditation  
 NELAP  Other

Turn-Around Time:  
 Standard  Rush  
 Project Name:  
Background Investigation  
 Project #:  
 Project Manager:  
Kelly Robinson  
 Sampler: Kelly Robinson  
 On Ice:  Yes  No  
 Sample Temperature: 4.9

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No
6/14/12	1200	GW	MW-13CK2 (DUP)	2 Poly	None	-003
				1 poly	HNO <sub>3</sub>	
				1 poly	NaOH	
				1 poly filtered HNO <sub>3</sub>		
				1 poly	H <sub>2</sub> SO <sub>4</sub>	
				1 poly filtered None		-007
				2 Poly	None	-004
				1 poly	HNO <sub>3</sub>	
				1 poly	NaOH	
				1 poly filtered HNO <sub>3</sub>		
				1 poly	H <sub>2</sub> SO <sub>4</sub>	
				1 poly filtered None		-008

Date: 6/14/12 Time: 1300  
 Relinquished by: Kelly Robinson  
 Date: 6/14/12 Time: 1300  
 Relinquished by: Kelly Robinson

Received by: [Signature] Date: 6/14/12 Time: 1300  
 Received by: [Signature] Date: 6/14/12 Time: 1300



**HALL ENVIRONMENTAL ANALYSIS LABORATORY**  
 www.hallenvironmental.com  
 4901 Hawkins NE - Albuquerque, NM 87109  
 Tel. 505-345-3975 Fax 505-345-4107

**Analysis Request**

BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH Method 8015B (Gas/Diesel)	TPH (Method 418.1)	EDB (Method 504.1)	8310 (PNA or PAH)	RCRA 8 Metals	Anions (F, Cl, NO <sub>3</sub> , NO <sub>2</sub> , PO <sub>4</sub> , SO <sub>4</sub> )	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)	Total Metals *	Dissolved Metals *	General Chemistry *	Air Bubbles (Y or N)
											X	X	X	
											X	X		
											X	X		
											X	X		
											X	X		
											X	X		
											X	X		
											X	X		
											X	X		

Remarks:  
 \* See attachment for full analyte list.

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

#### 4.7 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.

#### 4.8 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 also be analyzed for the following metals using the indicated analytical methods. The ground water analyses will be reported for dissolved and total metals.

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

*dissolved  
+  
total*

Analyte	Analytical Method
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
Thallium	SW846 method 6010/6020
Vanadium	SW-846 method 6010/6020
Zinc	SW-846 method 6010/6020

*Soil & GW  
~~SW-846~~  
 dissolved  
 +  
 totals*

Ground water samples will also be analyzed for the following additional general chemistry parameters.

Analyte	Analytical Method
Total Dissolved Solids	SM-2540C
Bicarbonate	SM-2320B (dissolved)
Chloride	EPA method 300.0 (dissolved & total)
Sulfate	EPA method 300.0 (dissolved & total)
Calcium	EPA method 6010/6020 (dissolved)
Magnesium	EPA method 6010/6020 (dissolved & total)
Sodium	EPA method 6010/6020 (dissolved)
Potassium	EPA method 6010/6020 (dissolved)
Manganese	SW-846 method 6010/6020 (dissolved & total)
Nitrate/nitrite	EPA method 300.0 (dissolved)
Iron	SW-846 method 6010/6020 (dissolved & total)

*gw  
 only*

Soil samples and ground water samples will be analyzed for the following constituents in addition to those listed above to support possible development of background for SWMU No. 16 (Active Landfill). The ground water analyses will be reported as both total and dissolved phase.

Analyte	Analytical Method
Aluminum	SW-846 method 6010/6020
Boron	SW-846 method 6010/6020
Copper	SW-846 method 6010/6020
Molybdenum	SW-846 method 6010/6020
Uranium	SW-846 method 6020
Fluoride	SW-846 method 300

*Soil & gw*

# **Appendix F**

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## **Quality Assurance/Quality Control Review**

## **1.0 DATA VALIDATION INTRODUCTION**

---

This summary presents data verification results for soil and groundwater samples collected from soil borings and monitoring wells installed at the Bloomfield Refinery in accordance with the approved Background Investigation Work Plan. The data review was performed in accordance with the procedures specified in the Order issued by NMED (NMED, 2007), USEPA Functional Guidelines for Organic and Inorganic Data Review, and quality assurance and control parameters set by the project laboratory Hall Environmental Analysis Laboratory, Inc.

A total of 21 soil samples and 2 groundwater samples were collected between January 2012 and June 2012 in accordance with the Background Investigation Work Plan. Soil and groundwater samples were submitted to Hall Environmental Analysis Laboratory for the following parameters in accordance with the approved Work Plan:

- Gasoline, diesel, and motor oil range organics by SW-846 Method 8015B (selected samples);
- Total recoverable metals (aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, molybdenum, nickel, selenium, silver, thallium, uranium, vanadium, and zinc) by SW846 Method 6010B;
- Cyanide by EPA Method 335.4;
- Mercury by EPA Method 7471; and
- Anions (chloride, fluoride, and sulfate) by USEPA Method 300.0

In addition as stated in the approved Work Plan, ground water samples submitted to Hall Environmental Analysis Laboratory were analyzed for the following additional analytes:

- Anions (nitrate and nitrite) by USEPA Method 300.0;
- Alkalinity (total alkalinity, carbonate, and bicarbonate) by SM-2320B;
- Total metals (calcium, magnesium) by USEPA Method 6010B;
- Dissolved metals (aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium, cobalt, copper, iron, lead, manganese, magnesium, molybdenum, nickel, potassium, selenium, silver, sodium, thallium, uranium, vanadium, and zinc) by USEPA Method 200.7B; and
- Total dissolved solids by SM-2540C.

Additionally, 6 quality assurance samples consisting of trip blanks, equipment rinsate blanks, and field duplicates were collected and analyzed as part of the investigation activities. Table A-1 presents a summary of the sample identifications, laboratory sample identifications, and requested analytical parameters.

## **2.0 QUALITY CONTROL PARAMETERS REVIEWED**

---

Sample results were subject to a Level II data review that includes an evaluation of the following quality control (QC) parameters:

- Chain-of-Custody;
- Sample Preservation and Temperature Upon Laboratory Receipt
- Holding Times;
- Blank Contamination (method blanks, trip blanks, field blanks, and equipment rinsate blanks);
- Surrogate Recovery (for organic parameters);
- Laboratory Control Sample (LCS) Recovery and Relative Percent Difference (RPD);
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recovery and RPD;
- Duplicates (field duplicate, laboratory duplicate); and
- Other Applicable QC Parameters.

The data qualifiers used to qualify the analytical results associated with QC parameters outside of the established data quality objectives are defined below:

- J+ The analyte was positively identified; however, the result should be considered an estimated value with a potential high bias.
- J- The analyte was positively identified; however, the result should be considered an estimated value with a potential low bias.
- UJ The reporting limit is considered an estimated value.
- R Quality control indicates that the data is not usable.

Results qualified as “J+”, “J-“, or “UJ” are of acceptable data quality and may be used quantitatively to fulfill the objectives of the analytical program, per EPA guidelines. In order to perform a statistical evaluation of the data collected as part of the background investigation activities, analytical results for analytes that were detected at concentrations above the respective laboratory detection limit but below the practical quantitation limit were qualified with a “J,” as shown on Table 3 of this Investigation Report.

In addition, field sample BK-3 (1.5-2.0’) analytical result for sulfate was qualified “J” since the reported concentration was above the analytical quantitation range.

Results for the performance monitoring events that required qualification based on the data verification are summarized in Table A-2.

## **2.1 CHAIN-OF-CUSTODY**

The chain-of-custody documentation associated with project samples was found to be complete. Chain-of-custodies included sample identifications, date and time of collection, requested parameters, and relinquished/received signatures.

## **2.2 SAMPLE PRESERVATION AND TEMPERATURE UPON LABORATORY RECEIPT**

Samples collected were received preserved and intact by Hall Environmental Laboratories, Inc. Samples were received by the laboratory at a temperature of 6.0 degrees Celsius or lower. Data qualification on lower temperature samples was not required.

## **2.3 HOLDING TIMES**

All samples were extracted and analyzed within method-specified holding time limits.

## **2.4 BLANK CONTAMINATION**

### **2.4.1 Method Blank**

Method blanks were analyzed at the appropriate frequency. Target compounds were not detected above the practical quantitation limit in the method blanks, with the exception of the following:

- Sulfate was detected in the method blank for analytical batch 502. Associated field sample results did not include sulfate as a reported analyte, therefore data qualification was not needed.
- Aluminum, copper, nickel, and selenium were detected in the method blank for analytical batch 514 and 529. Associated field samples have detected concentrations greater than 10 times the respective concentrations detected in the method blank; therefore data qualification was not needed.
- Dissolved iron was detected in the method blank for analytical batch R921. Associated field sample results were non-detect; therefore data qualification was not needed.
- Beryllium, cobalt, iron, molybdenum, vanadium, and zinc were detected in method blank for analytical batch 551. Associated field sample detected

concentrations were greater than 100 times the respective concentrations detected in the method blank; therefore data qualification was not needed.

- Mercury was detected in the method blank for analytical batch 602. Associated field sample results were non-detect; therefore data qualification was not needed.
- Boron was detected in the method blank for analytical batch 529. Associated field samples have detected concentrations greater than 10 times the respective concentration detected in the method blank; therefore data qualification was not needed.
- Aluminum, boron, cadmium, molybdenum, nickel, selenium, silver, and vanadium were detected in the method blank for analytical batch 749. Associated detected field sample results have concentrations greater than 10 times the respective concentration detected in the method blank; therefore data qualification was not needed.
- Cadmium, chromium, copper, magnesium, molybdenum, uranium, and zinc were detected in the method blank for analytical batch 685. Associated field sample results have detected concentrations greater than 10 times the respective concentration detected in the method blank; therefore data qualification was not needed.
- Aluminum, antimony, boron, cadmium, chromium, copper, nickel, selenium, uranium, and zinc were detected in the method blank for analytical batch 677. Associated field sample results have detected concentrations greater than 10 times the respective concentration detected in the method blank; therefore data qualification was not needed.

#### **2.4.2 Trip Blank**

Trip blanks were analyzed at the appropriate frequency as specified in the Order. Target compounds were not detected in the trip blanks.

#### **2.4.3 Field Blanks/Equipment Rinsate Blank**

Field and equipment rinsate blanks were collected at the appropriate frequency as specified in the Background Investigation Work Plan. Target compounds were not detected in the field blanks and equipment rinsate blank, with the exception of the following:

- Zinc was detected in equipment blank EB-061412 at 0.025 mg/L and 0.010 mg/L. Associated field samples were qualified “J+” due to a potential high bias.

#### **2.4.4 Common Laboratory Contaminants**

Per USEPA guidelines, common laboratory contaminants for VOC analysis are acetone,

2-butanone (MEK), cyclohexane, chloromethane, and methylene chloride. Common laboratory contaminants for SVOC analysis include phthalates. Concentrations were not detected in method blanks, and therefore no field data was qualified due to common laboratory impacts.

## **2.5 SURROGATE RECOVERY**

Surrogate recoveries for the organic and inorganic analyses were performed at the required frequency and were within laboratory acceptance limits.

## **2.6 LCS RECOVERY AND RELATIVE PERCENT DIFFERENCE**

LCS/LCS duplicates were performed at the required frequency and were evaluated based on the following criteria:

- If the analyte recovery was above acceptance limits for the LCS or LCS duplicate, but the analyte was not detected in the associated batch, then data qualification was not required.
- If the analyte recovery was above acceptance limits for the LCS or LCS duplicate and the analyte was detected in the associated batch, then the analyte results were qualified “J+” to account for a potential high bias.
- If the analyte recovery was below acceptance limits for LCS or LCS duplicate then the analyte results in the associated analytical batch were qualified (“UJ” for non-detects and “J-” for detected results) to account for a potential low bias.

LCS/LCSD percent recoveries and relative percent differences (RPDs) were within acceptance limits; therefore no data qualification due to LCS/LCSD was required.

## **2.7 MS/MSD RECOVERY AND RELATIVE PERCENT DIFFERENCE**

MS/MSD samples were performed at the required frequency and were evaluated by the following criteria:

- If the MS or MSD recovery for an analyte was above acceptance limits but the analyte was not detected in the associated analytical batch, then data qualification was not required.
- If the MS or MSD recovery for an analyte was above acceptance limits and the analyte was detected in the associated analytical batch, then analyte results were qualified “J+” to account for a potential high bias.

- Low MS/MSD recoveries for inorganic parameters result in sample qualification of the associated analytical batch.
- Results were not qualified based on non-project specific MS/MSD (i.e., batch QC) recoveries.

MS/MSD percent recoveries and RPDs were within acceptance limits except for the following:

- The MS/MSD percent recoveries for Antimony (43.8% / 41.0%) were below the lower acceptance limit of 75% for analytical batch 514. Associated field sample results for Antimony were non-detect. Data qualification “UJ” was required to indicate a potential bias for the associated samples.
- The MS/MSD percent recoveries for Thallium (40.7% / 42.5%) were below the lower acceptance limit of 75% for analytical batch 514. Associated field sample results for Thallium were non-detect. Data qualification “UJ” was required to indicate a potential bias for the associated samples.
- The MS duplicate percent recoveries for Lead (73.8%), Nickel (74.3%), Selenium (74.1%), and Zinc (73.7%) were below the lower acceptance limit of 75% for analytical batch 514. The MS recoveries for these analytes were within acceptance limits, therefore data qualification was not necessary.
- The MS/MSD percent recoveries for Antimony (32.1% / 29.6%) were below the lower acceptance limit of 75% for analytical batch 529. Associated field sample results for Antimony were non-detect. Data qualification “UJ” was required to indicate a potential bias for the associated samples.
- The MS/MSD percent recoveries for Selenium (67.7% / 67.3%) were below the lower acceptance limit of 75% for analytical batch 514. Associated field sample results for Selenium were non-detect. Data qualification “UJ” was required to indicate a potential bias for the associated samples.
- The MS/MSD percent recoveries for Thallium (0% / 0%) were below the lower acceptance limit of 75% for analytical batch 514. Associated field sample results for Thallium were non-detect. Data qualification “UJ” was required to indicate a potential bias for the associated samples.
- The MS duplicate percent recoveries for Lead (74.6%), Molybdenum (72.4%), and Nickel (71.7%) were below the lower acceptance limit of 75% for analytical batch 529. The MS recoveries for these analytes were within acceptance limits, therefore data qualification was not required.
- The MS/MSD percent recoveries for Antimony (41.4% / 33.9%) were below the lower acceptance limit of 75% for analytical batch 749. Associated field sample results for Antimony were non-detect. Data qualification “J-” was required to indicate a potential bias for the associated samples.
- The MS/MSD percent recoveries for Copper (71.0% / 60.8%) were below the lower acceptance limit of 75% for analytical batch 749. Associated field sample

results for Selenium were non-detect. Data qualification “J-” was required to indicate a potential bias for the associated samples.

- The MS/MSD percent recoveries for Selenium (72.1% / 73.6%) were below the lower acceptance limit of 75% for analytical batch 749. Associated field sample results for Selenium were non-detect. Data qualification “UJ” was required to indicate a potential bias for the associated samples.
- The MS/MSD percent recoveries for Thallium (0% / 0%) were below the lower acceptance limit of 75% for analytical batch 749. Associated field sample results for Thallium were non-detect. Data qualification “UJ” was required to indicate a potential bias for the associated samples.
- The MS duplicate percent recovery for Zinc (72.9%) was below the lower acceptance limit of 75% for analytical batch 749. The MS recovery for this analyte was within acceptance limit, therefore data qualification was not required.
- The MS percent recoveries for Fluoride (125%), Chloride (118%), Nitrite (118%) and Nitrate (124%) were above the upper acceptance limit of 110%, 111%, 111%, and 113%, respectively, for analytical batch R3489. The MS duplicate recoveries for these analytes were within acceptance limits; therefore data qualification was not required.

## **2.8 DUPLICATES**

### **2.8.1 Field Duplicates**

Field duplicates were collected at a rate required per the approved Background Investigation Work Plan. The RPDs between the field duplicate and its associated sample were calculated and are presented in Table A-3. The field duplicates were evaluated by the following criteria:

- If an analyte was detected at a concentration greater than five times the method reporting limit, the RPD should be less than 35 percent for soil and 25 percent for ground water samples.
- If an analyte was detected at a concentration that is less than five times the method reporting limit, then the difference between the sample and the field duplicate should not exceed the method reporting limit.
- Duplicate RPDs are calculated by dividing the difference of the concentrations by the average of the concentrations.

Field duplicate RPDs were within acceptance limits except for the following:

- Lead for field sample BK-10 (5-6')
- Aluminum, chromium, iron, lead, zinc, barium, iron, molybdenum, selenium, and zinc for MW-BCK2

### 3.0 COMPLETENESS SUMMARY

---

Two types of completeness were calculated for this project: contract and technical. The following equations were used to calculate the two types of completeness:

$$\% \text{ Contract Completeness} = \left( \frac{\text{Number of contract compliant results}}{\text{Number of reported results}} \right) \times 100$$

$$\% \text{ Technical Completeness} = \left( \frac{\text{Number of usable results}}{\text{Number of reported results}} \right) \times 100$$

The overall contract completeness, which includes the evaluation of protocol and contract deviations, which includes the evaluation of the QC parameters listed in Section 2.0, was approximately 97.5 percent for soil analysis and 97 percent for groundwater analysis. The technical completeness attained for Background Investigation activities was 100 percent. The completeness results are provided in Table A-4. The analytical results for the required analytes per the approved Background Investigation Work Plan were considered usable for the intended purposes and the project DQOs have been met.

**TABLE A-1**  
**Sampling and Analysis Schedule**

**Table A-1**  
**Sampling and Analysis Schedule**  
**Background Investigation Report**  
**Western Refining Southwest, Inc. - Bloomfield Refinery**

Sample ID	Lab ID	Date Collected	Sample Type
BK-9 (5-5.5')	1201809-001	1/24/2012	N
BK-9 (54-56')	1201809-002	1/24/2012	N
MeOH Blank	1201809-003		TB
BK-1 (0-0.5')	1201885-001	1/27/2012	N
BK-1 (1.5-2.0')	1201885-002	1/27/2012	N
BK-2 (0-0.5')	1201885-003	1/27/2012	N
BK-2 (1.5-2.0')	1201885-004	1/27/2012	N
BK-3 (0-0.5')	1201885-005	1/27/2012	N
BK-3 (1.5-2.0')	1201885-006	1/27/2012	N
BK-4 (0-0.5')	1201885-007	1/27/2012	N
BK-4 (1.5-2.0')	1201885-008	1/27/2012	N
BK-5 (0-0.5')	1201885-009	1/27/2012	N
BK-5 (1.5-2.0')	1201885-010	1/27/2012	N
BK-6 (0-0.5')	1201885-011	1/27/2012	N
BK-6 (1.5-2.0')	1201885-012	1/27/2012	N
BK-7 (0-0.5')	1201885-013	1/27/2012	N
BK-7 (1.5-2.0')	1201885-014	1/27/2012	N
BK-8 (0-0.5')	1201885-015	1/27/2012	N
BK-8 (1.5-2.0')	1201885-016	1/27/2012	N
BK-7 (0-0.5') DUP	1201885-017	1/27/2012	FD
BK-EB-012712	1201885-018	1/27/2012	N
BK-9 (73-73.5)	1202153-001	2/1/2012	N
BK-10 (5-6')	1202350-001	2/7/2012	N
BK-10 (5-6') DUP	1202350-002	2/7/2012	FD
BK-10 (40-42')	1202350-003	2/7/2012	N
BK-EB-020812	1202350-004	2/8/2012	N
EB-061412	1206661-001	6/14/2012	N
MW-BCK2	1206661-002	6/14/2012	N
MW-BCK2 (DUP)	1206661-003	6/14/2012	FD
MW-BCK1	1206661-004	6/14/2012	N

**Notes:**

VOCs = Volatile Organic Compounds  
N = Normal field sample  
FD = Field duplicate

TB = Trip Blank  
EB = Equipment Blank  
MB = Methanol Blank

**TABLE A-2**  
**Qualified Data**

**Table A-2**  
**Qualified Data**  
**Background Investigation Report**  
**Western Refining Southwest, Inc. - Bloomfield Refinery**

Sample ID	Date Collected	Analyte	Result	Units	Matrix	Qualifier	Comments
BK-9 (5-5.5')	1/24/2012	Antimony	< 2.5	mg/Kg	Soil	UJ	Qualified due to low MS/ MSD recovery.
BK-1 (1.5-2.0')	1/27/2012	Antimony	< 5.0	mg/Kg	Soil	UJ	Qualified due to low MS/ MSD recovery.
BK-9 (73-73.5)	2/1/2012	Antimony	2.1	mg/Kg	Soil	J-	Qualified due to low MS/ MSD recovery.
BK-9 (73-73.5)	2/1/2012	Copper	19	mg/Kg	Soil	J-	Qualified due to low MS/ MSD recovery.
BK-1 (1.5-2.0')	1/27/2012	Selenium	< 5.0	mg/Kg	Soil	UJ	Qualified due to low MS/ MSD recovery.
BK-9 (73-73.5)	2/1/2012	Selenium	< 2.5	mg/Kg	Soil	UJ	Qualified due to low MS/ MSD recovery.
BK-3 (1.5-2.0')	1/27/2012	Sulfate	7,600	mg/kg	Soil	J	Qualified due to concentration above the quantitation limit.
BK-8 (1.5-2.0')	1/27/2012	Sulfate	10,000	mg/kg	Soil	J	Qualified due to concentration above the quantitation limit.
BK-9 (5-5.5')	1/24/2012	Thallium	< 2.5	mg/Kg	Soil	UJ	Qualified due to low MS/ MSD recovery.
BK-1 (1.5-2.0')	1/27/2012	Thallium	< 5.0	mg/Kg	Soil	UJ	Qualified due to low MS/ MSD recovery.
BK-9 (73-73.5)	2/1/2012	Thallium	< 2.5	mg/Kg	Soil	UJ	Qualified due to low MS/ MSD recovery.
MW-BCK2	6/14/2012	Zinc	0.089	mg/L	Water	J+	Qualified due to associated equipment blank detections.
MW-BCK2	6/14/2012	Zinc	0.030	mg/L	Water	J+	Qualified due to associated equipment blank detections.
MW-BCK1	6/14/2012	Zinc	0.12	mg/L	Water	J+	Qualified due to associated equipment blank detections.
MW-BCK1	6/14/2012	Zinc	0.012	mg/L	Water	J+	Qualified due to associated equipment blank detections.

ug/kg - microgram per kilogram  
mg/kg - milligrams per kilogram  
UJ - Estimated reporting limit  
J+ = high bias

MS/MSD - Matrix spike/matrix spike duplicate

**TABLE A-3**  
**Field Duplicate Summary**

**Table A-3**  
**Field Duplicate Summary**  
**Background Investigation Report**  
**Western Refining Southwest, Inc. - Bloomfield Refinery**

	Parameter	BK-7 (0-0.5')	BK-7 (0-0.5') DUP	RPD (%)
		Sample Result	Field Duplicate	
Inorganics (mg/kg)	Aluminum	12,000	11,000	8.7
	Antimony	< 2.5	< 2.5	NC
	Arsenic	3.2	< 2.5	NC
	Barium	140	160	13.3
	Beryllium	0.40	0.36	10.5
	Boron	4.3	4.0	7.2
	Cadmium	< 0.10	< 0.10	NC
	Chloride	< 7.5	< 7.5	NC
	Chromium	5.8	5.3	9.0
	Cobalt	3.2	3.0	6.5
	Copper	5.5	5.1	7.5
	Cyanide	< 0.50	< 0.50	NC
	Fluoride	< 1.5	< 1.5	NC
	Iron	11,000	12,000	8.7
	Lead	2.4	2.7	11.8
	Manganese	200	200	0.0
	Mercury	< 0.033	< 0.033	NC
	Molybdenum	< 0.40	< 0.40	NC
	Nickel	4.6	4.3	6.7
	Selenium	< 2.5	< 2.5	NC
	Silver	< 0.25	< 0.25	NC
	Sulfate	< 7.5	< 7.5	NC
	Thallium	< 2.5	< 2.5	NC
	Uranium	< 5.0	< 5.0	NC
	Vanadium	19	17	11.1
	Zinc	19	18	5.4

**Notes:**

RPD = Relative percent difference; [(difference)/(average)]\* 100

NC = Not calculated; RPD values were not calculated for non-detects

mg/kg = milligrams per kilogram

\* = Field Duplicate RPD Outlier

**Table A-3**  
**Field Duplicate Summary**  
**Background Investigation Report**  
**Western Refining Southwest, Inc. - Bloomfield Refinery**

	Parameter	BK-10 (5-6)	BK-10 (5-6) DUP	RPD (%)
		Sample Result	Field Duplicate	
<b>Inorganics (mg/kg)</b>	Aluminum	7,900	8,300	4.9
	Antimony	< 5.0	< 12	NC
	Arsenic	< 5.0	< 12	NC
	Barium	150	110	30.8
	Beryllium	< 0.30	< 0.75	NC
	Boron	< 4.0	< 10	NC
	Cadmium	< 0.20	< 0.50	NC
	Chloride	210	220	4.7
	Chromium	4.6	5.1	10.3
	Cobalt	2.6	3.0	14.3
	Copper	3.5	3.8	8.2
	Cyanide	< 0.30	< 0.30	NC
	Fluoride	3.0	2.9	3.4
	Iron	9,100	9,900	8.4
	Lead	2.6	3.8	<b>37.5*</b>
	Manganese	180	190	5.4
	Mercury	< 0.033	< 0.033	NC
	Molybdenum	< 0.80	< 2.0	NC
	Nickel	3.8	4.3	12.3
	Selenium	< 5.0	< 12	NC
	Silver	< 0.50	< 1.2	NC
	Sulfate	2,300	2,200	4.4
	Thallium	< 5.0	< 12	NC
	Uranium	< 10	< 25	NC
Vanadium	15	17	12.5	
Zinc	16	19	17.1	

**Notes:**

RPD = Relative percent difference; [(difference)/(average)]\* 100

NC = Not calculated; RPD values were not calculated for non-detects

mg/kg = milligrams per kilogram

\* = Field Duplicate RPD Outlier

**Table A-3**  
**Field Duplicate Summary**  
**Background Investigation Report**  
**Western Refining Southwest, Inc. - Bloomfield Refinery**

	Parameter	MW-BCK2 Sample Result	MW-BCK2 (DUP) Field Duplicate	RPD (%)
<b>General Chemistry (mg/l);</b>	Chloride	21	20	4.9
	Fluoride	< 2.0	< 2.0	NC
	Nitrate+Nitrite as N	< 2.0	< 2.0	NC
	Sulfate	7900	7800	1.3
	Total Dissolved Solids	12700	12500	1.6
	Bicarbonate (As CaCO3)	110	100	9.5
	Carbonate (As CaCO3)	< 2.0	< 2.0	NC
	Total Alkalinity (as CaCO3)	110	100	9.5
<b>Total Metals (mg/l):</b>	Aluminum	33	25	<b>27.6 *</b>
	Antimony	< 0.0025	< 0.0025	NC
	Arsenic	0.0047	0.0042	11.2
	Barium	0.12	0.13	8.0
	Beryllium	0.0023	< 0.0020	NC
	Boron	0.60	0.63	4.9
	Cadmium	< 0.0020	< 0.0020	NC
	Chromium	0.025	0.017	<b>38.1 *</b>
	Cobalt	0.019	0.013	37.5
	Copper	0.010	0.011	9.5
	Cyanide	<0.01	<0.01	NC
	Iron	29	21	<b>32 *</b>
	Lead	0.025	0.016	<b>43.9 *</b>
	Magnesium	52	50	3.9
	Manganese	1.9	1.7	11.1
	Mercury	< 0.0010	< 0.0010	NC
	Molybdenum	0.017	0.016	6.1
	Nickel	0.015	< 0.010	NC
	Selenium	0.0041	0.0054	27.4
	Silver	< 0.0050	< 0.0050	NC
	Thallium	< 0.0025	< 0.0025	NC
	Uranium	0.0040	0.0026	42.4
	Vanadium	< 0.050	< 0.050	NC
	Zinc	0.089	0.066	<b>29.7 *</b>
<b>Dissolved Metals (mg/l):</b>	Aluminum	3.8	< 0.020	NC
	Antimony	< 0.0050	< 0.0050	NC
	Arsenic	0.0027	0.0032	16.9
	Barium	0.035	0.020	<b>54.5 *</b>
	Beryllium	< 0.0020	< 0.0020	NC
	Boron	0.67	0.71	5.8
	Cadmium	< 0.0020	< 0.0020	NC
	Calcium	390	380	2.6
	Chromium	< 0.0060	< 0.0060	NC
	Cobalt	0.0068	< 0.0060	NC
	Copper	< 0.0060	< 0.0060	NC
	Iron	0.94	0.099	<b>161.9 *</b>
	Lead	< 0.0050	< 0.0050	NC
	Magnesium	47	46	2.2
	Manganese	1.1	1.1	0.0
	Molybdenum	0.024	0.015	<b>46.2 *</b>
	Nickel	< 0.010	< 0.010	NC
	Potassium	18	16	11.8
	Selenium	0.0079	0.011	<b>32.8 *</b>
	Silver	< 0.0050	< 0.0050	NC
	Sodium	3700	3700	0.0
	Thallium	< 0.0050	< 0.0050	NC
	Uranium	< 0.0050	< 0.0050	NC
	Vanadium	< 0.050	< 0.050	NC
	Zinc	0.089	0.023	<b>117.9 *</b>

**Notes:**

RPD = Relative percent difference; [(difference)/(average)]\* 100

NC = Not calculated; RPD values were not calculated for non-detects

ug/kg-dry = micrograms per kilogram dry

mg/kg-dry = milligrams per kilogram

\* = Field Duplicate RPD Outlier

**TABLE A-4**  
**Completeness Summaries**

**Table A-4**  
**Completeness Summary - Soil**  
**Background Investigation Report**  
**Western Refining Southwest, Inc. - Bloomfield Refinery**

	Parameter	Total Number of Results	Number of Contractual Compliance	Percent Contractual Compliance	Number of Usable Results	Percent Technical Compliance
<b>TPH (mg/kg-dry):</b>	Diesel Range Organics (DRO)	1	1	100.0	1	100
	Motor Oil Range Organics (MRO)	1	1	100.0	1	100
	Gasoline Range Organics (GRO)	1	1	100.0	1	100
<b>Metals (mg/kg-dry):</b>	Antimony	21	18 <sup>c</sup>	85.7	21	100
	Copper	21	20 <sup>c</sup>	95.2	21	100
	Selenium	21	19 <sup>c</sup>	90.5	21	100
	Sulfate	20	18 <sup>b</sup>	90.0	20	100
	Thallium	21	18 <sup>c</sup>	85.7	21	100
	Zinc	21	18 <sup>a</sup>	85.7	21	100
	All remaining metals	21	21	100.0	21	100

**Notes:**

Number of samples used in completeness calculations includes field duplicates but does not include equipment rinsate, field, or trip blanks.

Percent Contractual Compliance = (number of contract compliant results / Number of reported results)\*100

Percent Technical Compliance = (Number of usable results / Number of reported results) \* 100

a = Qualified due to equipment blank detection.

b = Qualified due to detected concentration exceeding the laboratory quantitation limit.

c = Qualified due to low MS/MSD recovery

**Table A-4**  
**Completeness Summary - Groundwater**  
**Background Investigation Report**  
**Western Refining Southwest, Inc. - Bloomfield Refinery**

	Parameter	Total Number of Results	Number of Contractual Compliance	Percent Contractual Compliance	Number of Usable Results	Percent Technical Compliance
<b>Total Metals:</b>	Zinc	2	0 <sup>a</sup>	0.0	2	100
	All remaining metals	2	2	100.0	2	100
<b>Metals (mg/kg-dry):</b>	Zinc	2	0 <sup>a</sup>	0.0	2	100
	All remaining metals	2	2	100.0	2	100
<b>General Chemistry</b>	All analytes	2	2	100.0	2	100

**Notes:**

Number of samples used in completeness calculations includes field duplicates but does not include equipment rinsate, field, or trip blanks.

Percent Contractual Compliance = (number of contract compliant results / Number of reported results)\*100

Percent Technical Compliance = (Number of usable results / Number of reported results) \* 100

a = Qualified due to equipment blank detection.

b = Qualified due to detected concentration exceeding the laboratory quantitation limit.

c = Qualified due to low MS/MSD recovery

# **Appendix G**

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## **Dixon Outliers Test**

## Dixon's Test

Dixon's Extreme Value test (1953) can be used to test for statistical outliers when the sample size is less than or equal to 25<sup>1</sup>. It is noted that Dixon's test considers both extreme values that are much smaller than the rest of the data (Case 1) and extreme values that are much larger than the rest of the data (Case 2). This test assumes that the data without the suspected outlier are normally distributed; therefore, it is necessary to perform a test for normality on the data without the suspected outlier before applying this test. This means that the user has to identify (guess) potential outliers that may be present in the data set. One simple way to identify and look at outliers is the use of graphical displays such as a Q-Q plot and box plot. The Dixon test often suffers from masking effects when more than one outlier may be present in the data set. If more than one outlier is suspected, the Dixon test may lead to masking where two or more outliers close in value "hide" one another. As mentioned before, the use of robust and resistant outlier procedures (Singh and Nocerino, 1995, Rousseeuw and Leroy, 1987, and Scout, 1999) is desirable. However, robust and resistant methods are beyond the scope of ProUCL 4.0. Several robust methods are available in Scout (1999) software package, which is currently under revision and upgrade.

Even though Dixon's test finds outliers in both tails (low and high outliers) of the data distribution, it is the identification of high outlying observations (perhaps representing contamination), which is important in environmental applications. The inclusion of high outliers in a data set results in distorted statistics of interest, including estimates and test statistics. The low identified outliers (if any) may be retained in a data set to compute various statistics of interest.

### Directions for the Dixon's Test

**STEP 1:** Let  $X_{(1)}, X_{(2)}, \dots, X_{(n)}$  represent the data ordered from smallest to largest. Check that the data without the suspect outlier are normally distributed. If normality fails, then apply a different outlier identification method such as a robust outlier identification procedure. *It is suggested to avoid the use of a transformation such as a log-transformation to achieve normality to be able to use the Dixon test.* All cleanup and remediation decisions are made based upon the data set in raw scale. Therefore, outliers perhaps representing isolated contaminated locations should be identified in the original scale. As mentioned before, the use of a log-transformation tends to hide and accommodate outliers (instead of identifying them).

**STEP 2:**  $X_{(1)}$  is a potential outlier (Case 1): Compute the test statistic,  $C$ , where

$$C = \frac{X_{(2)} - X_{(1)}}{X_{(n)} - X_{(1)}} \text{ for } 3 \leq n \leq 7, \quad C = \frac{X_{(3)} - X_{(1)}}{X_{(n-1)} - X_{(1)}} \text{ for } 11 \leq n \leq 13,$$

$$C = \frac{X_{(2)} - X_{(1)}}{X_{(n-1)} - X_{(1)}} \text{ for } 8 \leq n \leq 10, \quad C = \frac{X_{(3)} - X_{(1)}}{X_{(n-2)} - X_{(1)}} \text{ for } 14 \leq n \leq 25,$$

---

<sup>1</sup> Explanation of Dixon's Test is excerpt from ProUCL Version 4.00.05 Technical Guide (EPA/600/R-07/041), pp. 182-183.

**STEP 3:** If  $C$  exceeds the critical value for the specified significance level  $\alpha$ , then  $X_{(1)}$  is an outlier and should be further investigated.

**STEP 4:**  $X_{(n)}$  is a potential outlier (Case 2): Compute the test statistic,  $C$ , where

$$C = \frac{X_{(n)} - X_{(n-1)}}{X_{(n)} - X_{(1)}} \text{ for } 3 \leq n \leq 7, \quad C = \frac{X_{(n)} - X_{(n-2)}}{X_{(n)} - X_{(2)}} \text{ for } 11 \leq n \leq 13,$$

$$C = \frac{X_{(n)} - X_{(n-1)}}{X_{(n)} - X_{(2)}} \text{ for } 8 \leq n \leq 10, \quad C = \frac{X_{(n)} - X_{(n-2)}}{X_{(n)} - X_{(3)}} \text{ for } 14 \leq n \leq 25,$$

**STEP 5:** If  $C$  exceeds the critical value for the specified significance level  $\alpha$ , then  $X_{(n)}$  is an outlier and should be further investigated.

# **Appendix H**

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## **Statistical Evaluation**

Normal Background Statistics for Full Data Sets

User Selected Options

From File	I:\Projects\Western Refining Company\GIANT\Bloomfield\NMED July 2007 Order\Site Background\June 2007
Full Precision	OFF
Confidence Coefficient	95%
Coverage	95%
Different or Future K Values	1

Aluminum

Raw Statistics

Number of Valid Observations	18
Number of Missing Values	1
Number of Distinct Observations	12
Minimum	6600
Maximum	26000
Second Largest	23000
Mean	15456
Geometric Mean	14599
First Quartile	12000
Median	16000
Third Quartile	17750
SD	5089
Coefficient of Variation	0.329
Skewness	0.166

Normal Distribution Test

Shapiro Wilk Test Statistic	0.981
5% Shapiro Wilk Critical Value	0.897

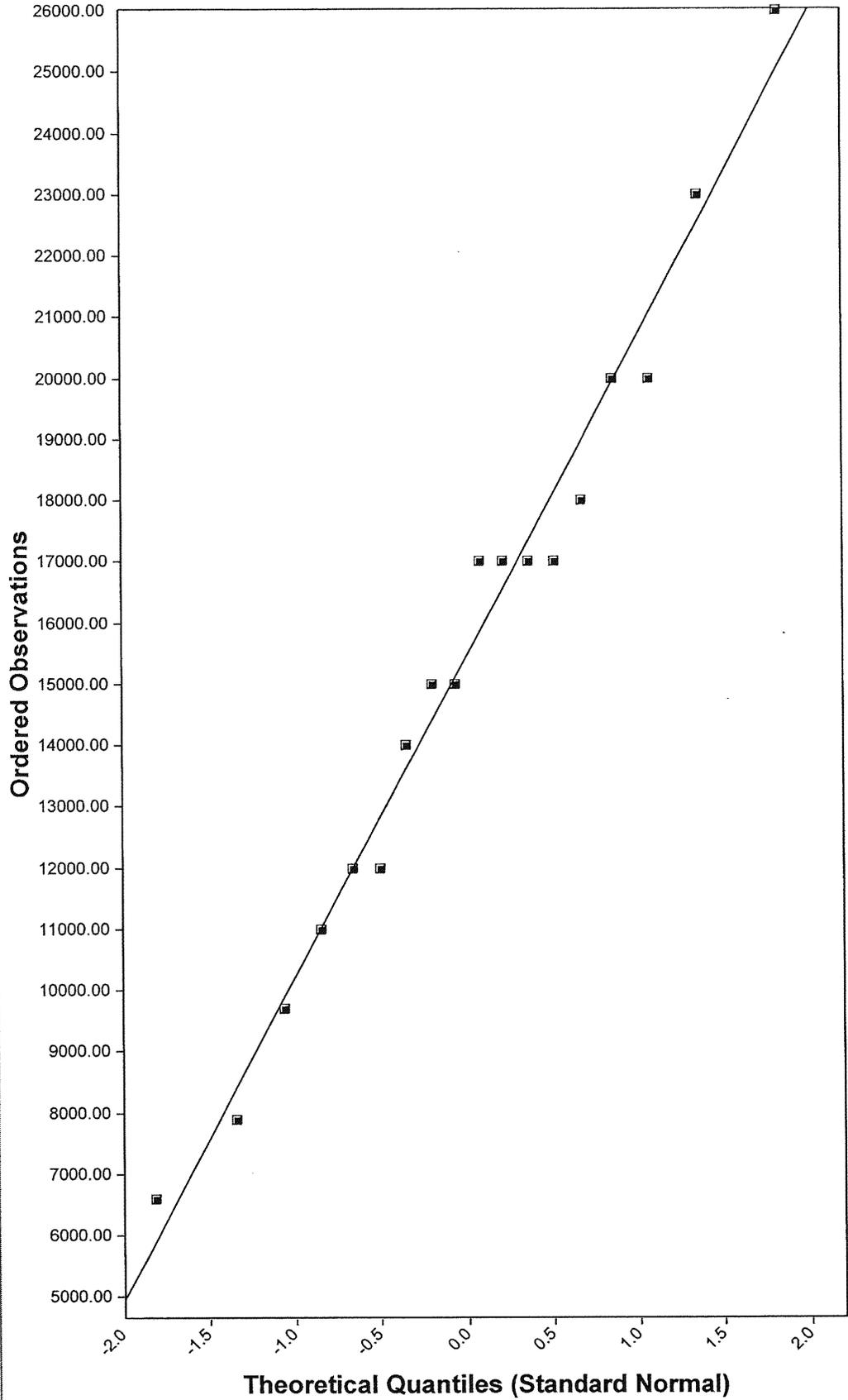
Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

90% Percentile (z)	21978
95% Percentile (z)	23827
99% Percentile (z)	27295
Tolerance Factor K	2.453
95% UTL with 95% Coverage	27940
95% UPL (t)	24552

Outlier Tests for Selected Variables	
<b>User Selected Options:</b>	
From File	WorkSheet.wst
Full Precision	OFF
Test for Suspected Outliers with Dixon test	1
Test for Suspected Outliers with Rosner test	1
<b>Dixon's Outlier Test for Aluminum</b>	
Number of data = 18	
10% critical value: 0.424	
5% critical value: 0.475	
1% critical value: 0.561	
<b>1. Data Value 26000 is a Potential Outlier (Upper Tail)?</b>	
Test Statistic: 0.368	
For 10% significance level, 26000 is not an outlier.	
For 5% significance level, 26000 is not an outlier.	
For 1% significance level, 26000 is not an outlier.	
<b>2. Data Value 6600 is a Potential Outlier (Lower Tail)?</b>	
Test Statistic: 0.231	
For 10% significance level, 6600 is not an outlier.	
For 5% significance level, 6600 is not an outlier.	
For 1% significance level, 6600 is not an outlier.	

### Normal Q-Q Plot for Aluminum



#### Aluminum

n = 18

Mean = 15456

Sd = 5089

Slope = 5250

Intercept = 15456

Correlation, R = 0.991

Shapiro-Wilk Test

Exact Test Value = 0.981

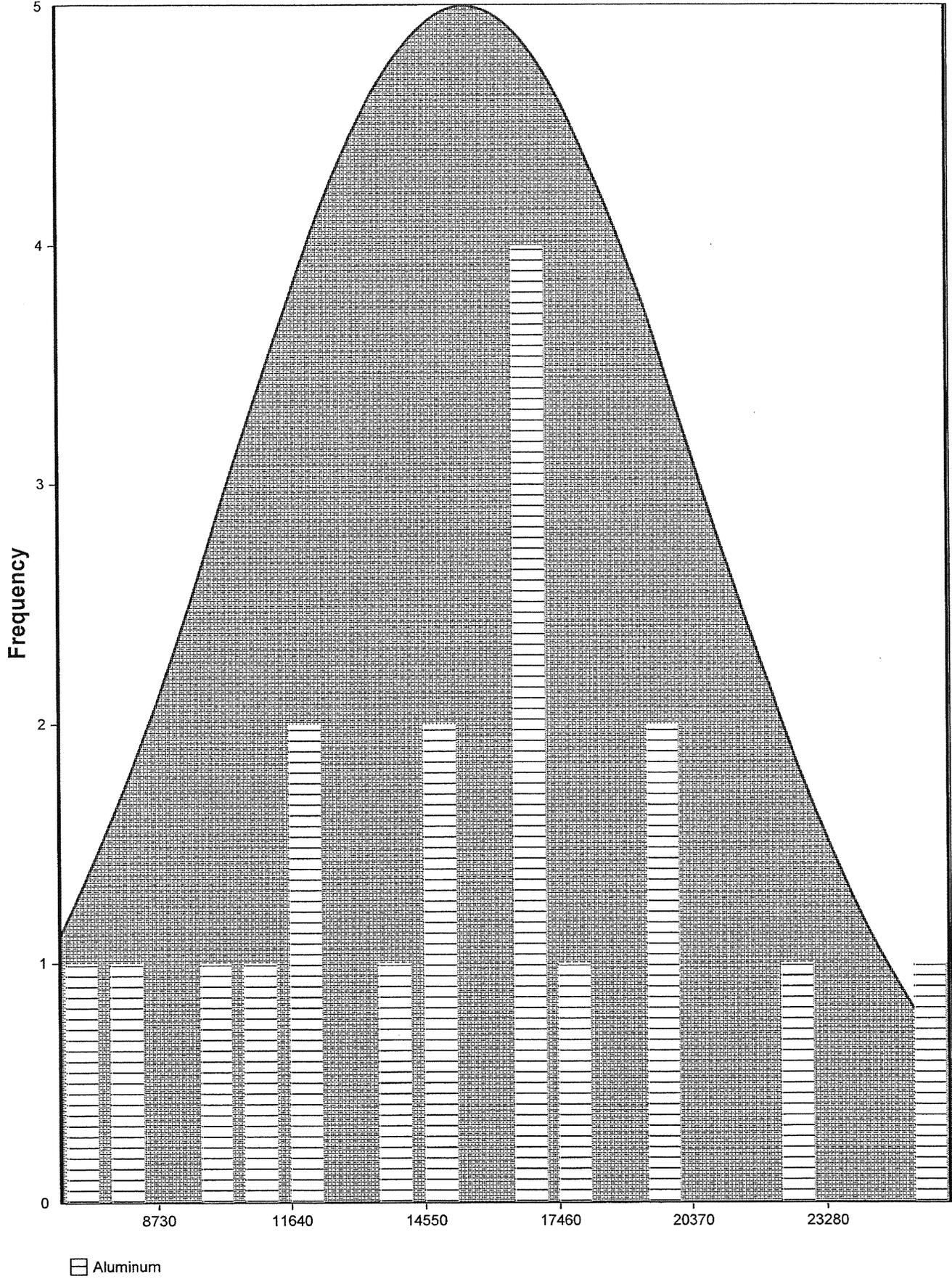
Critical Val(0.05) = 0.897

Data Appear Normal

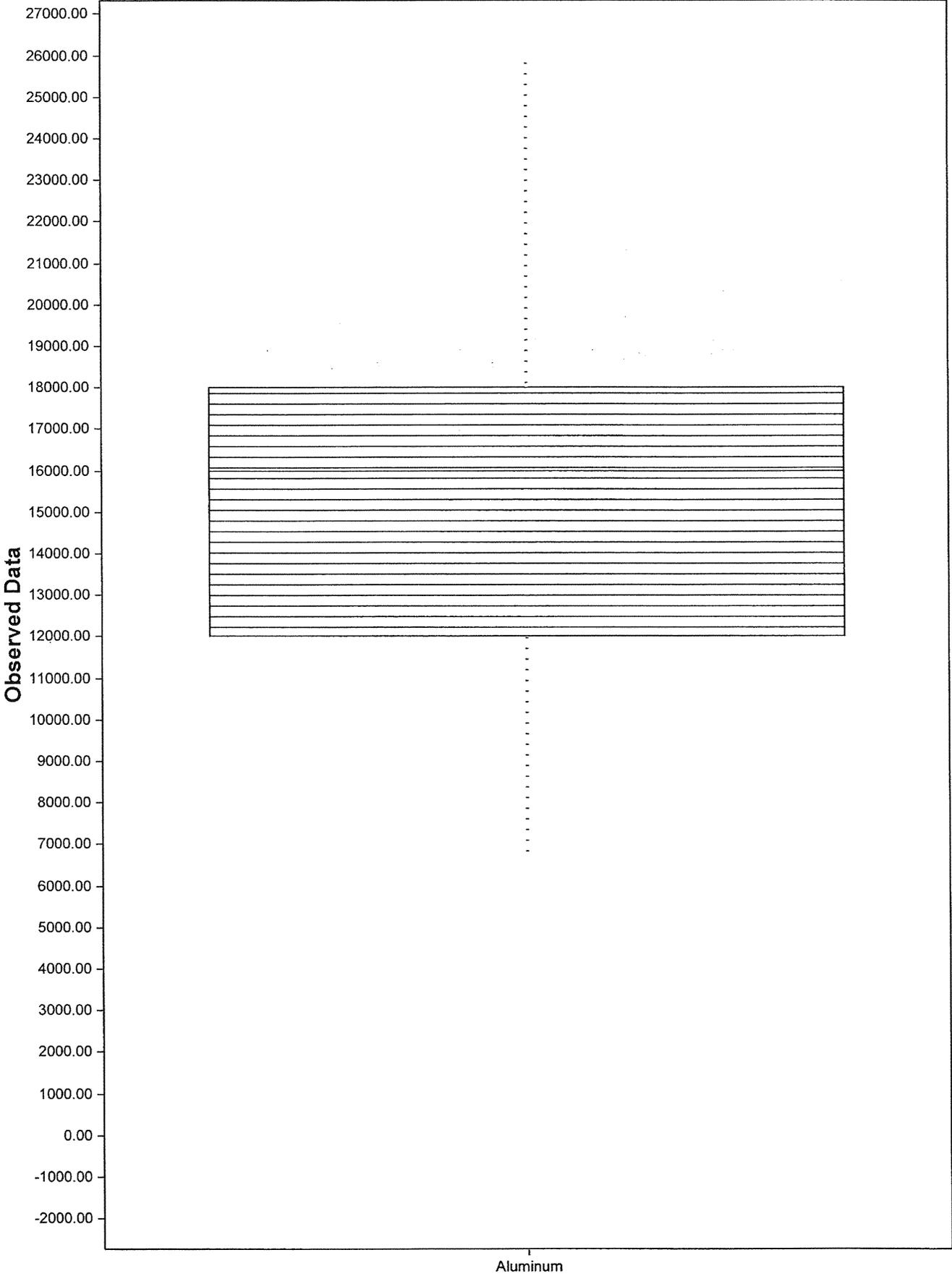
Approx. Test Value = 0.981

p-Value = 0.944

Histogram for Aluminum



# Box Plot for Aluminum





Normal Background Statistics for Full Data Sets

User Selected Options

From File I:\Projects\Western Refining Company\GIANT\Bloomfield\NMED July 2007 Order\Site Background\June

Full Precision OFF

Confidence Coefficient 95%

Coverage 95%

Different or Future K Values 1

Arsenic

Raw Statistics

Number of Valid Observations	18
Number of Distinct Observations	14
Minimum	1.4
Maximum	3.2
Second Largest	3.1
Mean	2.439
Geometric Mean	2.369
First Quartile	1.975
Median	2.6
Third Quartile	2.875
SD	0.566
Coefficient of Variation	0.232
Skewness	-0.587

Normal Distribution Test

Shapiro Wilk Test Statistic	0.923
5% Shapiro Wilk Critical Value	0.897

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

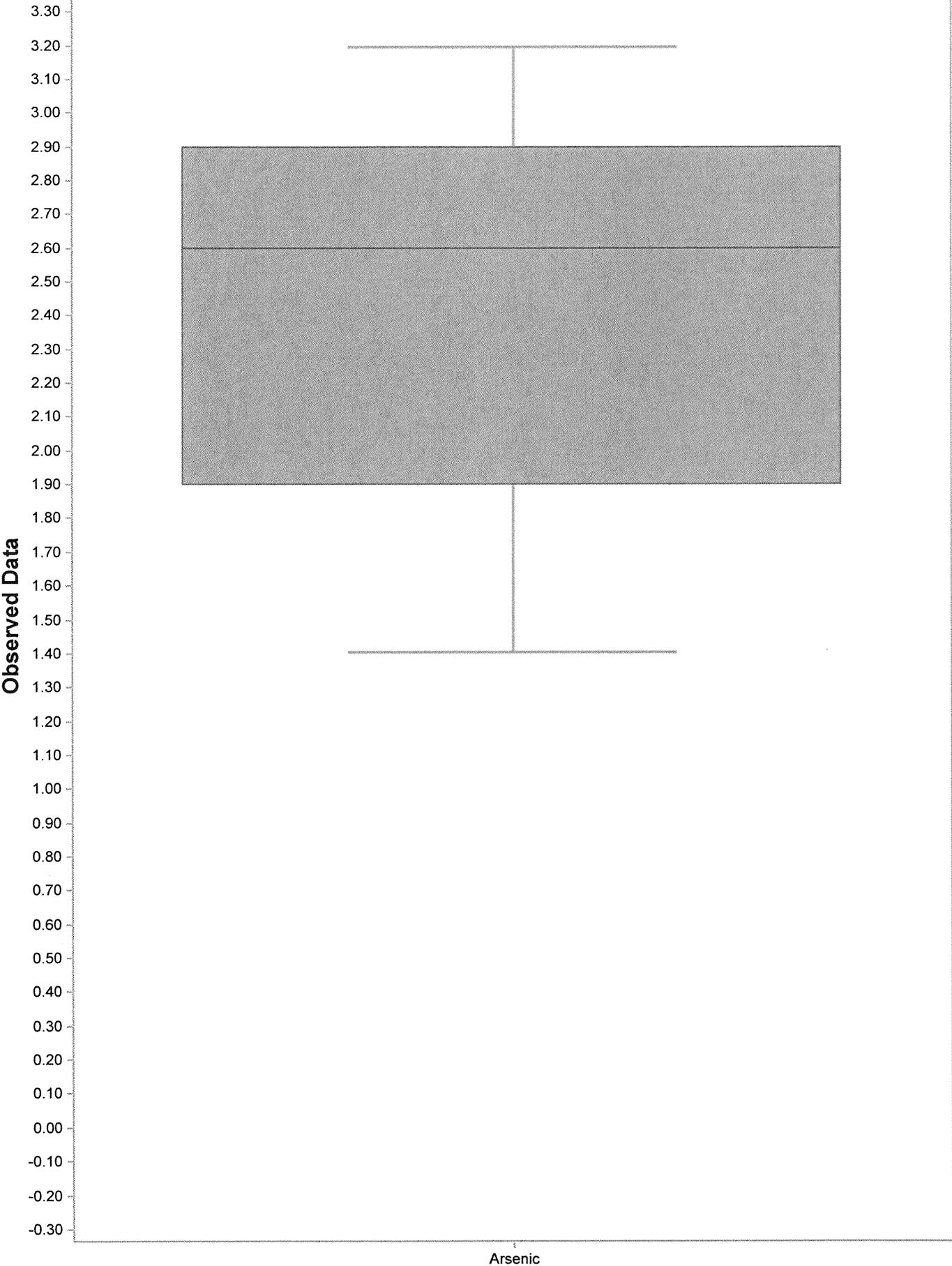
90% Percentile (z)	3.164
95% Percentile (z)	3.37
99% Percentile (z)	3.755
Tolerance Factor K	2.453
95% UTL with 95% Coverage	3.827
95% UPL (t)	3.45

Outlier Tests for Selected Variables	
User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Test for Suspected Outliers with Dixon test	1
Test for Suspected Outliers with Rosner test	1
<b>Dixon's Outlier Test for Arsenic</b>	
Number of data = 18	
10% critical value: 0.424	
5% critical value: 0.475	
1% critical value: 0.561	
<b>1. Data Value 3.2 is a Potential Outlier (Upper Tail)?</b>	
Test Statistic: 0.125	
For 10% significance level, 3.2 is not an outlier.	
For 5% significance level, 3.2 is not an outlier.	
For 1% significance level, 3.2 is not an outlier.	
<b>2. Data Value 1.4 is a Potential Outlier (Lower Tail)?</b>	
Test Statistic: 0.125	
For 10% significance level, 1.4 is not an outlier.	
For 5% significance level, 1.4 is not an outlier.	
For 1% significance level, 1.4 is not an outlier.	

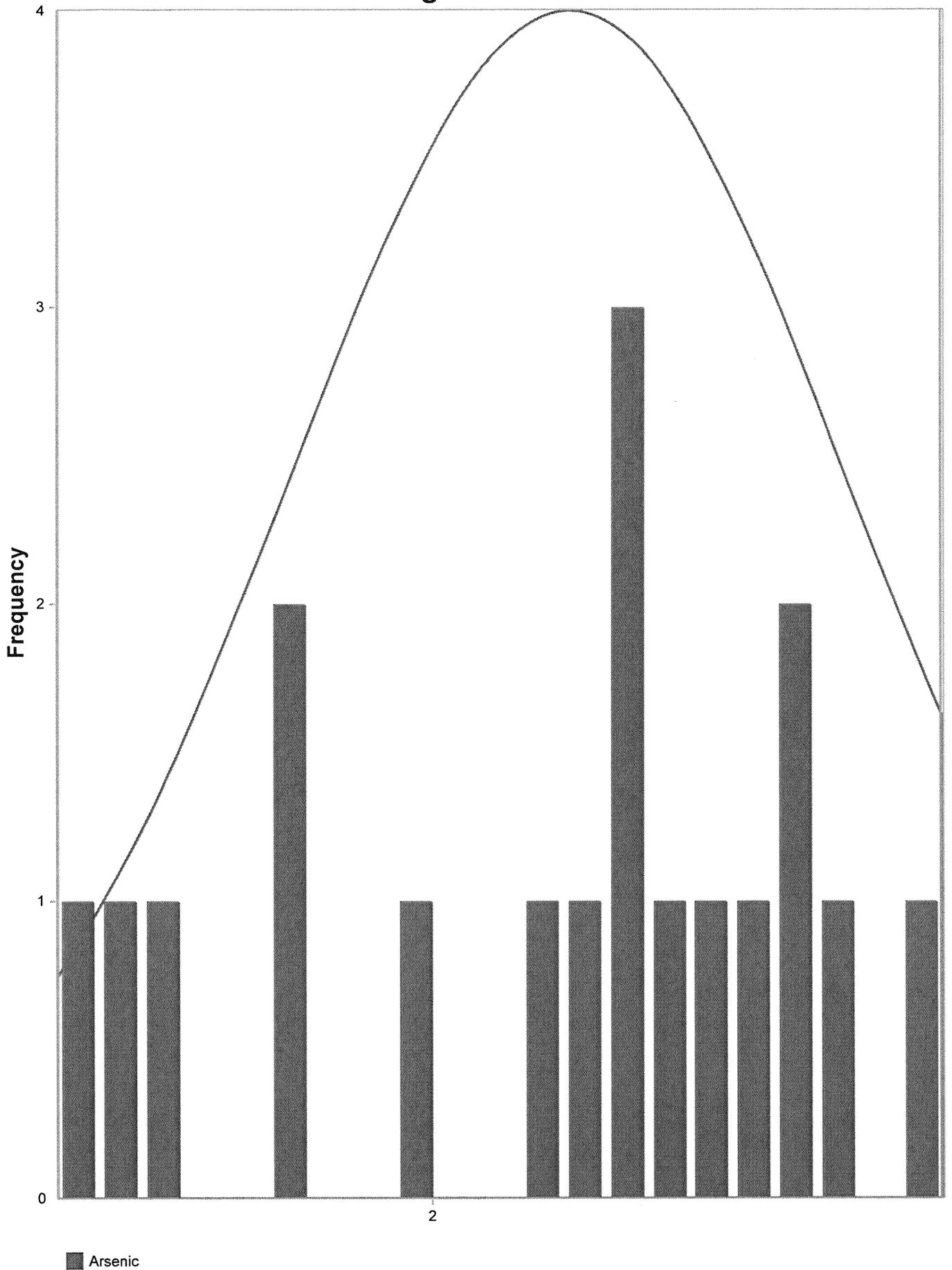
	0	1	2	3	4
	Arsenic	D_Arsenic	NROS_Arsenic	LnROS_Arsenic	GROS_Arsenic
1	2.8	1	2.8	2.8	2.8
2	1.9	1	1.9	1.9	1.9
3	1.4	1	1.4	1.4	1.4
4	3	1	3	3	3
5	3.1	1	3.1	3.1	3.1
6	3	1	3	3	3
7	2.4	1	2.4	2.4	2.4
8	2.6	1	2.6	2.6	2.6
9	2.6	1	2.6	2.6	2.6
10	2.2	1	2.2	2.2	2.2
11	1.9	1	1.9	1.9	1.9
12	2.7	1	2.7	2.7	2.7
13	3.2	1	3.2	3.2	3.2
14	2.5	1	2.5	2.5	2.5
15	1.6	1	1.6	1.6	1.6
16	2.9	1	2.9	2.9	2.9
17	1.5	1	1.5	1.5	1.5
18	5	0	2.42941176470588	2.35570044302473	2.55607090054673

↑  
ROS  
Substituted  
Value

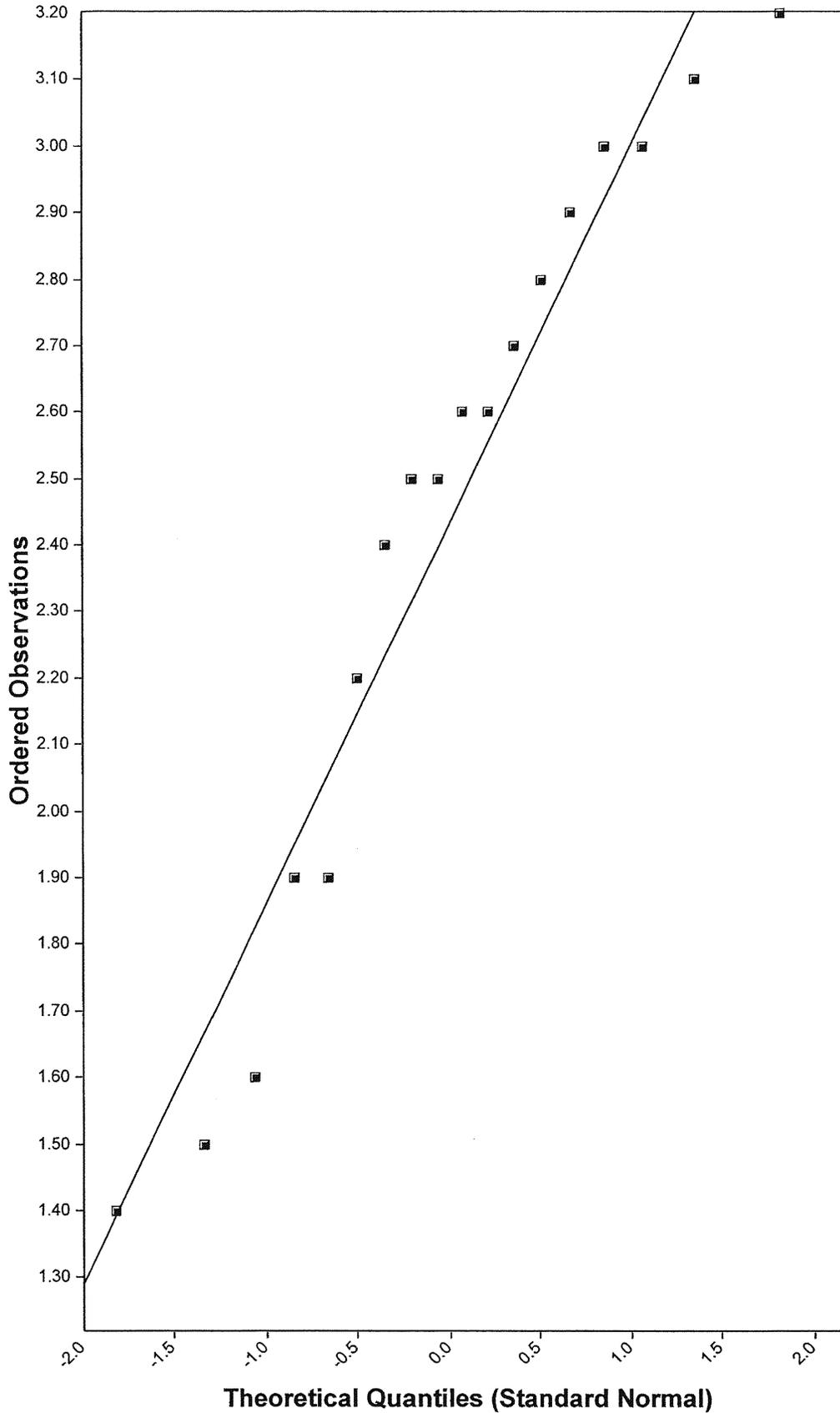
# Box Plot for Arsenic



# Histogram for Arsenic



### Normal Q-Q Plot for Arsenic



#### Arsenic

n = 18

Mean = 2.433

Sd = 0.565

Slope = 0.571

Intercept = 2.433

Correlation, R = 0.971

Shapiro-Wilk Test

Exact Test Value = 0.928

Critical Val(0.05) = 0.897

Data Appear Normal

Approx. Test Value = 0.932

p-Value = 0.213



Lognormal Background Statistics for Full Data Sets

User Selected Options

From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Coverage	95%
Different or Future K Values	1
Number of Bootstrap Operations	2000

Barium

Log-Transformed Statistics

Number of Valid Observations	16
Number of Distinct Observations	10
Minimum	4.533
Maximum	5.966
Second Largest	5.561
Mean	5.05
First Quartile	4.852
Median	5.011
Third Quartile	5.187
SD	0.413

Lognormal Distribution Test

Shapiro Wilk Test Statistic	0.901
5% Shapiro Wilk Critical Value	0.887

Data appear Lognormal at 5% Significance Level

Background Statistics Assuming Lognormal Distribution

90% Percentile (z)	265
95% Percentile (z)	308
99% Percentile (z)	408.2
95% UPL	329.3
Tolerance Factor K	2.524
95% UTL with 95% Coverage	442.9

Some Nonparametric Background Statistics

95% Chebyshev UPL	529.1
95% Bootstrap BCA UTL with 95% Coverage	390
95% Percentile Bootstrap UTL with 95% Coverage	390

Outlier Tests for Selected Variables

User Selected Options

From File WorkSheet.wst

Full Precision OFF

Test for Suspected Outliers with Dixon test 1

Test for Suspected Outliers with Rosner test 1

Dixon's Outlier Test for Barium

Number of data = 18

10% critical value: 0.424

5% critical value: 0.475

1% critical value: 0.561

1. Data Value 760 is a Potential Outlier (Upper Tail)?

Test Statistic: 0.557

For 10% significance level, 760 is an outlier.

For 5% significance level, 760 is an outlier.

For 1% significance level, 760 is not an outlier.

2. Data Value 93 is a Potential Outlier (Lower Tail)?

Test Statistic: 0.010

For 10% significance level, 93 is not an outlier.

For 5% significance level, 93 is not an outlier.

For 1% significance level, 93 is not an outlier.

Outlier Tests for Selected Variables

User Selected Options

From File WorkSheet.wst

Full Precision OFF

Test for Suspected Outliers with Dixon test 1

Test for Suspected Outliers with Rosner test 1

Dixon's Outlier Test for Barium

Number of data = 17

10% critical value: 0.438

5% critical value: 0.49

1% critical value: 0.577

1. Data Value 480 is a Potential Outlier (Upper Tail)?

Test Statistic: 0.573

For 10% significance level, 480 is an outlier.

For 5% significance level, 480 is an outlier.

For 1% significance level, 480 is not an outlier.

2. Data Value 93 is a Potential Outlier (Lower Tail)?

Test Statistic: 0.018

For 10% significance level, 93 is not an outlier.

For 5% significance level, 93 is not an outlier.

For 1% significance level, 93 is not an outlier.

Outlier Tests for Selected Variables

User Selected Options

From File WorkSheet.wst

Full Precision OFF

Test for Suspected Outliers with Dixon test 1

Test for Suspected Outliers with Rosner test 1

Dixon's Outlier Test for Barium

Number of data = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

1. Data Value 390 is a Potential Outlier (Upper Tail)?

Test Statistic: 0.476

For 10% significance level, 390 is an outlier.

For 5% significance level, 390 is not an outlier.

For 1% significance level, 390 is not an outlier.

2. Data Value 93 is a Potential Outlier (Lower Tail)?

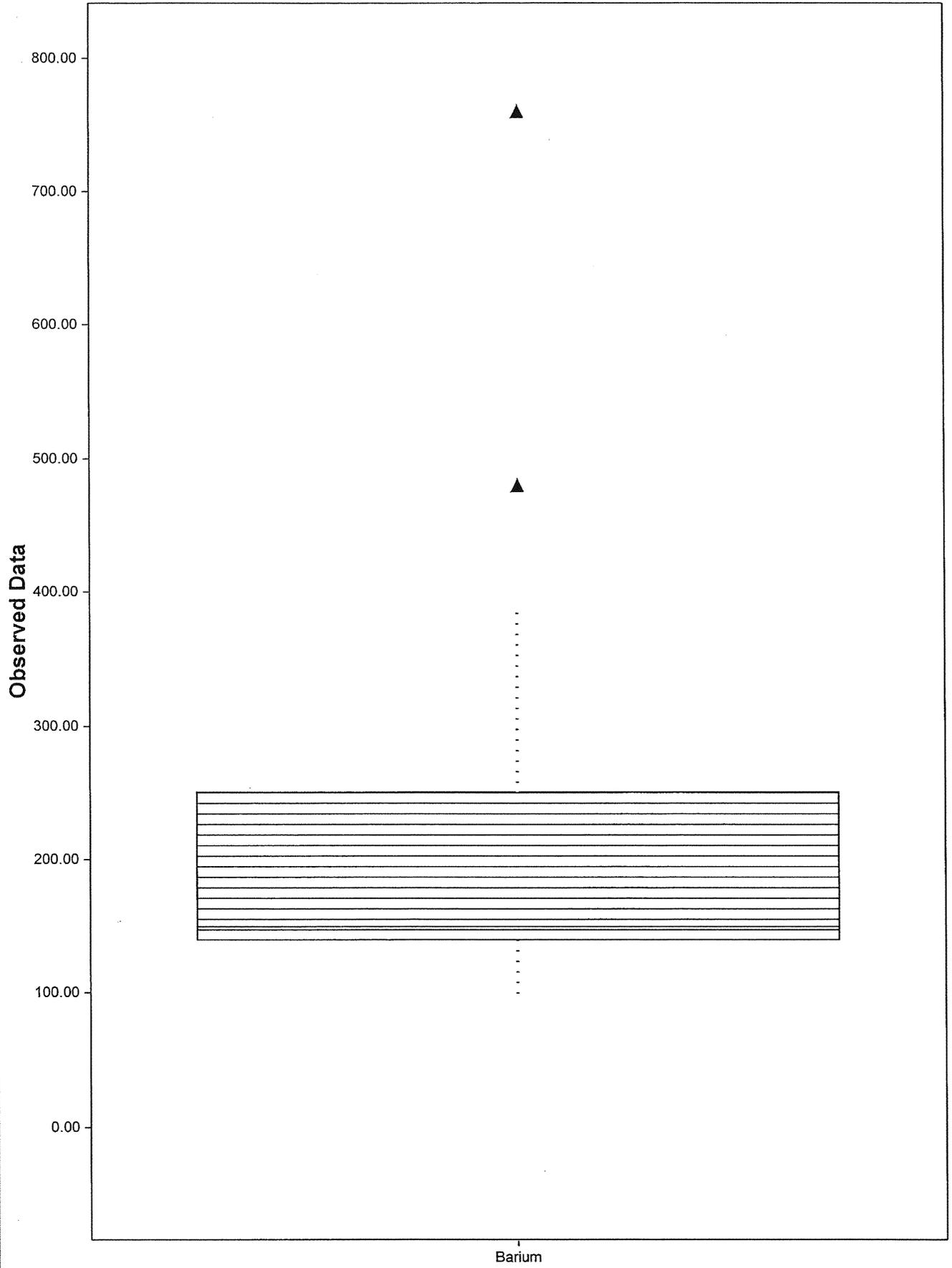
Test Statistic: 0.019

For 10% significance level, 93 is not an outlier.

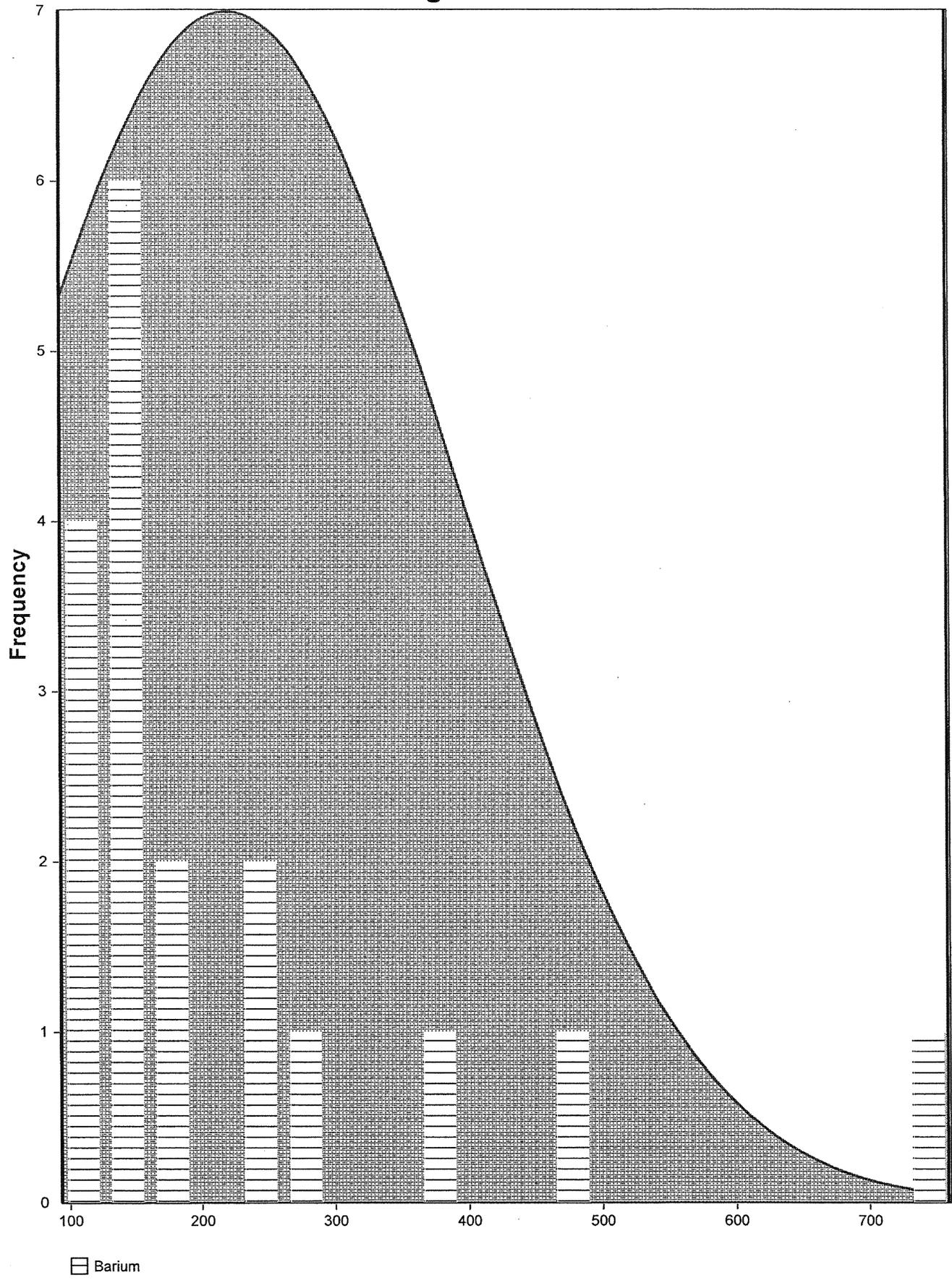
For 5% significance level, 93 is not an outlier.

For 1% significance level, 93 is not an outlier.

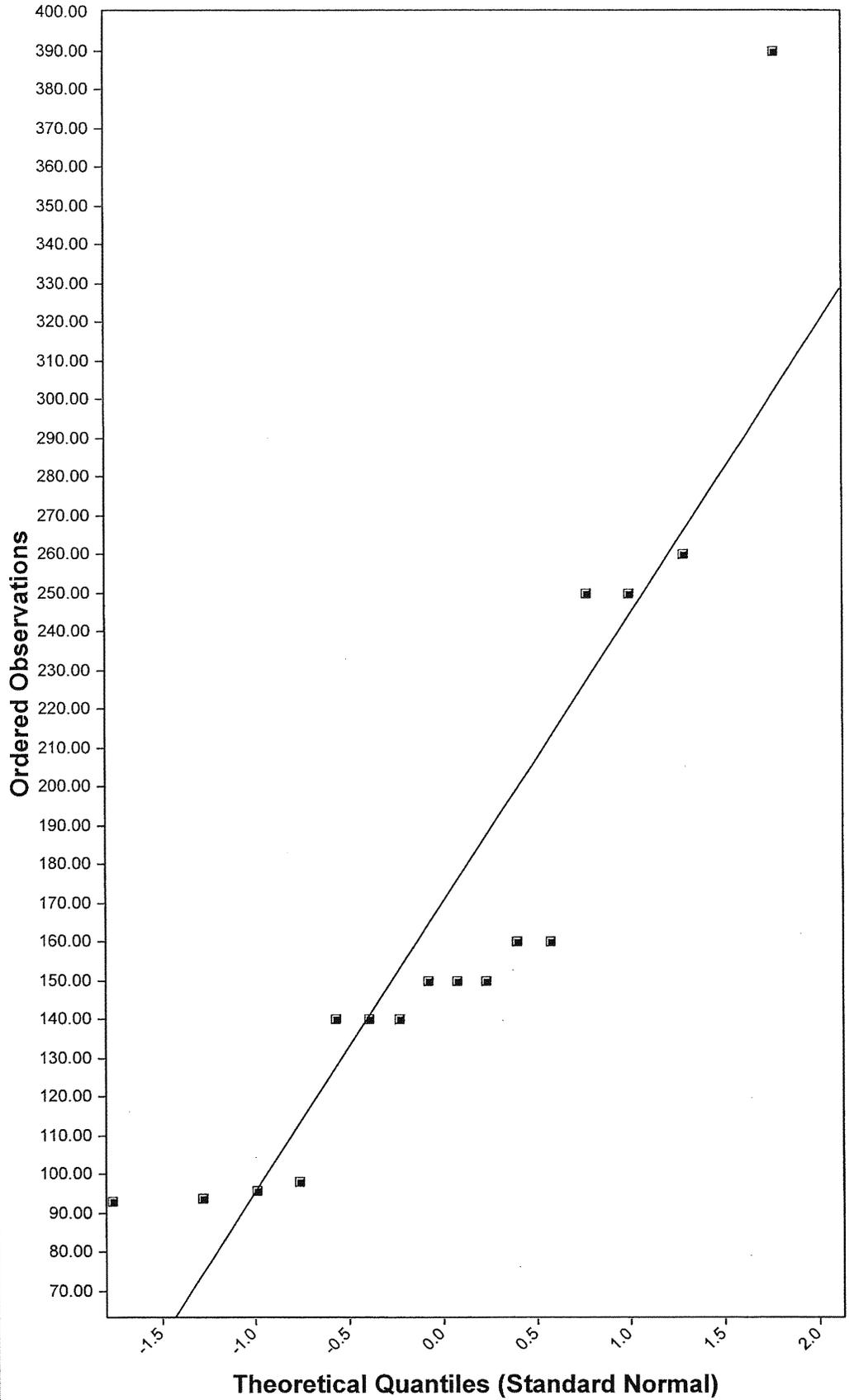
# Box Plot for Barium



# Histogram for Barium



# Normal Q-Q Plot for Barium



## Barium

n = 16

Mean = 170.1

Sd = 79.9

Slope = 74.81

Intercept = 170.1

Correlation, R = 0.896

Shapiro-Wilk Test

Exact Test Value = 0.810

Critical Val(0.05) = 0.887

Data Not Normal

Approx. Test Value = 0.808

p-Value = 0.00304

■ Barium



Normal Background Statistics for Full Data Sets

User Selected Options

From File	I:\Projects\Western Refining Company\GIANT\Bloomfield\NMED July 2007 Order\Site Background\June 2
Full Precision	OFF
Confidence Coefficient	95%
Coverage	95%
Different or Future K Values	1

Beryllium

Raw Statistics

Number of Valid Observations	18
Number of Distinct Observations	16
Minimum	0.24
Maximum	0.67
Second Largest	0.64
Mean	0.466
Geometric Mean	0.449
First Quartile	0.4
Median	0.475
Third Quartile	0.545
SD	0.122
Coefficient of Variation	0.263
Skewness	-0.236

Normal Distribution Test

Shapiro Wilk Test Statistic	0.973
5% Shapiro Wilk Critical Value	0.897

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

90% Percentile (z)	0.622
95% Percentile (z)	0.667
99% Percentile (z)	0.75
Tolerance Factor K	2.453
95% UTL with 95% Coverage	0.766
95% UPL (t)	0.684

From File: WorkSheet.wst

Summary Statistics for Raw Full Dataset

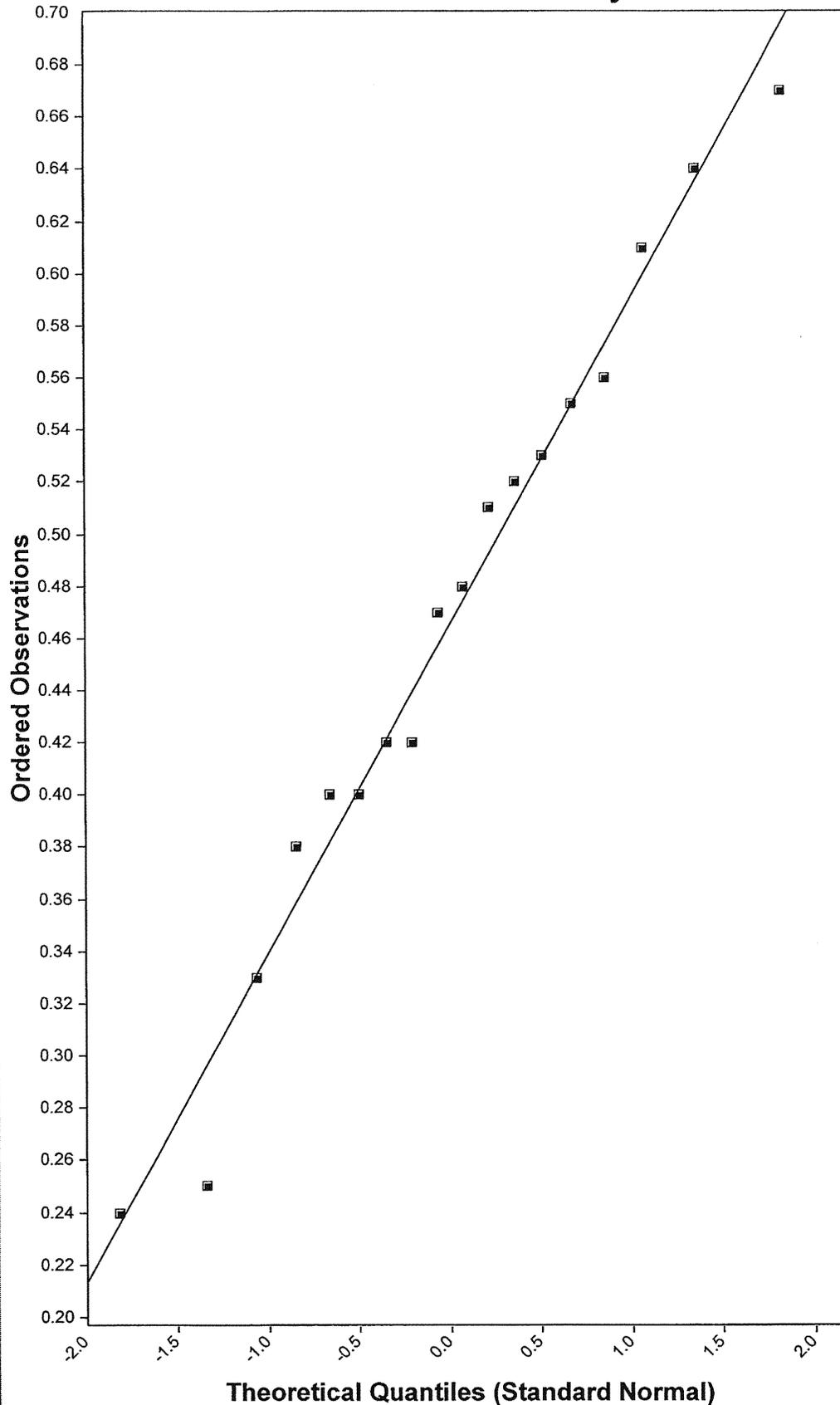
Variable	NumObs	Minimum	Maximum	Mean	Median	Variance	SD	MAD/0.675	Skewness	Kurtosis	CV
Beryllium	18	0.24	0.67	0.466	0.475	0.015	0.122	0.111	-0.236	-0.445	0.263

Percentiles for Raw Full Dataset

Variable	NumObs	5%ile	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
Beryllium	18	0.249	0.306	0.388	0.4	0.475	0.545	0.556	0.619	0.645	0.665

Outlier Tests for Selected Variables	
<b>User Selected Options</b>	
From File	WorkSheet.wst
Full Precision	OFF
Test for Suspected Outliers with Dixon test	1
Test for Suspected Outliers with Rosner test	1
<b>Dixon's Outlier Test for Beryllium</b>	
Number of data = 18	
10% critical value: 0.424	
5% critical value: 0.475	
1% critical value: 0.561	
<b>1. Data Value 0.67 is a Potential Outlier (Upper Tail)?</b>	
Test Statistic: 0.176	
For 10% significance level, 0.67 is not an outlier.	
For 5% significance level, 0.67 is not an outlier.	
For 1% significance level, 0.67 is not an outlier.	
<b>2. Data Value 0.24 is a Potential Outlier (Lower Tail)?</b>	
Test Statistic: 0.243	
For 10% significance level, 0.24 is not an outlier.	
For 5% significance level, 0.24 is not an outlier.	
For 1% significance level, 0.24 is not an outlier.	

## Normal Q-Q Plot for Beryllium



### Beryllium

n = 18

Mean = 0.466

Sd = 0.122

Slope = 0.126

Intercept = 0.466

Correlation, R = 0.99

Shapiro-Wilk Test

Exact Test Value = 0.973

Critical Val(0.05) = 0.897

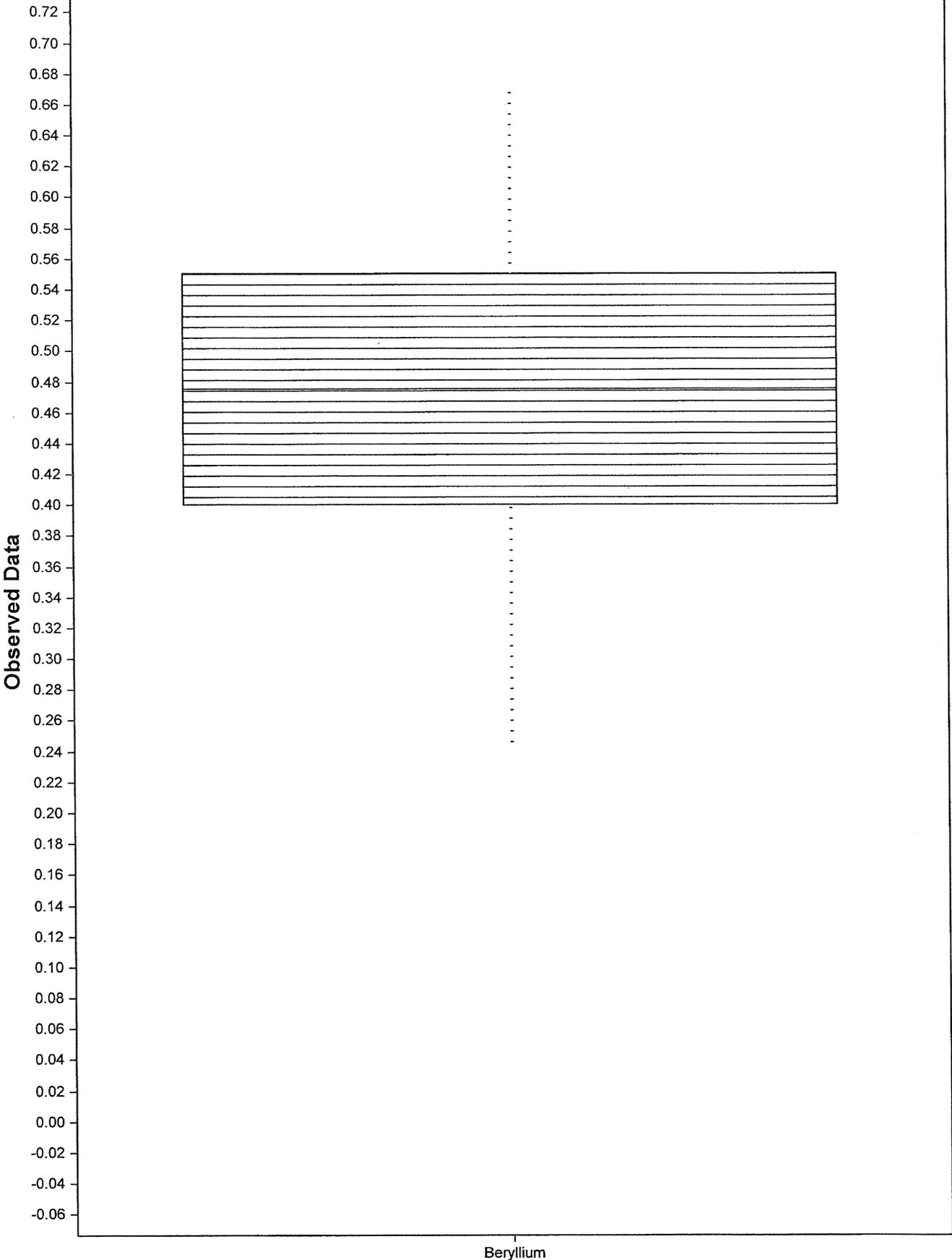
Data Appear Normal

Approx. Test Value = 0.975

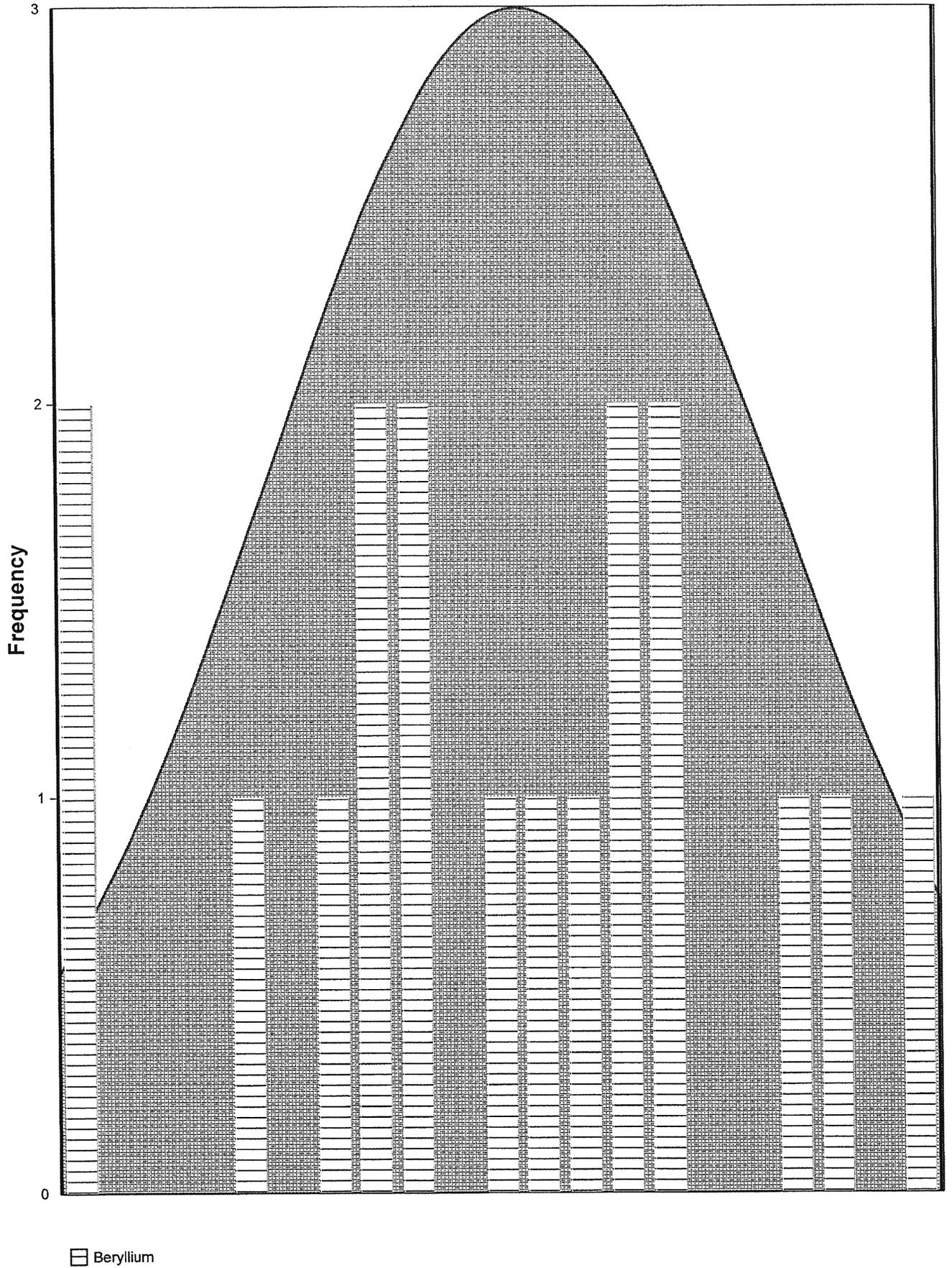
p-Value = 0.86

■ Beryllium

# Box Plot for Beryllium



# Histogram for Beryllium



Normal Background Statistics for Full Data Sets

User Selected Options

From File I:\Projects\Western Refining Company\GIANT\Bloomfield\NMED July 2007 Order\Site Background\June 2

Full Precision OFF

Confidence Coefficient 95%

Coverage 95%

Different or Future K Values 1

Boron

Raw Statistics

Number of Valid Observations	17
Number of Distinct Observations	15
Minimum	3.8
Maximum	9.9
Second Largest	8.2
Mean	6.035
Geometric Mean	5.789
First Quartile	4.3
Median	5.5
Third Quartile	7.4
SD	1.814
Coefficient of Variation	0.301
Skewness	0.569

Normal Distribution Test

Shapiro Wilk Test Statistic	0.929
5% Shapiro Wilk Critical Value	0.892

Data appear Normal at 5% Significance Level

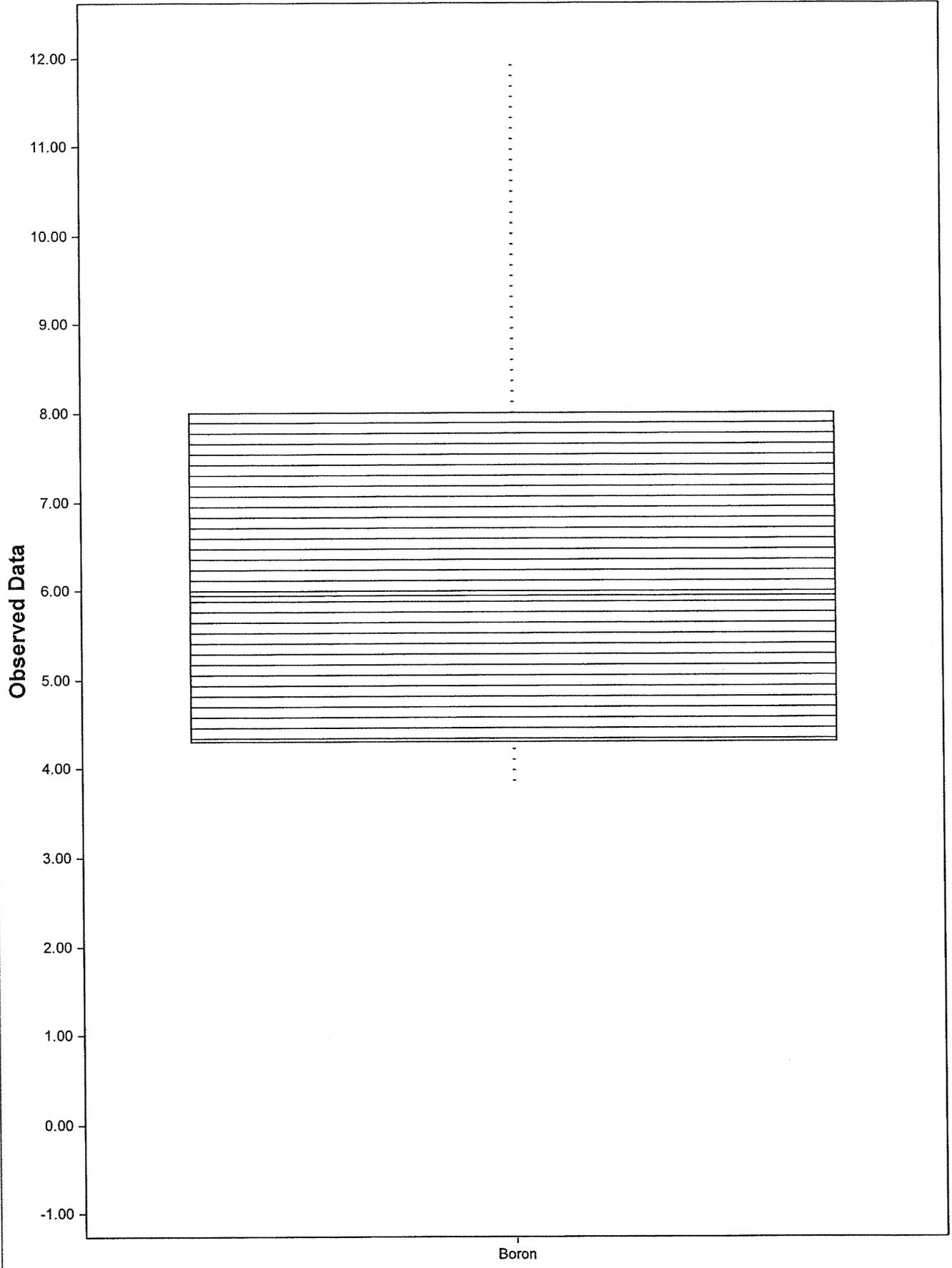
Background Statistics Assuming Normal Distribution

90% Percentile (z)	8.36
95% Percentile (z)	9.019
99% Percentile (z)	10.25
Tolerance Factor K	2.486
95% UTL with 95% Coverage	10.54
95% UPL (t)	9.294

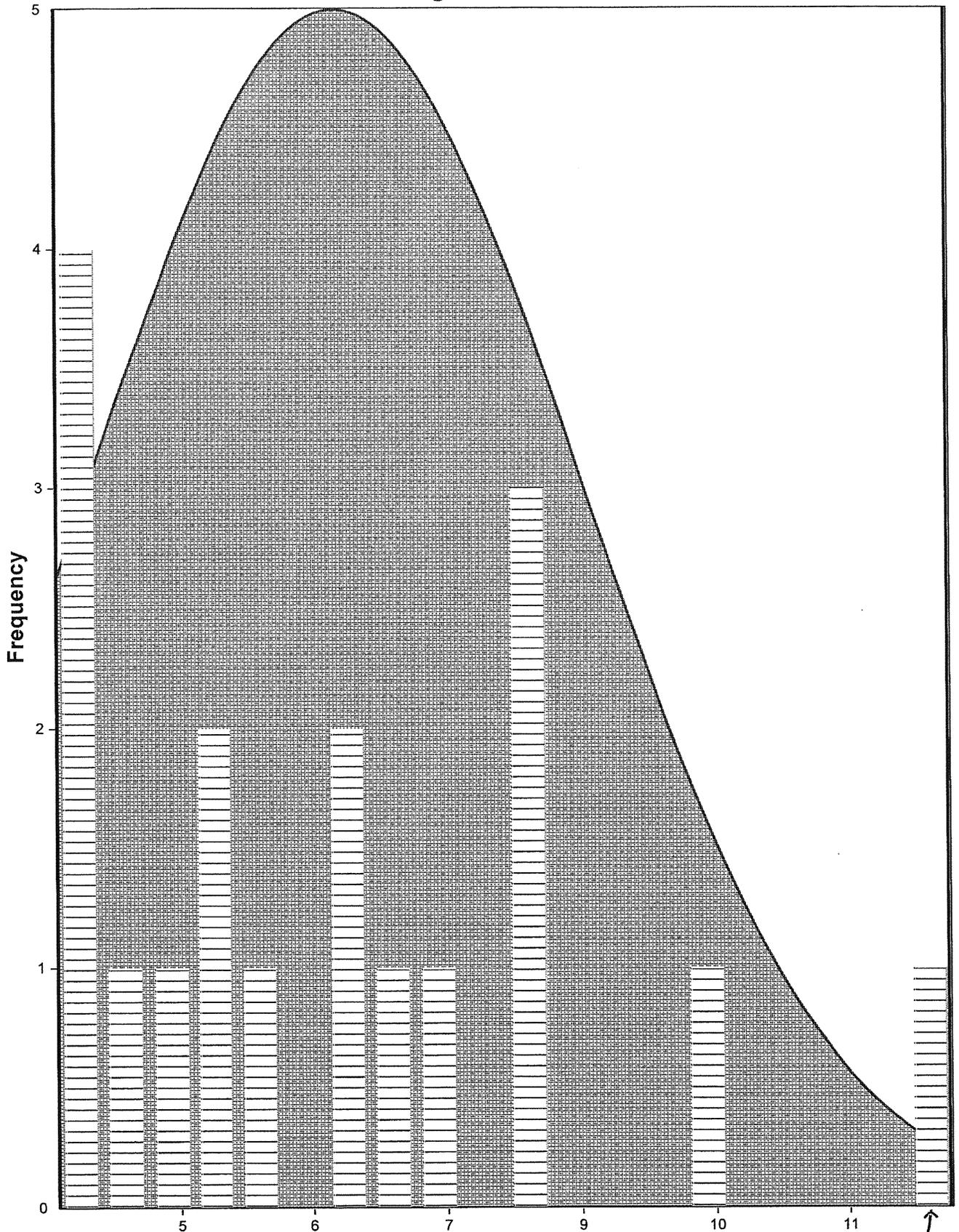
From File: WorkSheet.wst											
Summary Statistics for Raw Full Dataset											
Variable	NumObs	Minimum	Maximum	Mean	Median	Variance	SD	MAD/0.675	Skewness	Kurtosis	CV
Boron	17	3.8	9.9	6.035	5.5	3.29	1.814	1.927	0.569	-0.592	0.301
Percentiles for Raw Full Dataset											
Variable	NumObs	5%ile	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
Boron	17	3.96	4.06	4.22	4.3	5.5	7.4	7.88	8.2	8.54	9.628

Outlier Tests for Selected Variables	
<b>User Selected Options</b>	
From File	WorkSheet.wst
Full Precision	OFF
Test for Suspected Outliers with Dixon test	1
Test for Suspected Outliers with Rosner test	1
<b>Dixon's Outlier Test for Boron</b>	
Number of data = 18	
10% critical value: 0.424	
5% critical value: 0.475	
1% critical value: 0.561	
<b>1. Data Value 12 is a Potential Outlier (Upper Tail)?</b>	
Test Statistic: 0.481	
For 10% significance level, 12 is an outlier.	
For 5% significance level, 12 is an outlier.	
For 1% significance level, 12 is not an outlier.	
<b>2. Data Value 3.8 is a Potential Outlier (Lower Tail)?</b>	
Test Statistic: 0.068	
For 10% significance level, 3.8 is not an outlier.	
For 5% significance level, 3.8 is not an outlier.	
For 1% significance level, 3.8 is not an outlier.	

# Box Plot for Boron



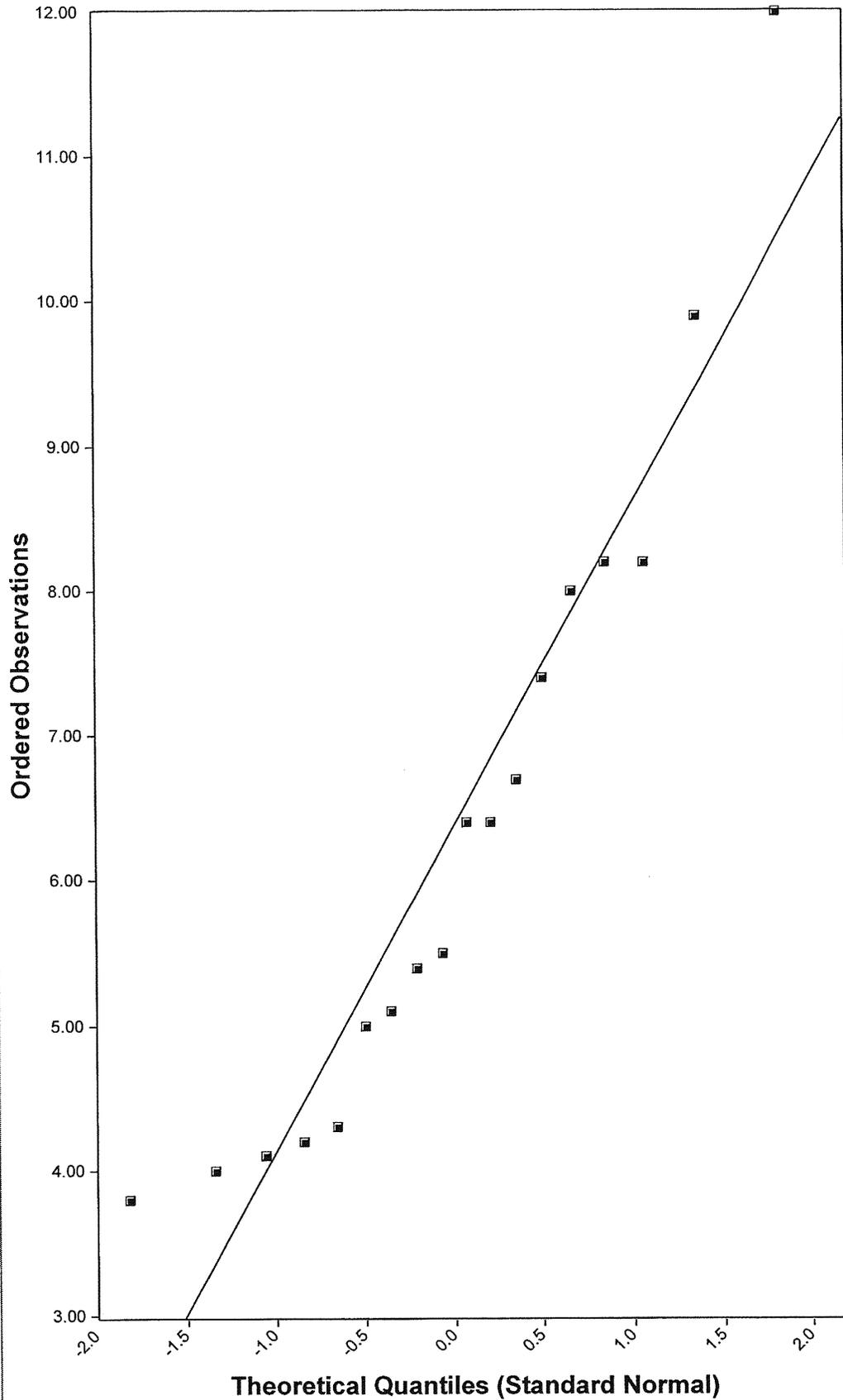
# Histogram for Boron



□ Boron

↑  
removed  
as  
outlier

# Normal Q-Q Plot for Boron



## Boron

n = 18

Mean = 6.367

Sd = 2.252

Slope = 2.239

Intercept = 6.367

Correlation, R = 0.955

Shapiro-Wilk Test

Exact Test Value = 0.909

Critical Val(0.05) = 0.897

Data Appear Normal

Approx. Test Value = 0.911

p-Value = 0.0895



Lognormal Background Statistics for Data Sets with Non-Detects

User Selected Options

From File WorkSheet.wst

Full Precision OFF

Confidence Coefficient 95%

Coverage 95%

Different or Future K Values 1

Number of Bootstrap Operations 2000

Chloride

Log-Transformed Statistics

Total Number of Data	18
Number of Non-Detect Data	10
Number of Detected Data	8
Minimum Detected	2.565
Maximum Detected	6.292
Percent Non-Detects	55.56%
Minimum Non-detect	2.015
Maximum Non-detect	2.015
Mean of Detected data	4.552
SD of Detected data	1.594

Warning: There are only 8 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic 0.82

5% Shapiro Wilk Critical Value 0.818

Data appear Lognormal at 5% Significance Level

Background Statistics Assuming Lognormal Distribution

DL/2 Substitution Method

Mean (Log Scale) 2.757

SD (Log Scale) 1.943

Tolerance Factor K 2.453

95% UTL 95% Coverage 1849

95% UPL 507.4

90% Percentile (z) 190

95% Percentile (z) 384.8

99% Percentile (z) 1446

Note: DL/2 is not a recommended method.

Log ROS Method

Mean in Log Scale 1.993

SD in Log Scale 2.825



Outlier Tests for Selected Variables

User Selected Options

From File    WorkSheet.wst

Full Precision    OFF

Test for Suspected Outliers with Dixon test    1

Test for Suspected Outliers for Rosner test    1

Dixon's Outlier Test for Chloride

Number of data = 8

10% critical value: 0.479

5% critical value: 0.554

1% critical value: 0.683

1. Data Value 540 is a Potential Outlier (Upper Tail)?

Test Statistic: 0.228

For 10% significance level, 540 is not an outlier.

For 5% significance level, 540 is not an outlier.

For 1% significance level, 540 is not an outlier.

2. Data Value 13 is a Potential Outlier (Lower Tail)?

Test Statistic: 0.002

For 10% significance level, 13 is not an outlier.

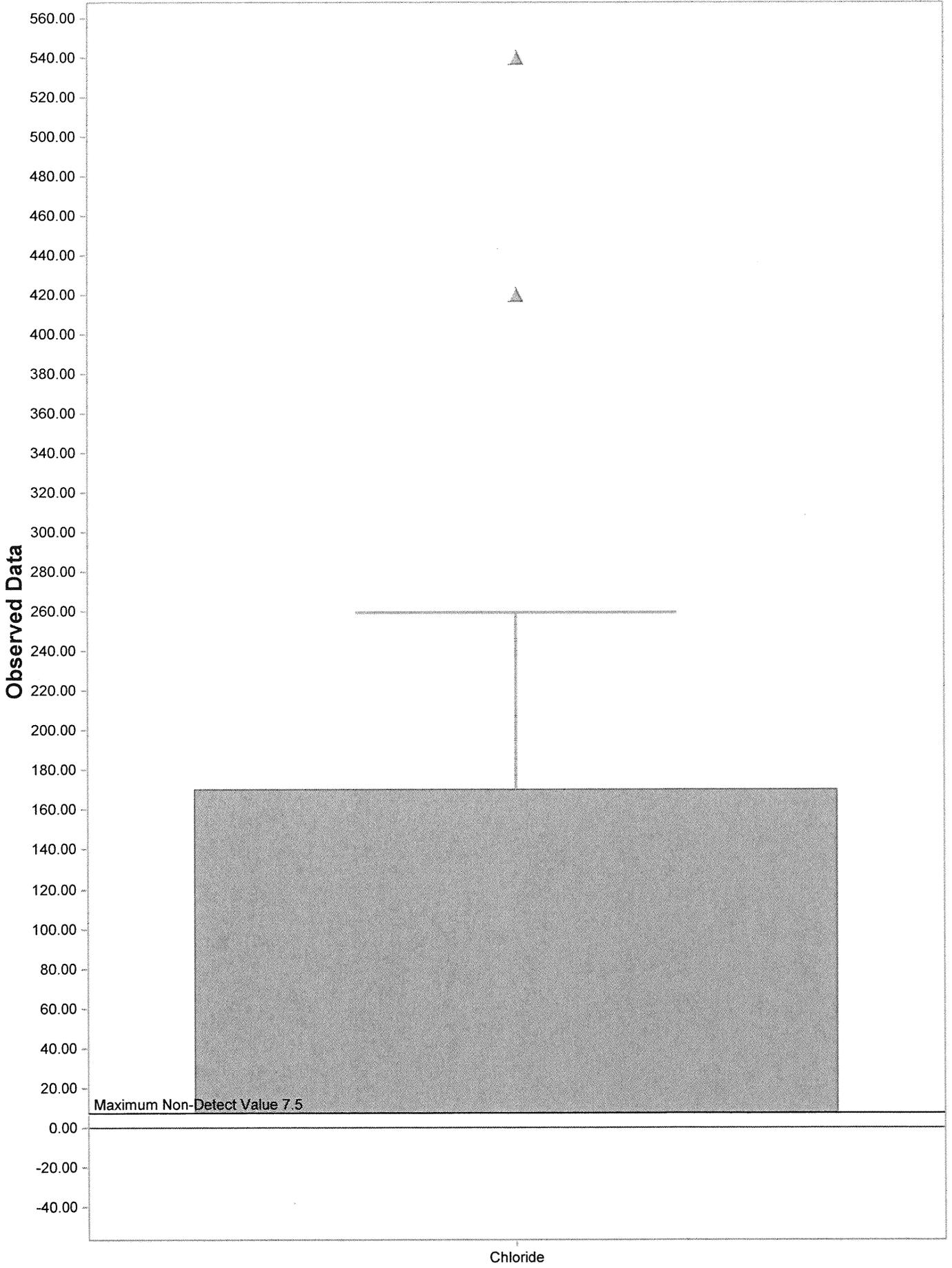
For 5% significance level, 13 is not an outlier.

For 1% significance level, 13 is not an outlier.

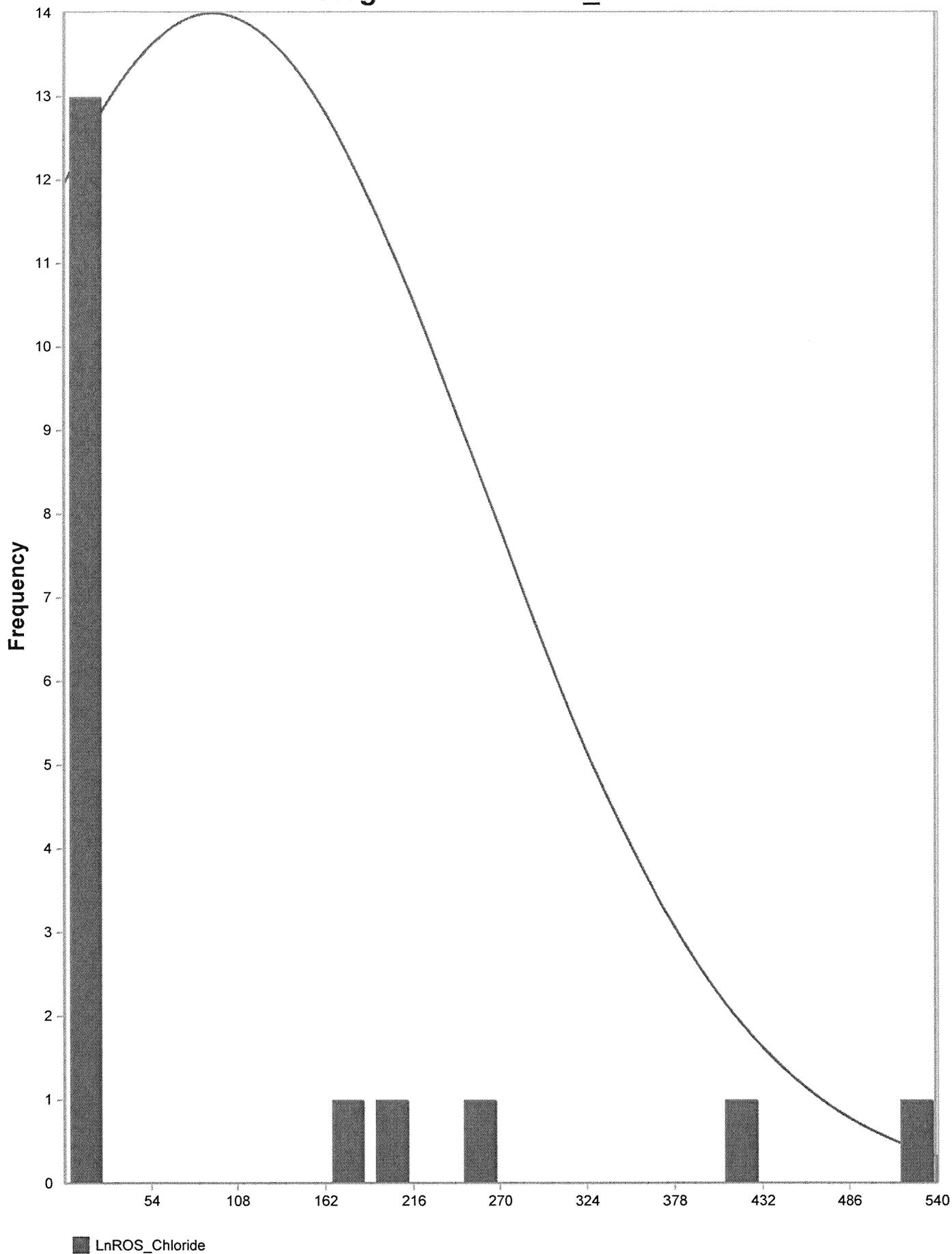
	0	1	2	3	4
	Chloride	D_Chloride	NROS_Chloride	LnROS_Chloride	GROS_Chloride
1	7.5	0	-817.791864716548	0.04875660267340470	0.0001
2	17	1	17	17	17
3	420	1	420	420	420
4	7.5	0	-667.508023935792	0.14825899312805	0.0001
5	13	1	13	13	13
6	7.5	0	-566.044641615993	0.31412876851662	0.0001
7	170	1	170	170	170
8	7.5	0	-485.352020492808	0.570742953275804	0.0001
9	7.5	0	-416.077218694588	0.952968194821624	0.0001
10	7.5	0	-353.819453119948	1.51065276987185	0.0001
11	7.5	0	-296.079698483913	2.31595837944717	0.0001
12	7.5	0	-241.237511463143	3.47523791984090	0.0001
13	540	1	540	540	540
14	260	1	260	260	260
15	210	1	210	210	210
16	7.5	0	-188.117508055599	5.148770318495490	0.0001
17	14	1	14	14	14
18	7.5	0	-135.770051024558	7.58472183515368	0.0001

↑  
ROS  
substitution  
values

# Box Plot for Chloride



### Histogram for LnROS\_Chloride



# Lognormal Q-Q Plot for Chloride Statistics using Log ROS Method

## Chloride

n = 18

Mean = 1.993

Sd = 2.825

Slope = 2.895

Intercept = 1.993

Correlation, R = 0.984

Shapiro-Wilk Test

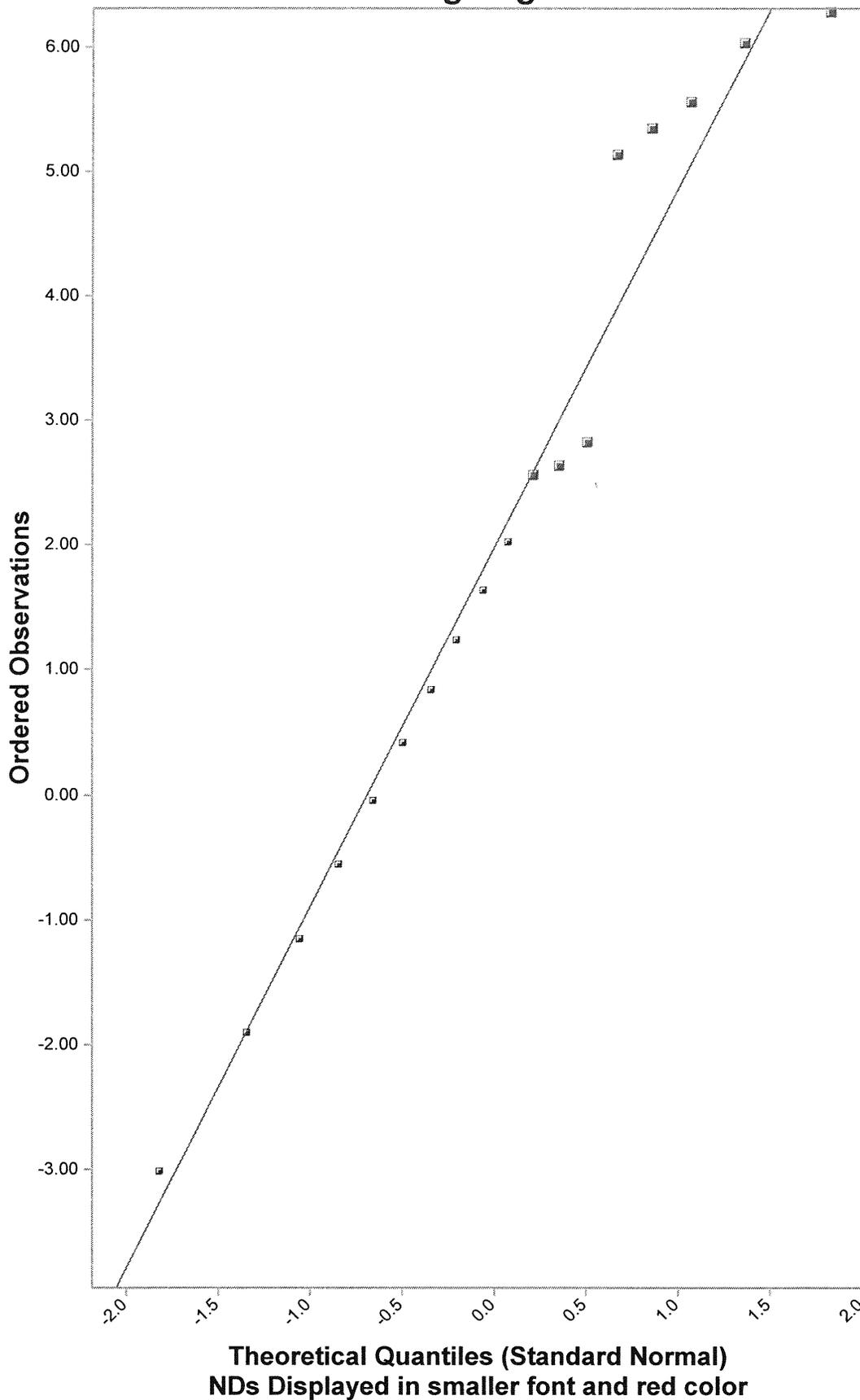
Exact Test Value = 0.955

Critical Val(0.05) = 0.897

Data Appear Lognormal

Approx. Test Value = 0.959

p-Value = 0.575



■ Chloride



Normal Background Statistics for Full Data Sets

User Selected Options

From File	I:\Projects\Western Refining Company\GIANT\Bloomfield\NMED July 2007 Order\Site Background\June 2
Full Precision	OFF
Confidence Coefficient	95%
Coverage	95%
Different or Future K Values	1

Chromium

Raw Statistics

Number of Valid Observations	18
Number of Distinct Observations	15
Minimum	3.5
Maximum	9.3
Second Largest	8.5
Mean	6.672
Geometric Mean	6.475
First Quartile	5.725
Median	6.65
Third Quartile	7.875
SD	1.595
Coefficient of Variation	0.239
Skewness	-0.273

Normal Distribution Test

Shapiro Wilk Test Statistic	0.971
5% Shapiro Wilk Critical Value	0.897

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

90% Percentile (z)	8.716
95% Percentile (z)	9.296
99% Percentile (z)	10.38
Tolerance Factor K	2.453
95% UTL with 95% Coverage	10.59
95% UPL (t)	9.523

From File: WorkSheet.wst

Summary Statistics for Raw Full Dataset

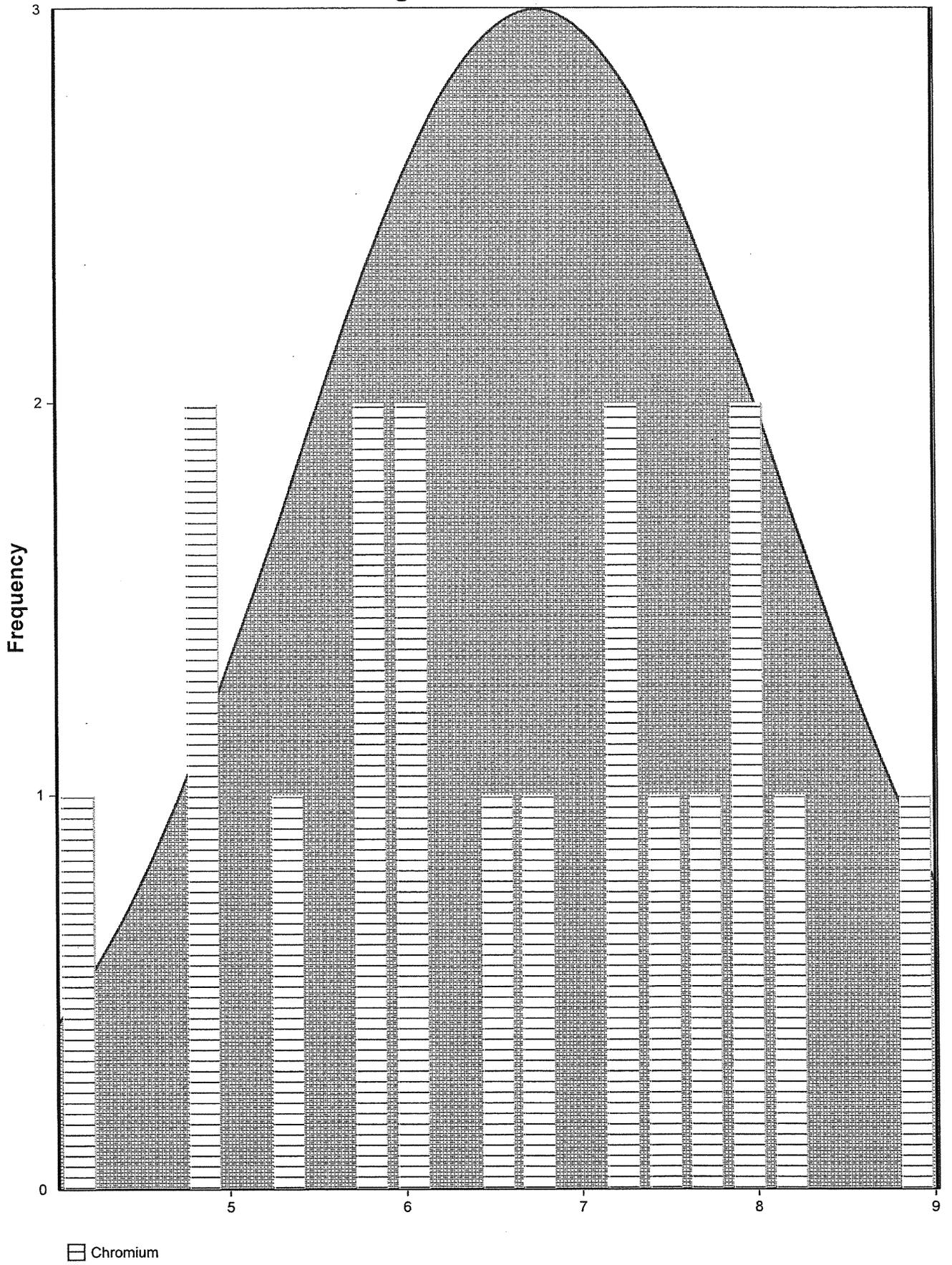
Variable	NumObs	Minimum	Maximum	Mean	Median	Variance	SD	MAD/0.675	Skewness	Kurtosis	CV
Chromium	18	3.5	9.3	6.672	6.65	2.544	1.595	1.779	-0.273	-0.711	0.239

Percentiles for Raw Full Dataset

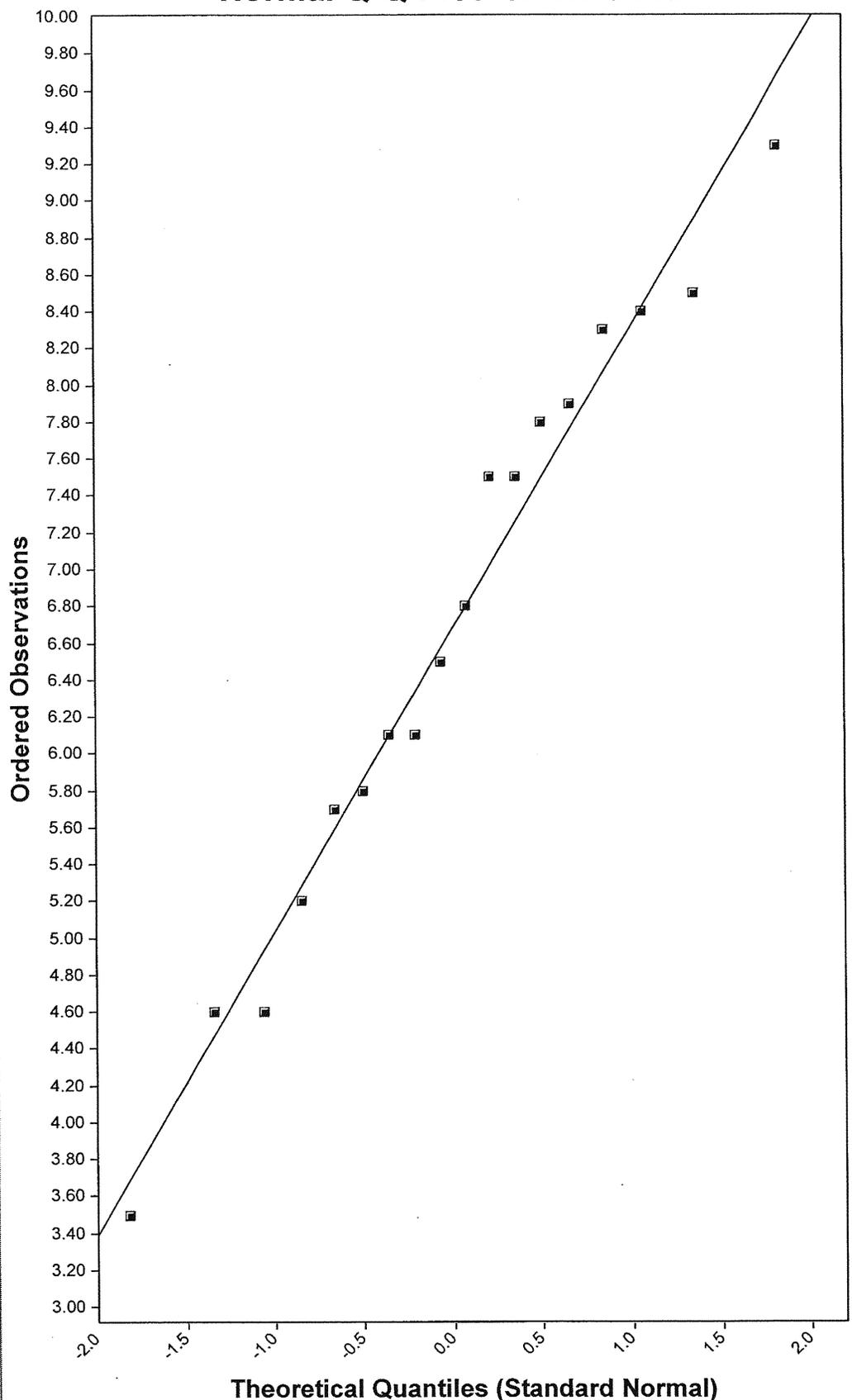
Variable	NumObs	5%ile	10%ile	20%ile	25%ile(Q1)	50%ile(Q2)	75%ile(Q3)	80%ile	90%ile	95%ile	99%ile
Chromium	18	4.435	4.6	5.4	5.725	6.65	7.875	8.14	8.43	8.62	9.164

Outlier Tests for Selected Variables	
<b>User Selected Options</b>	
From File	WorkSheet.wst
Full Precision	OFF
Test for Suspected Outliers with Dixon test	1
Test for Suspected Outliers with Rosner test	1
<b>Dixon's Outlier Test for Chromium</b>	
Number of data = 18	
10% critical value: 0.424	
5% critical value: 0.475	
1% critical value: 0.561	
<b>1. Data Value 9.3 is a Potential Outlier (Upper Tail)?</b>	
Test Statistic: 0.191	
For 10% significance level, 9.3 is not an outlier.	
For 5% significance level, 9.3 is not an outlier.	
For 1% significance level, 9.3 is not an outlier.	
<b>2. Data Value 3.5 is a Potential Outlier (Lower Tail)?</b>	
Test Statistic: 0.224	
For 10% significance level, 3.5 is not an outlier.	
For 5% significance level, 3.5 is not an outlier.	
For 1% significance level, 3.5 is not an outlier.	

# Histogram for Chromium



### Normal Q-Q Plot for Chromium



**Chromium**  
n = 18  
Mean = 6.672  
Sd = 1.595  
Slope = 1.642  
Intercept = 6.672  
Correlation, R = 0.989  
Shapiro-Wilk Test  
Exact Test Value = 0.971  
Critical Val(0.05) = 0.897  
Data Appear Normal  
Approx. Test Value = 0.973  
p-Value = 0.837

Normal Background Statistics for Full Data Sets

User Selected Options

From File	I:\Projects\Western Refining Company\GIANT\Bloomfield\NMED July 2007 Order\Site Background\June 2
Full Precision	OFF
Confidence Coefficient	95%
Coverage	95%
Different or Future K Values	1

Cobalt

Raw Statistics

Number of Valid Observations	18
Number of Distinct Observations	11
Minimum	2.1
Maximum	5.3
Second Largest	4.8
Mean	3.728
Geometric Mean	3.627
First Quartile	3.2
Median	3.9
Third Quartile	4.325
SD	0.866
Coefficient of Variation	0.232
Skewness	-0.0766

Normal Distribution Test

Shapiro Wilk Test Statistic	0.976
5% Shapiro Wilk Critical Value	0.897

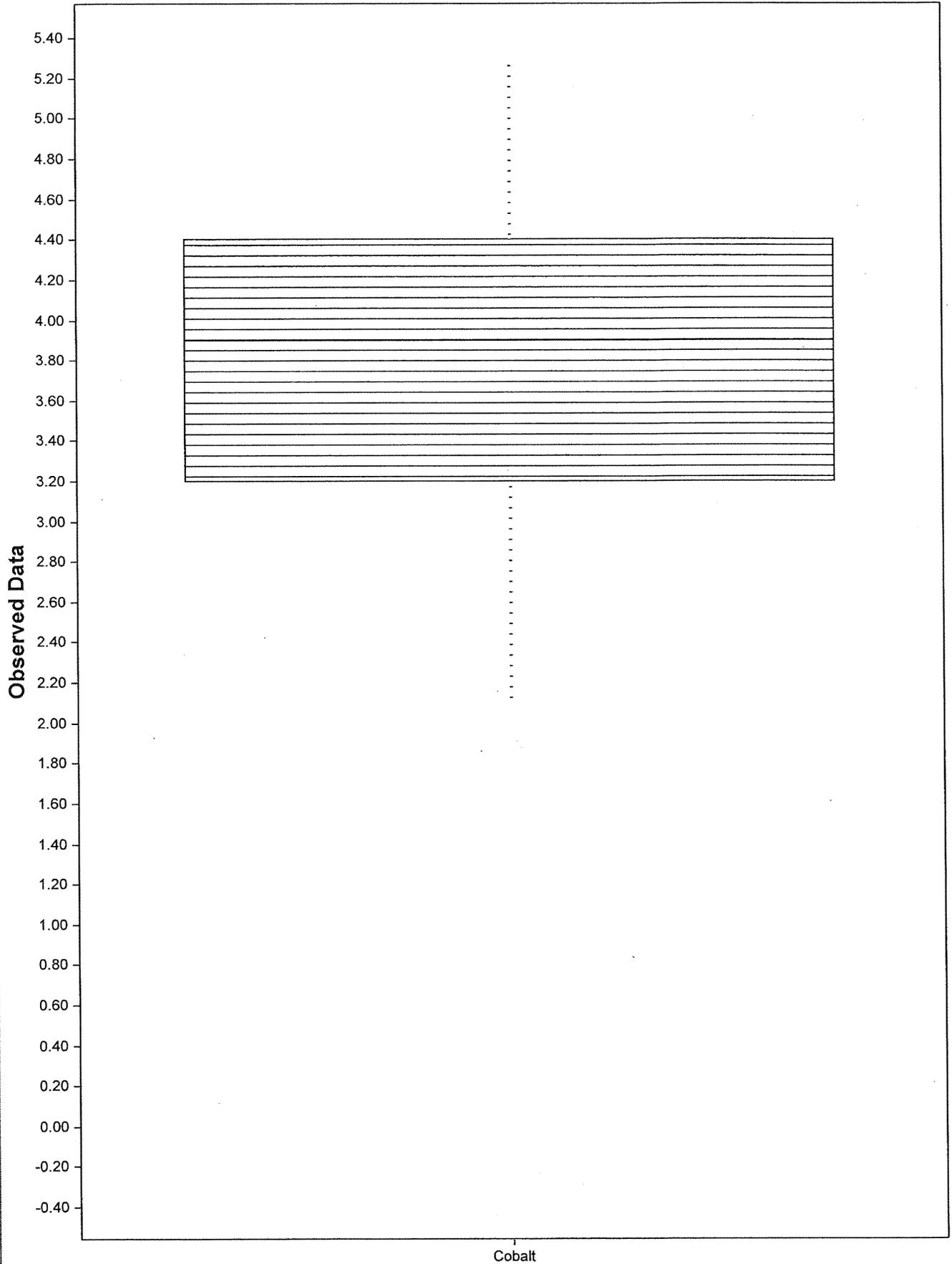
Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

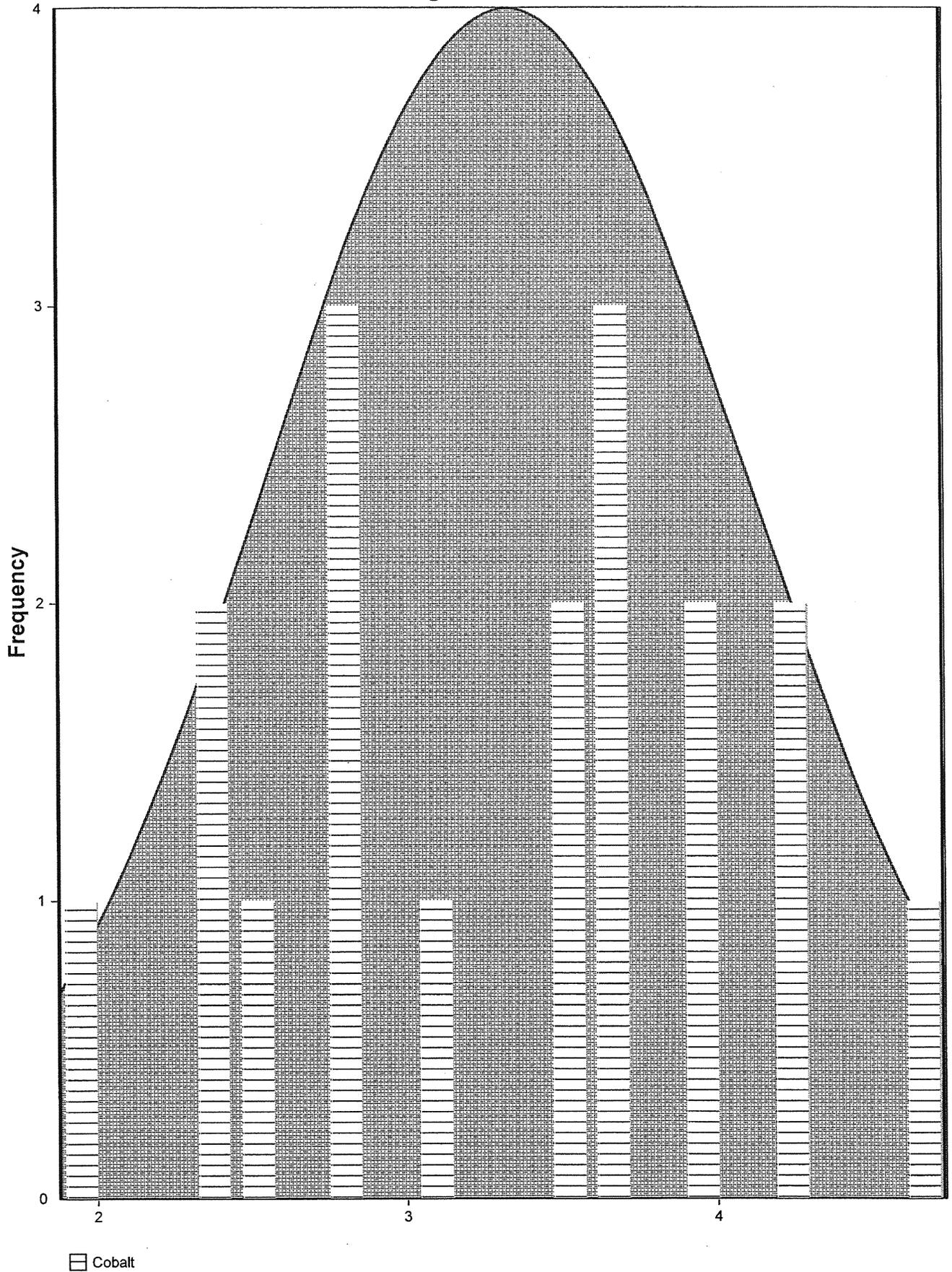
90% Percentile (z)	4.838
95% Percentile (z)	5.153
99% Percentile (z)	5.743
Tolerance Factor K	2.453
95% UTL with 95% Coverage	5.853
95% UPL (t)	5.276

Outlier Tests for Selected Variables	
<b>User Selected Options</b>	
From File	WorkSheet.wst
Full Precision	OFF
Test for Suspected Outliers with Dixon test	1
Test for Suspected Outliers with Rosner test	1
<b>Dixon's Outlier Test for Cobalt</b>	
Number of data = 18	
10% critical value: 0.424	
5% critical value: 0.475	
1% critical value: 0.561	
<b>1. Data Value 5.3 is a Potential Outlier (Upper Tail)?</b>	
Test Statistic: 0.192	
For 10% significance level, 5.3 is not an outlier.	
For 5% significance level, 5.3 is not an outlier.	
For 1% significance level, 5.3 is not an outlier.	
<b>2. Data Value 2.1 is a Potential Outlier (Lower Tail)?</b>	
Test Statistic: 0.222	
For 10% significance level, 2.1 is not an outlier.	
For 5% significance level, 2.1 is not an outlier.	
For 1% significance level, 2.1 is not an outlier.	

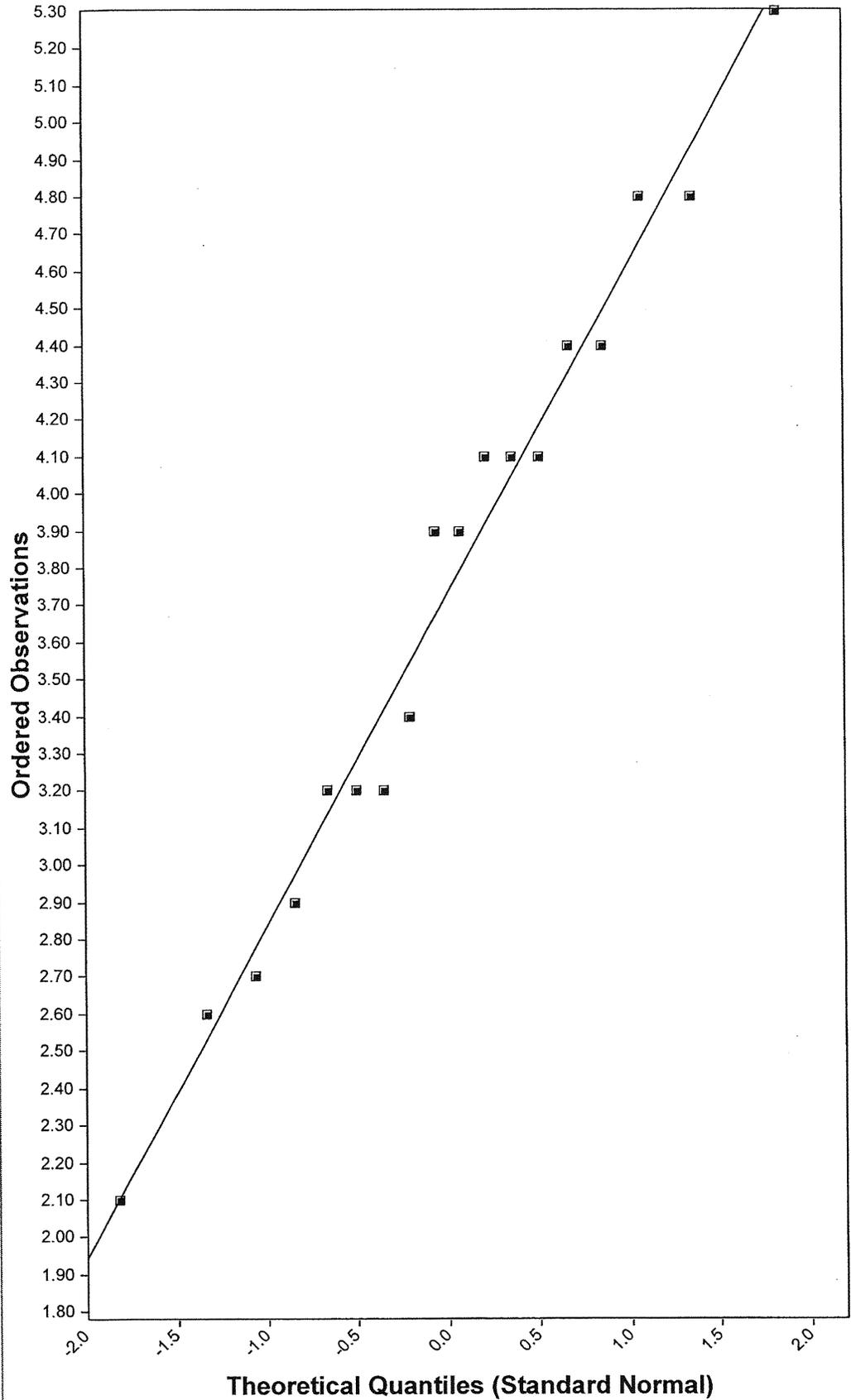
# Box Plot for Cobalt



# Histogram for Cobalt



### Normal Q-Q Plot for Cobalt



#### Cobalt

n = 18

Mean = 3.728

Sd = 0.866

Slope = 0.893

Intercept = 3.728

Correlation, R = 0.99

Shapiro-Wilk Test

Exact Test Value = 0.976

Critical Val(0.05) = 0.897

Data Appear Normal

Approx. Test Value = 0.977

p-Value = 0.898

■ Cobalt



Normal Background Statistics for Full Data Sets

User Selected Options

From File	I:\Projects\Western Refining Company\GIANT\Bloomfield\NMED July 2007 Order\Site Background\June 2
Full Precision	OFF
Confidence Coefficient	95%
Coverage	95%
Different or Future K Values	1

Copper

Raw Statistics

Number of Valid Observations	18
Number of Distinct Observations	17
Minimum	2.3
Maximum	8.8
Second Largest	8.7
Mean	6.039
Geometric Mean	5.74
First Quartile	5.125
Median	6
Third Quartile	7.425
SD	1.813
Coefficient of Variation	0.3
Skewness	-0.256

Normal Distribution Test

Shapiro Wilk Test Statistic	0.972
5% Shapiro Wilk Critical Value	0.897

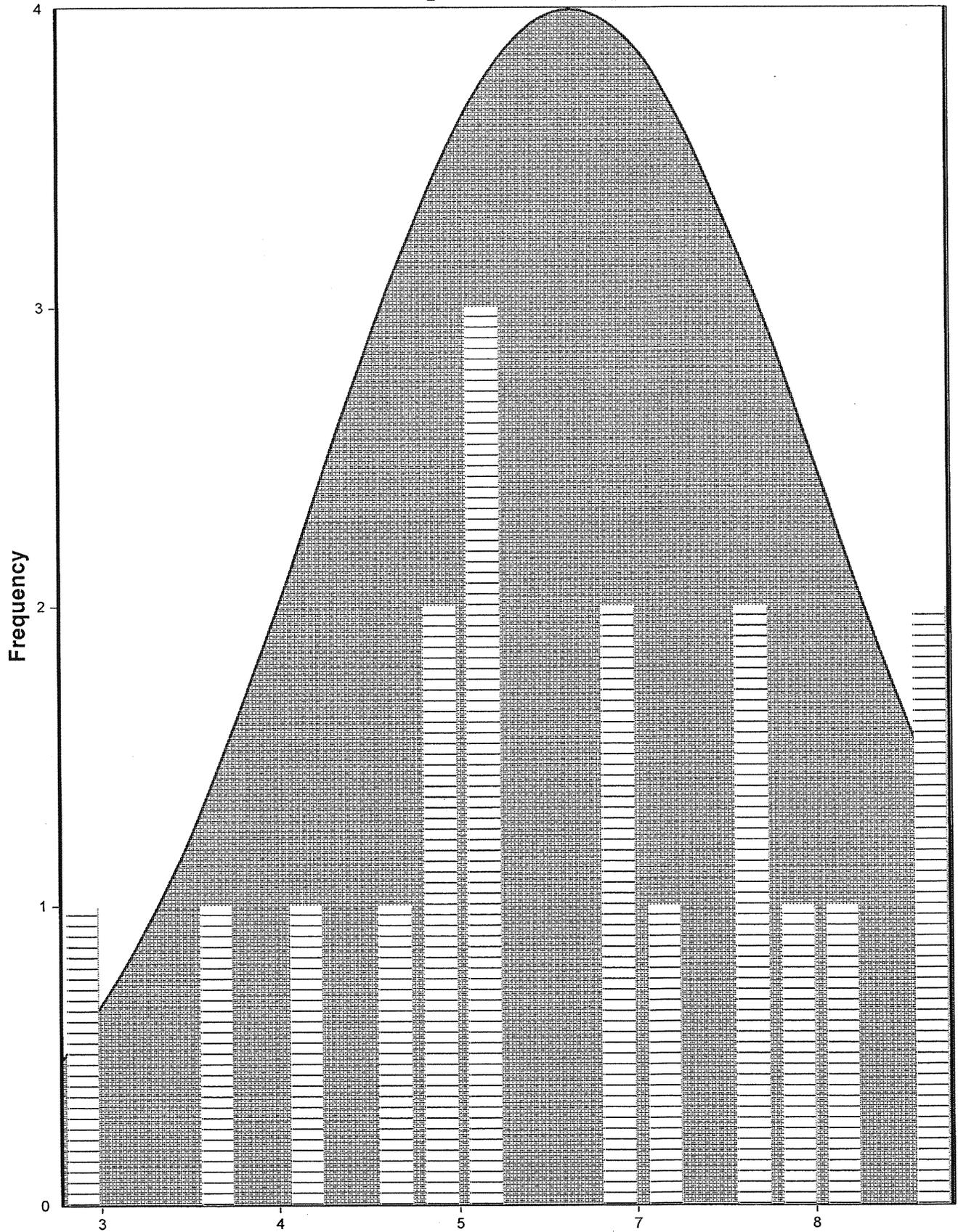
Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

90% Percentile (z)	8.362
95% Percentile (z)	9.021
99% Percentile (z)	10.26
Tolerance Factor K	2.453
95% UTL with 95% Coverage	10.49
95% UPL (t)	9.279

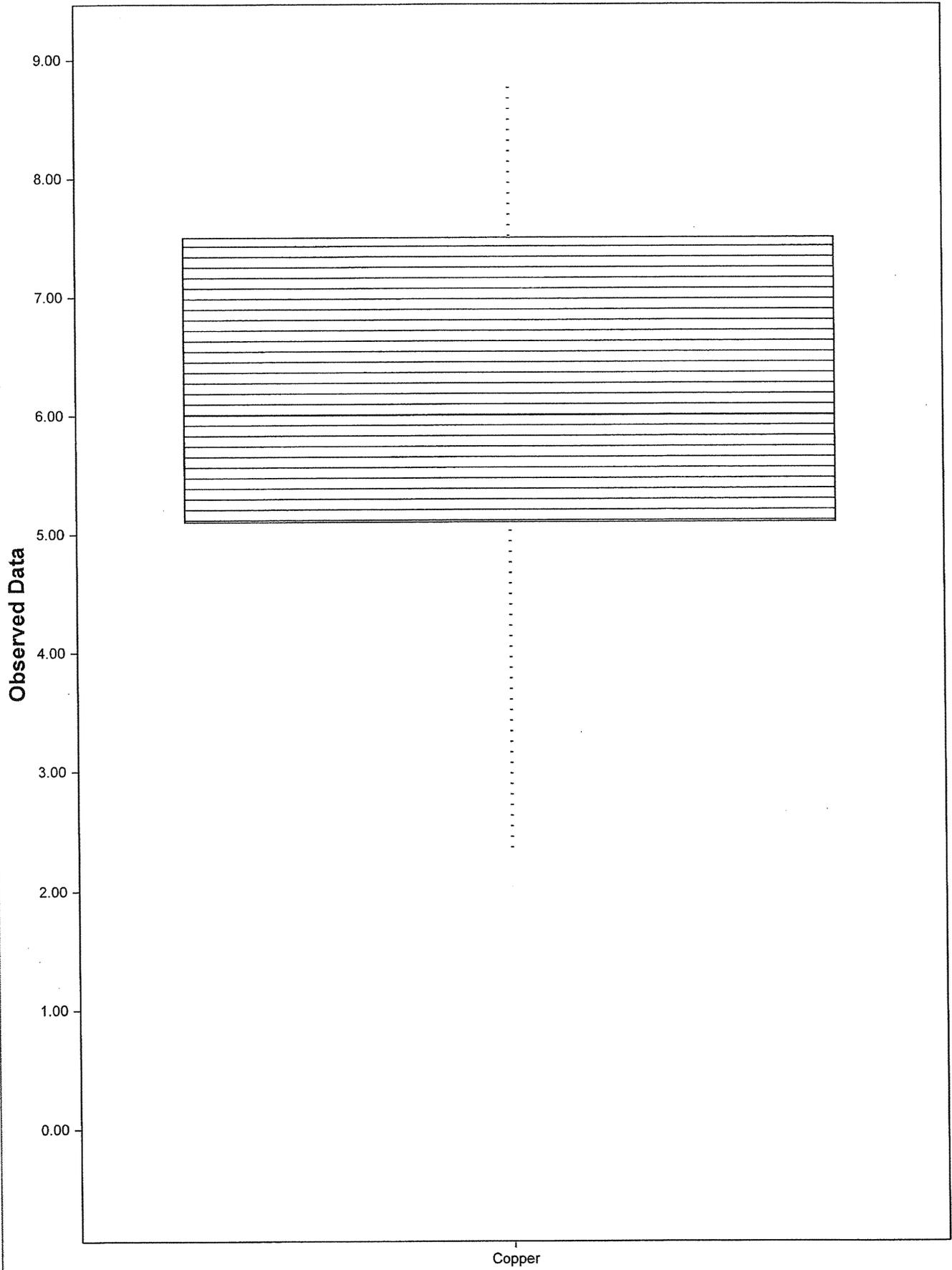
Outlier Tests for Selected Variables	
<b>User Selected Options</b>	
From File	WorkSheet.wst
Full Precision	OFF
Test for Suspected Outliers with Dixon test	1
Test for Suspected Outliers with Rosner test	1
<b>Dixon's Outlier Test for Copper</b>	
Number of data =	18
10% critical value:	0.424
5% critical value:	0.475
1% critical value:	0.561
<b>1. Data Value 8.8 is a Potential Outlier (Upper Tail)?</b>	
Test Statistic:	0.146
For 10% significance level, 8.8 is not an outlier.	
For 5% significance level, 8.8 is not an outlier.	
For 1% significance level, 8.8 is not an outlier.	
<b>2. Data Value 2.3 is a Potential Outlier (Lower Tail)?</b>	
Test Statistic:	0.293
For 10% significance level, 2.3 is not an outlier.	
For 5% significance level, 2.3 is not an outlier.	
For 1% significance level, 2.3 is not an outlier.	

# Histogram for Copper

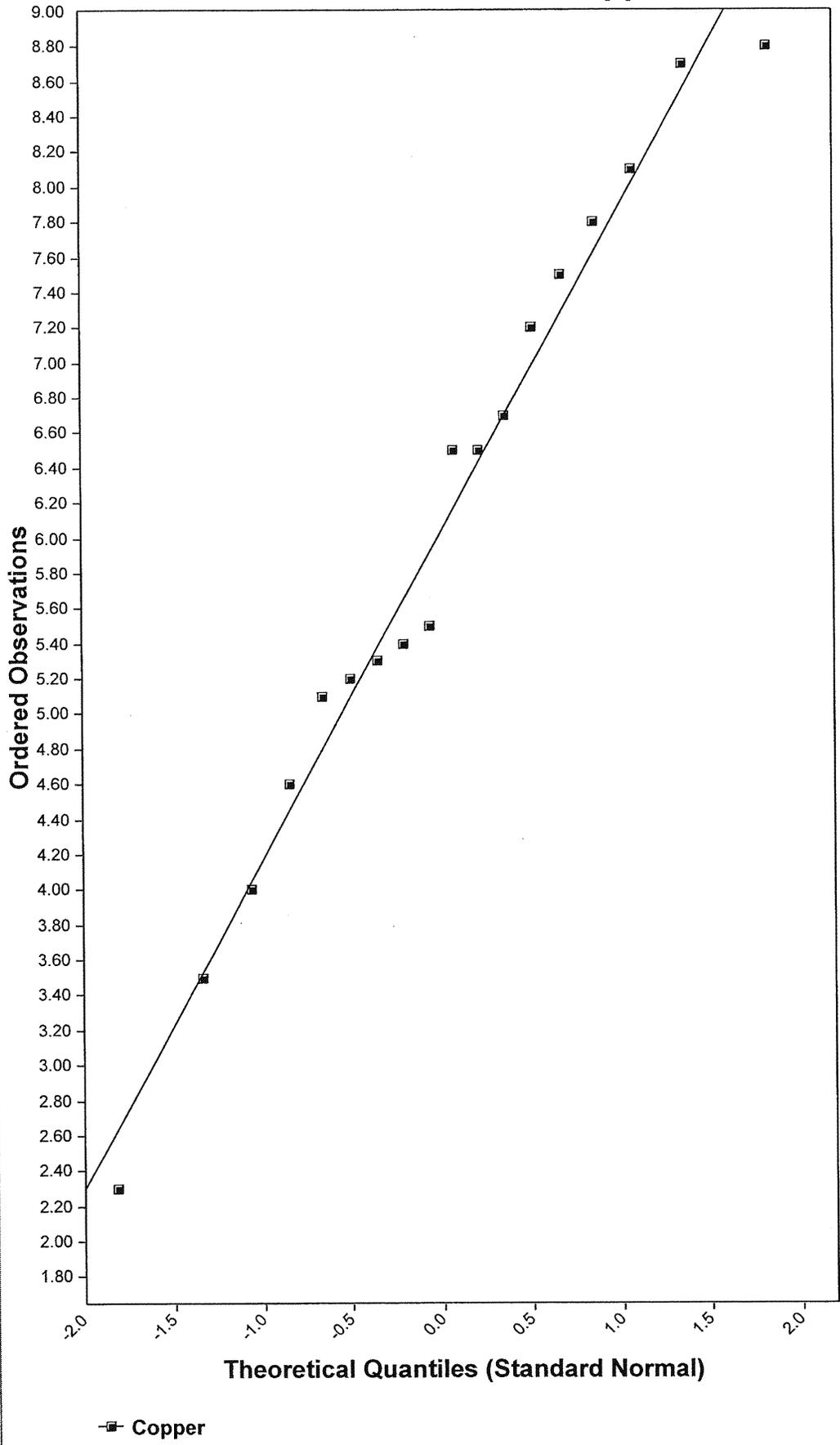


□ Copper

# Box Plot for Copper



# Normal Q-Q Plot for Copper



## Copper

n = 18

Mean = 6.039

Sd = 1.813

Slope = 1.868

Intercept = 6.039

Correlation, R = 0.99

Shapiro-Wilk Test

Exact Test Value = 0.972

Critical Val(0.05) = 0.897

Data Appear Normal

Approx. Test Value = 0.974

p-Value = 0.854



Lognormal Background Statistics for Data Sets with Non-Detects

User Selected Options

From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Coverage	95%
Different or Future K Values	1
Number of Bootstrap Operations	2000

Fluoride

Log-Transformed Statistics

Total Number of Data	18
Number of Non-Detect Data	2
Number of Detected Data	16
Minimum Detected	-0.713
Maximum Detected	2.485
Percent Non-Detects	11.11%
Minimum Non-detect	0.405
Maximum Non-detect	0.405
Mean of Detected data	1.045
SD of Detected data	1.072

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.919
5% Shapiro Wilk Critical Value	0.887

Data appear Lognormal at 5% Significance Level

Background Statistics Assuming Lognormal Distribution

DL/2 Substitution Method

Mean (Log Scale)	0.897
SD (Log Scale)	1.095
Tolerance Factor K	2.453
95% UTL 95% Coverage	35.98
95% UPL	17.36
90% Percentile (z)	9.978
95% Percentile (z)	14.85
99% Percentile (z)	31.32

Note: DL/2 is not a recommended method.

Log ROS Method

Mean in Log Scale	0.913
SD in Log Scale	1.082
Mean in Original Scale	4.061
SD in Original Scale	3.73
95% UTL 95% Coverage	35.43
95% BCA UTL with 95% Coverage	12
95% Bootstrap (%) UTL with 95% Coverage	12
95% UPL (t)	17.24
90% Percentile (z)	9.972

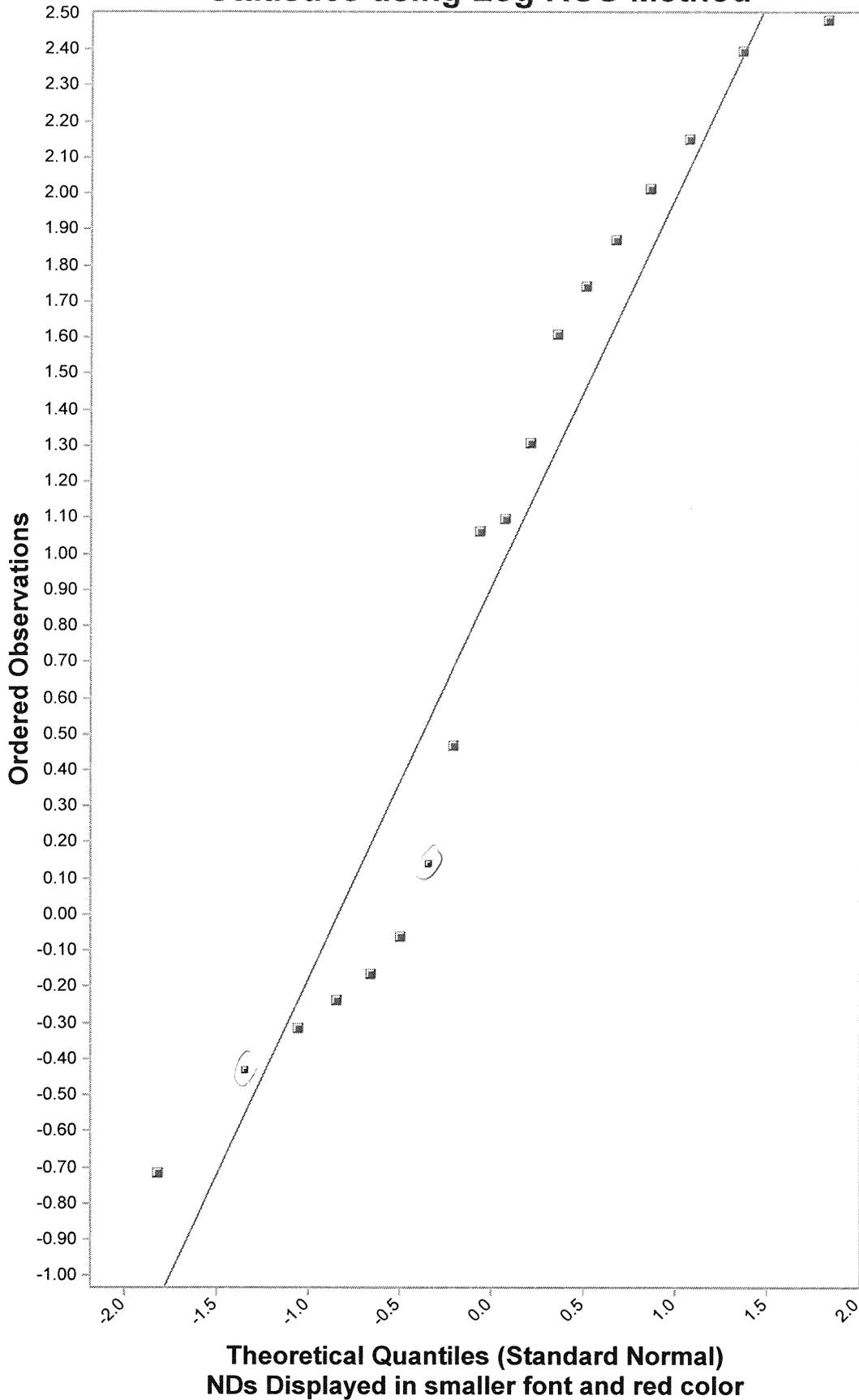


Outlier Tests for Selected Variables	
<b>User Selected Options</b>	
From File	WorkSheet.wst
Full Precision	OFF
Test for Suspected Outliers with Dixon test	1
Test for Suspected Outliers with Rosner test	1
<b>Dixon's Outlier Test for Fluoride</b>	
Number of data = 18	
10% critical value: 0.424	
5% critical value: 0.475	
1% critical value: 0.561	
<b>1. Data Value 12 is a Potential Outlier (Upper Tail)?</b>	
Test Statistic: 0.302	
For 10% significance level, 12 is not an outlier.	
For 5% significance level, 12 is not an outlier.	
For 1% significance level, 12 is not an outlier.	
<b>2. Data Value 0.49 is a Potential Outlier (Lower Tail)?</b>	
Test Statistic: 0.032	
For 10% significance level, 0.49 is not an outlier.	
For 5% significance level, 0.49 is not an outlier.	
For 1% significance level, 0.49 is not an outlier.	

	0	1	2	3	4
	Fluoride	D_Fluoride	NROS_Fluoride	LnROS_Fluoride	GROS_Fluoride
1	0.94	1	0.94	0.94	0.94
2	11	1	11	11	11
3	1.5	0	-0.559740528989136	0.649056568645270	0.0001
4	8.6	1	8.6	8.6	8.6
5	1.6	1	1.6	1.6	1.6
6	7.5	1	7.5	7.5	7.5
7	0.73	1	0.73	0.73	0.73
8	6.5	1	6.5	6.5	6.5
9	0.49	1	0.49	0.49	0.49
10	5	1	5	5	5
11	0.79	1	0.79	0.79	0.79
12	5.7	1	5.7	5.7	5.7
13	1.5	0	1.38585945013217	1.15127130338858	0.98005433455784
14	2.9	1	2.9	2.9	2.9
15	0.85	1	0.85	0.85	0.85
16	12	1	12	12	12
17	3.7	1	3.7	3.7	3.7
18	3	1	3	3	3

↑  
Selected  
Substitution  
Method

# Lognormal Q-Q Plot for Fluoride Statistics using Log ROS Method



## Fluoride

n = 18

Mean = 0.913

Sd = 1.082

Slope = 1.091

Intercept = 0.913

Correlation, R = 0.968

Shapiro-Wilk Test

Exact Test Value = 0.917

Critical Val(0.05) = 0.897

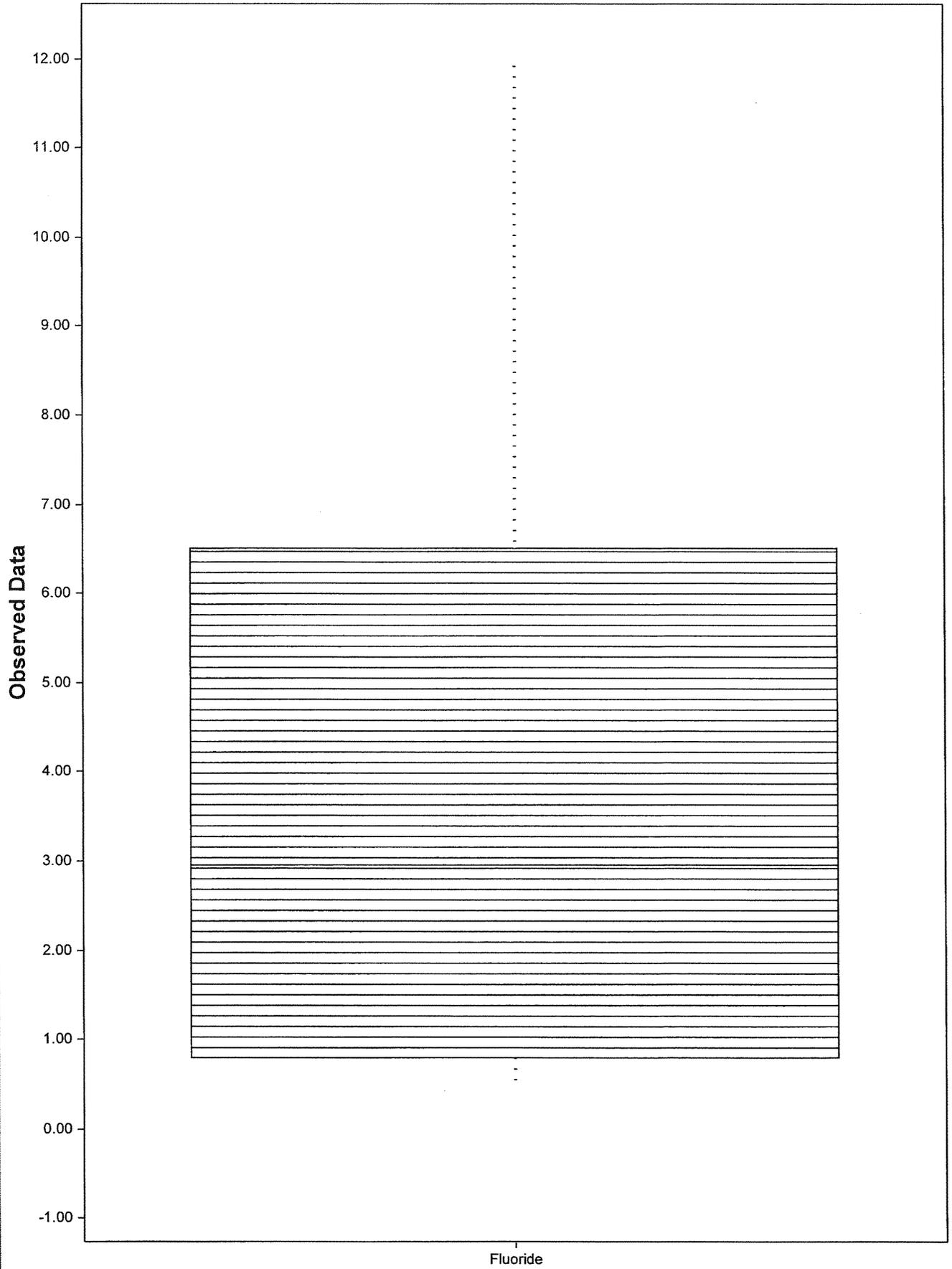
Data Appear Lognormal

Approx. Test Value = 0.923

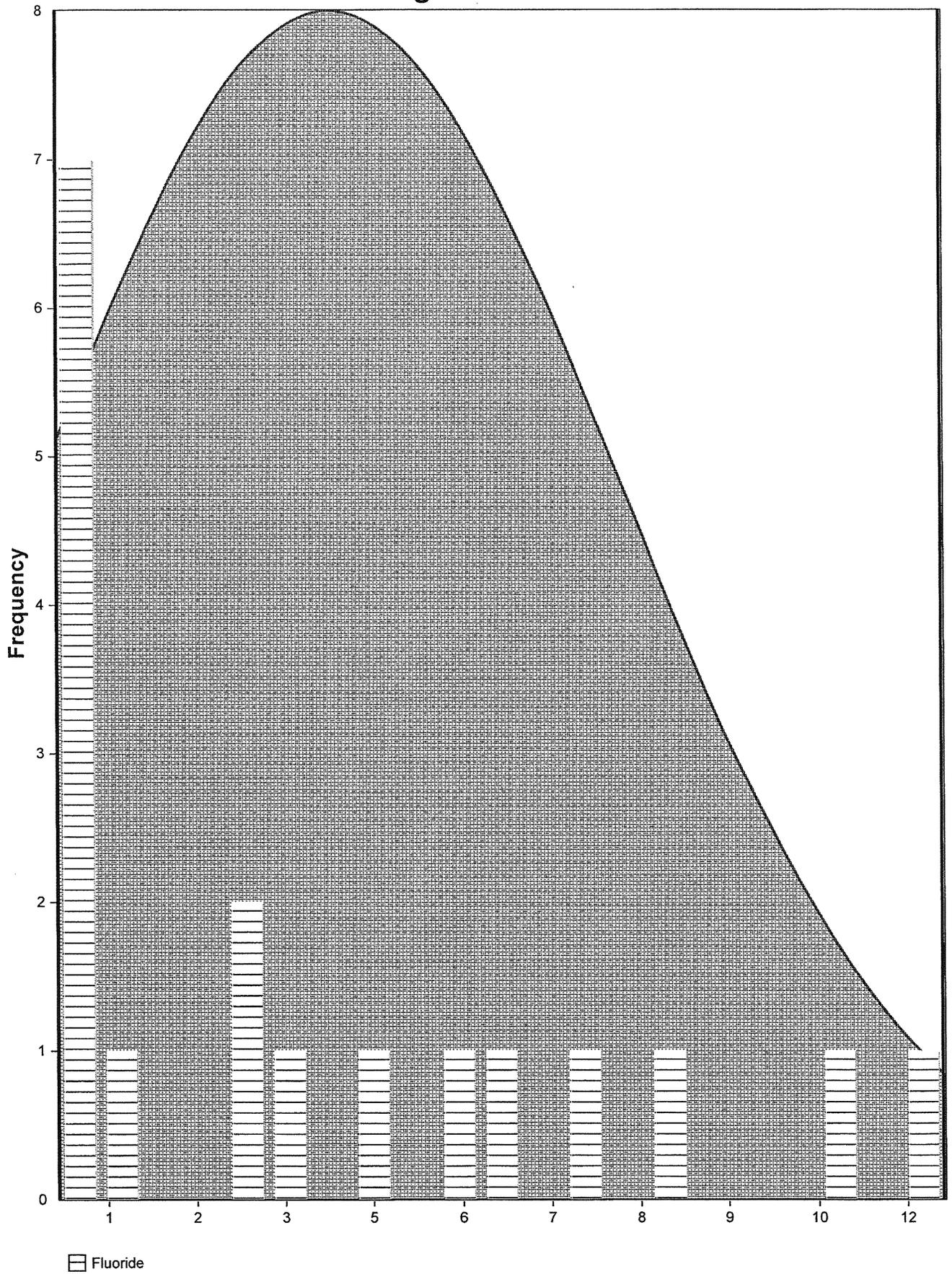
p-Value = 0.148

Fluoride

# Box Plot for Fluoride



# Histogram for Fluoride



Normal Background Statistics for Full Data Sets

User Selected Options

From File	I:\Projects\Western Refining Company\GIANT\Bloomfield\NMED July 2007 Order\Site Background\June 2
Full Precision	OFF
Confidence Coefficient	95%
Coverage	95%
Different or Future K Values	1

Iron

Raw Statistics

Number of Valid Observations	18
Number of Distinct Observations	12
Minimum	6500
Maximum	19000
Second Largest	18000
Mean	13539
Geometric Mean	12979
First Quartile	11250
Median	13000
Third Quartile	17500
SD	3811
Coefficient of Variation	0.281
Skewness	-0.203

Normal Distribution Test

Shapiro Wilk Test Statistic	0.938
5% Shapiro Wilk Critical Value	0.897

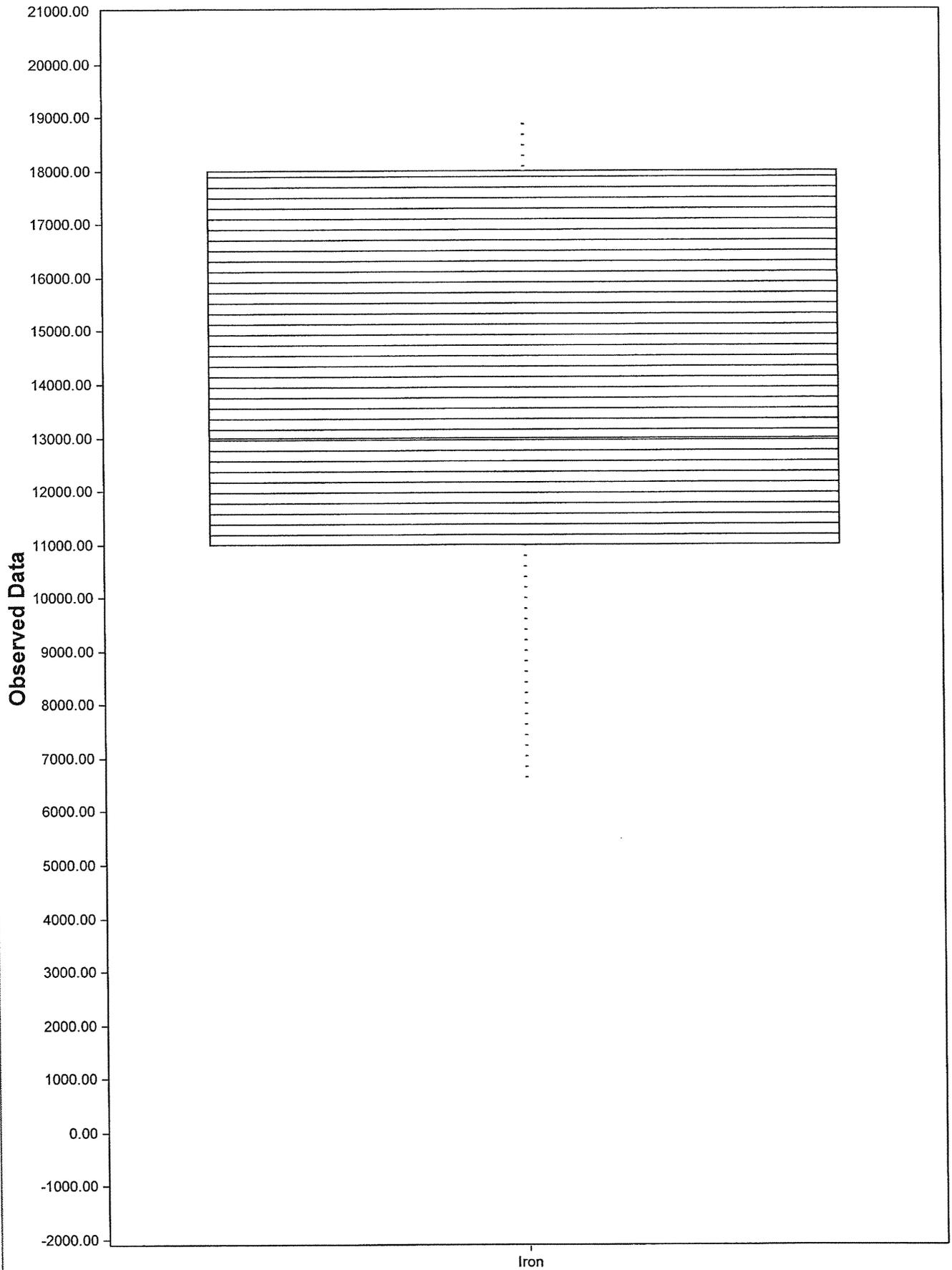
Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

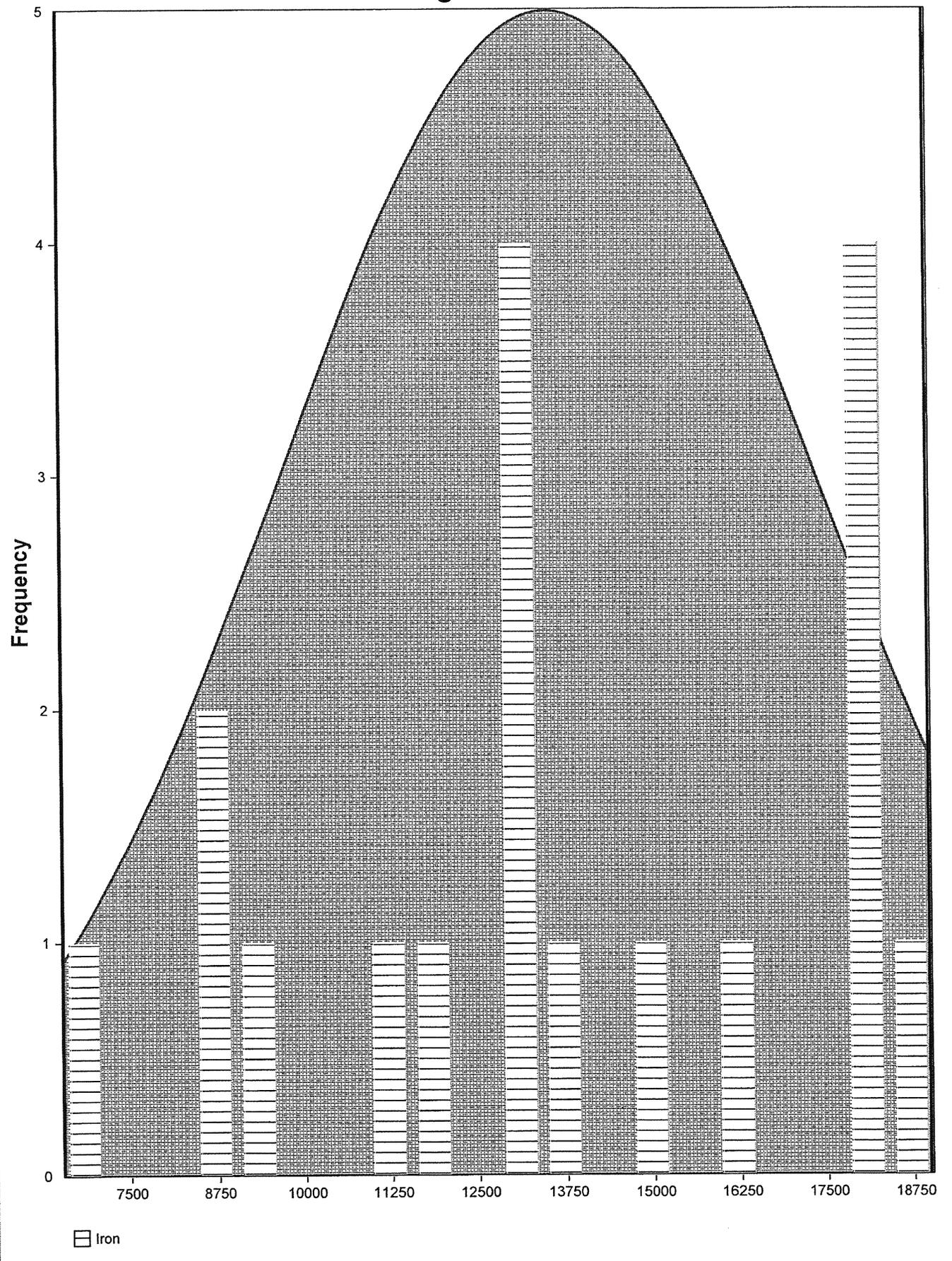
90% Percentile (z)	18423
95% Percentile (z)	19807
99% Percentile (z)	22404
Tolerance Factor K	2.453
95% UTL with 95% Coverage	22887
95% UPL (t)	20350

Outlier Tests for Selected Variables	
<b>User Selected Options</b>	
From File	WorkSheet.wst
Full Precision	OFF
Test for Suspected Outliers with Dixon test	1
Test for Suspected Outliers with Rosner test	1
<b>Dixon's Outlier Test for Iron</b>	
Number of data = 18	
10% critical value: 0.424	
5% critical value: 0.475	
1% critical value: 0.561	
<b>1. Data Value 19000 is a Potential Outlier (Upper Tail)?</b>	
Test Statistic: 0.097	
For 10% significance level, 19000 is not an outlier.	
For 5% significance level, 19000 is not an outlier.	
For 1% significance level, 19000 is not an outlier.	
<b>2. Data Value 6500 is a Potential Outlier (Lower Tail)?</b>	
Test Statistic: 0.191	
For 10% significance level, 6500 is not an outlier.	
For 5% significance level, 6500 is not an outlier.	
For 1% significance level, 6500 is not an outlier.	

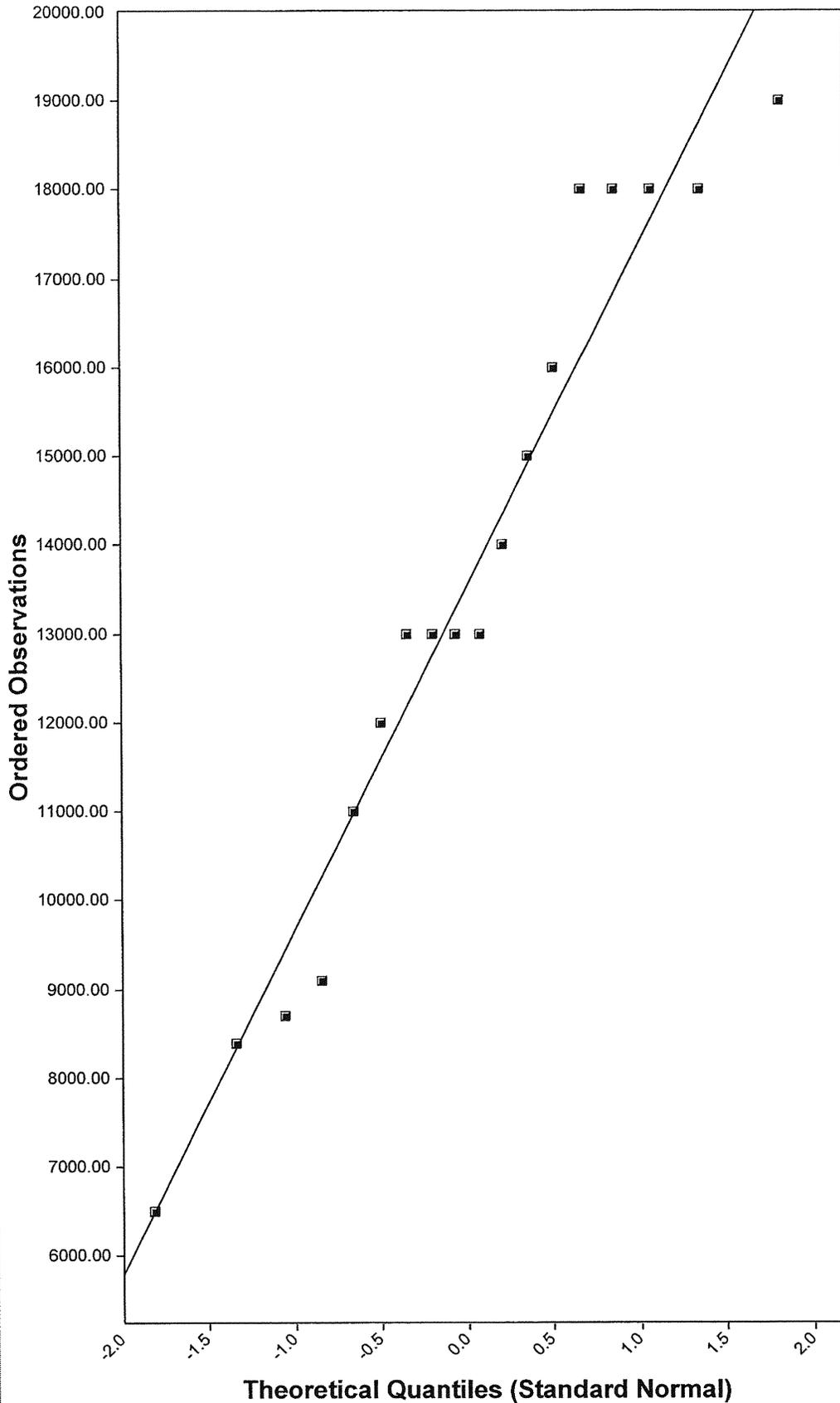
# Box Plot for Iron



# Histogram for Iron



# Normal Q-Q Plot for Iron



## Iron

n = 18  
Mean = 13539  
Sd = 3811  
Slope = 3869  
Intercept = 13539  
Correlation, R = 0.975  
Shapiro-Wilk Test  
Exact Test Value = 0.938  
Critical Val(0.05) = 0.897  
Data Appear Normal  
Approx. Test Value = 0.942  
p-Value = 0.313

—■— Iron



Normal Background Statistics for Full Data Sets

User Selected Options

From File	I:\Projects\Western Refining Company\GIANT\Bloomfield\NMED July 2007 Order\Site Background\June 2
Full Precision	OFF
Confidence Coefficient	95%
Coverage	95%
Different or Future K Values	1

Lead

Raw Statistics

Number of Valid Observations	18
Number of Distinct Observations	11
Minimum	1.2
Maximum	3.2
Second Largest	3.2
Mean	2.35
Geometric Mean	2.277
First Quartile	2.2
Median	2.4
Third Quartile	2.75
SD	0.562
Coefficient of Variation	0.239
Skewness	-0.499

Normal Distribution Test

Shapiro Wilk Test Statistic	0.945
5% Shapiro Wilk Critical Value	0.897

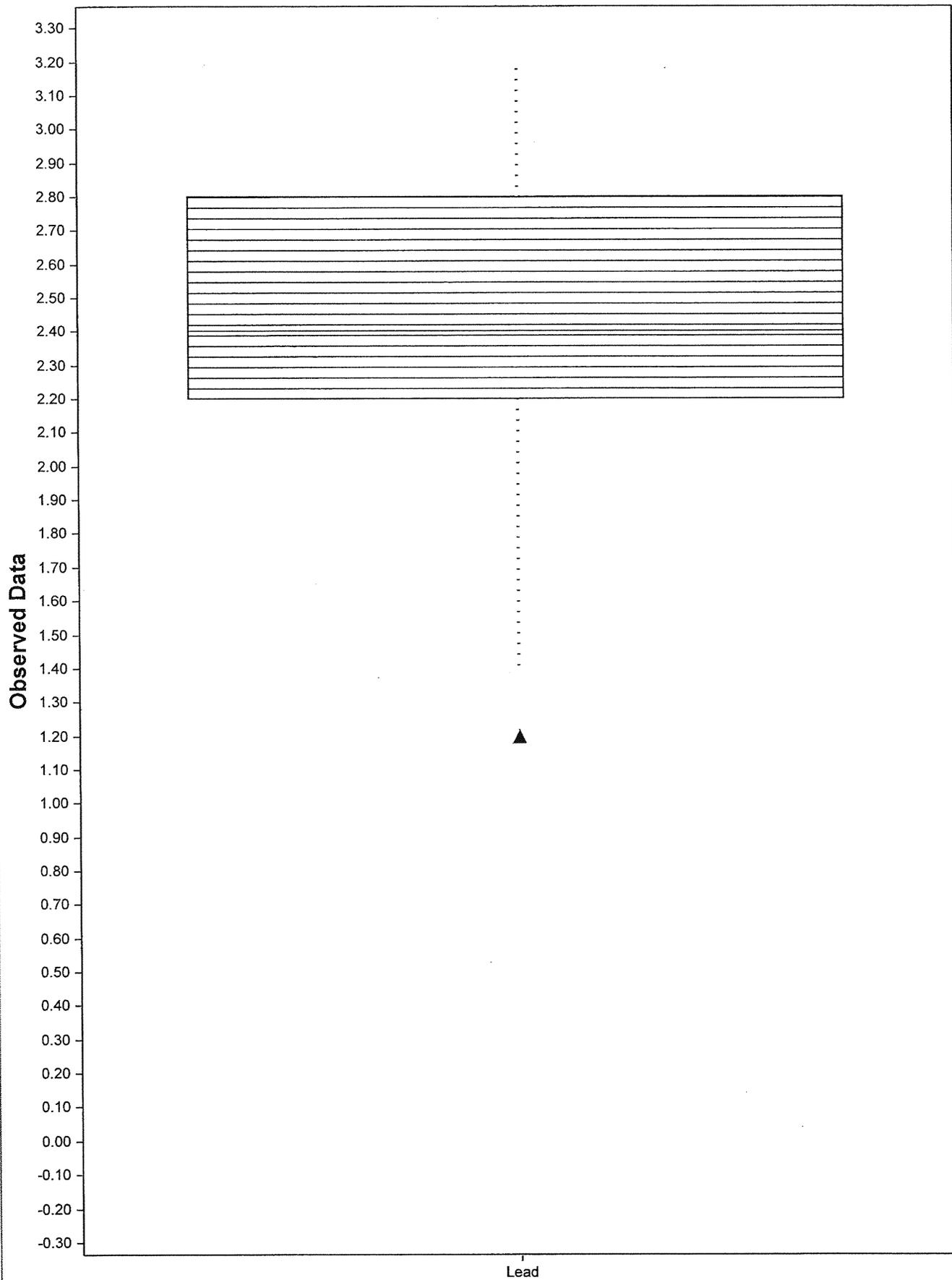
Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

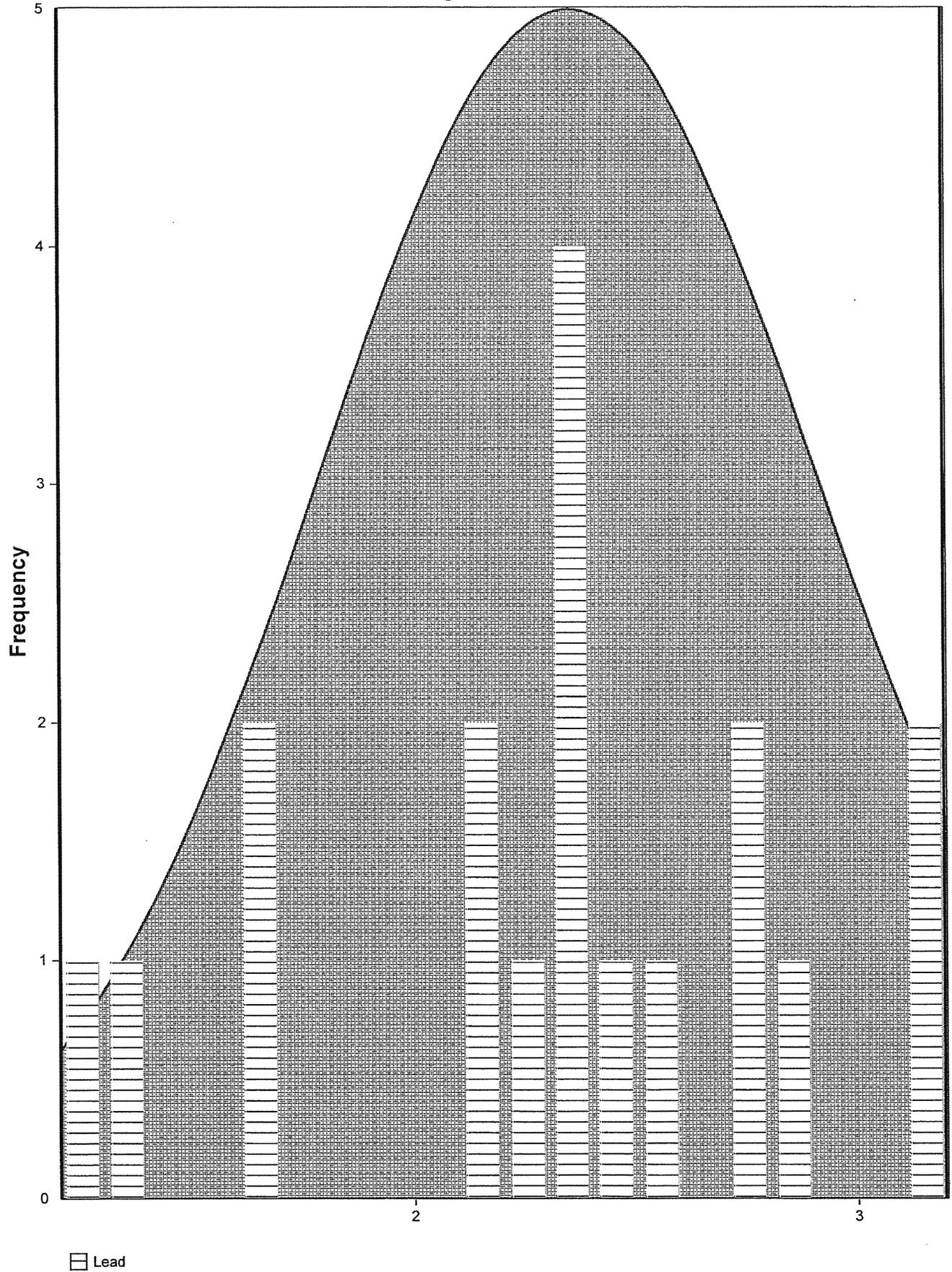
90% Percentile (z)	3.07
95% Percentile (z)	3.274
99% Percentile (z)	3.657
Tolerance Factor K	2.453
95% UTL with 95% Coverage	3.728
95% UPL (t)	3.354

Outlier Tests for Selected Variables	
User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Test for Suspected Outliers with Dixon test	1
Test for Suspected Outliers with Rosner test	1
<b>Dixon's Outlier Test for Lead</b>	
Number of data =	18
10% critical value:	0.424
5% critical value:	0.475
1% critical value:	0.561
<b>1. Data Value 3.2 is a Potential Outlier (Upper Tail)?</b>	
Test Statistic:	0.200
For 10% significance level, 3.2 is not an outlier.	
For 5% significance level, 3.2 is not an outlier.	
For 1% significance level, 3.2 is not an outlier.	
<b>2. Data Value 1.2 is a Potential Outlier (Lower Tail)?</b>	
Test Statistic:	0.294
For 10% significance level, 1.2 is not an outlier.	
For 5% significance level, 1.2 is not an outlier.	
For 1% significance level, 1.2 is not an outlier.	

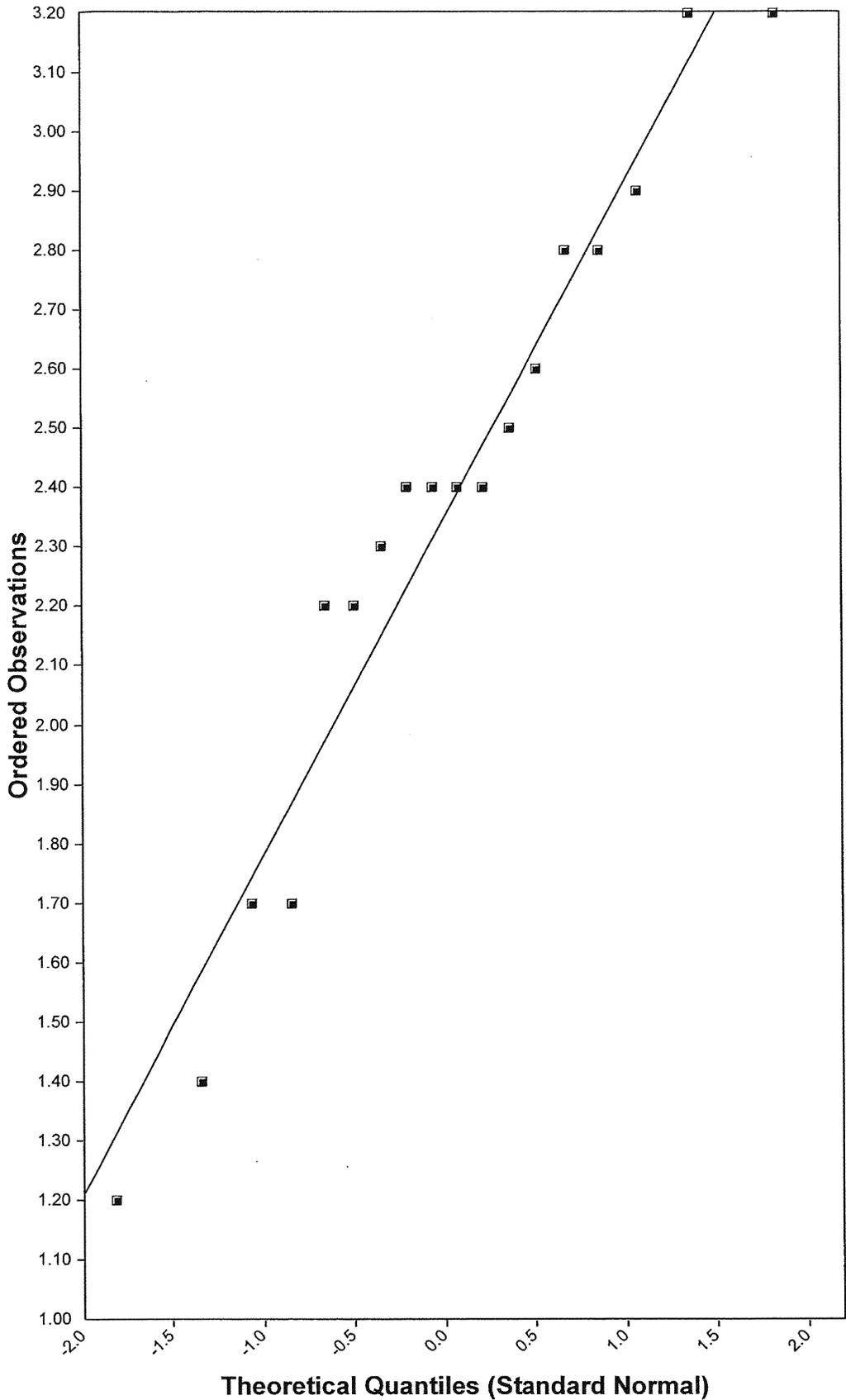
# Box Plot for Lead



# Histogram for Lead



# Normal Q-Q Plot for Lead



## Lead

n = 18

Mean = 2.35

Sd = 0.562

Slope = 0.57

Intercept = 2.35

Correlation, R = 0.975

Shapiro-Wilk Test

Exact Test Value = 0.945

Critical Val(0.05) = 0.897

Data Appear Normal

Approx. Test Value = 0.946

p-Value = 0.374

Lead



Normal Background Statistics for Full Data Sets

User Selected Options

From File	I:\Projects\Western Refining Company\GIANT\Bloomfield\NMED July 2007 Order\Site Background\June 2
Full Precision	OFF
Confidence Coefficient	95%
Coverage	95%
Different or Future K Values	1

Manganese

Raw Statistics

Number of Valid Observations	18
Number of Distinct Observations	12
Minimum	130
Maximum	360
Second Largest	290
Mean	240.6
Geometric Mean	233.5
First Quartile	200
Median	255
Third Quartile	280
SD	57.75
Coefficient of Variation	0.24
Skewness	-0.0857

Normal Distribution Test

Shapiro Wilk Test Statistic	0.962
5% Shapiro Wilk Critical Value	0.897

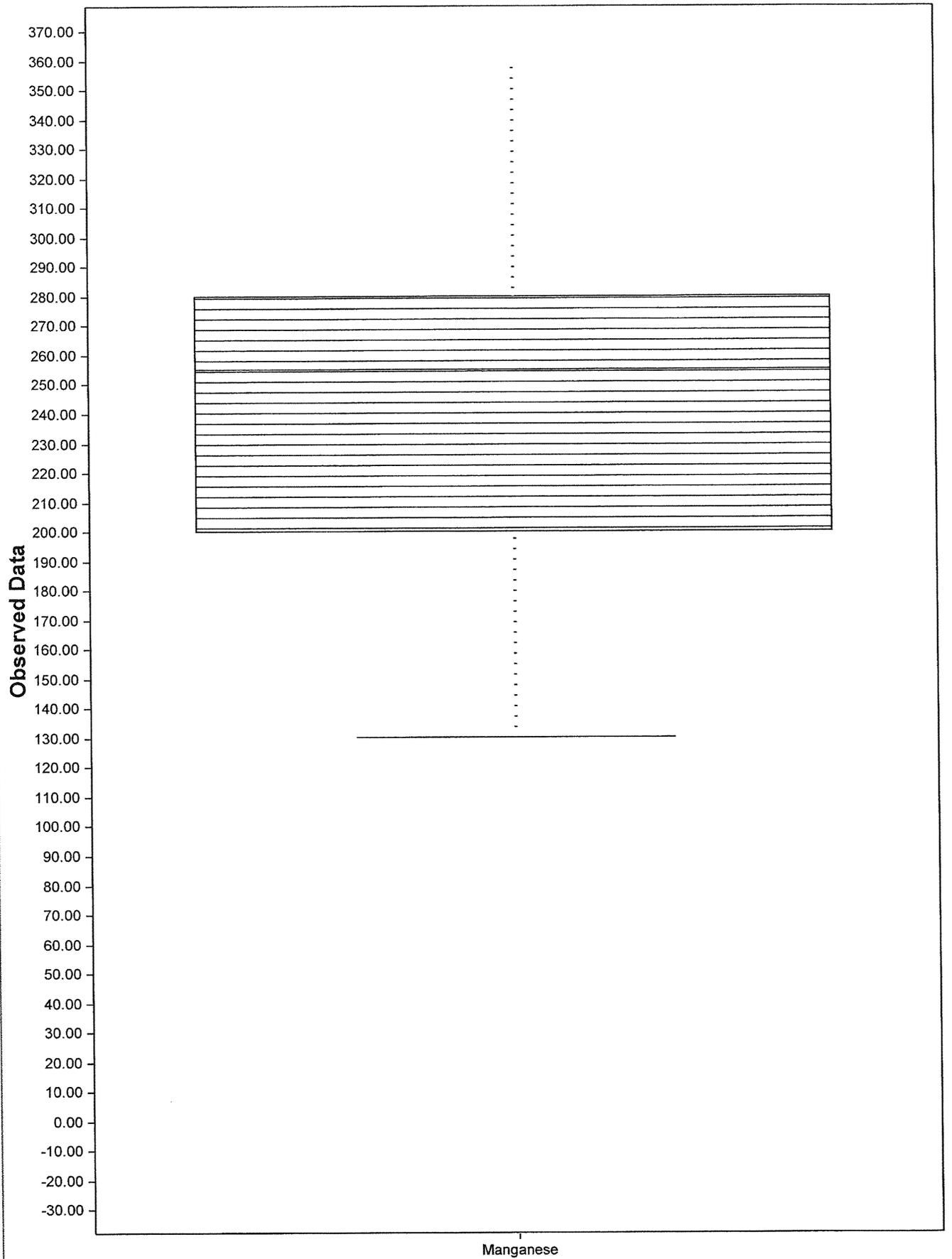
Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

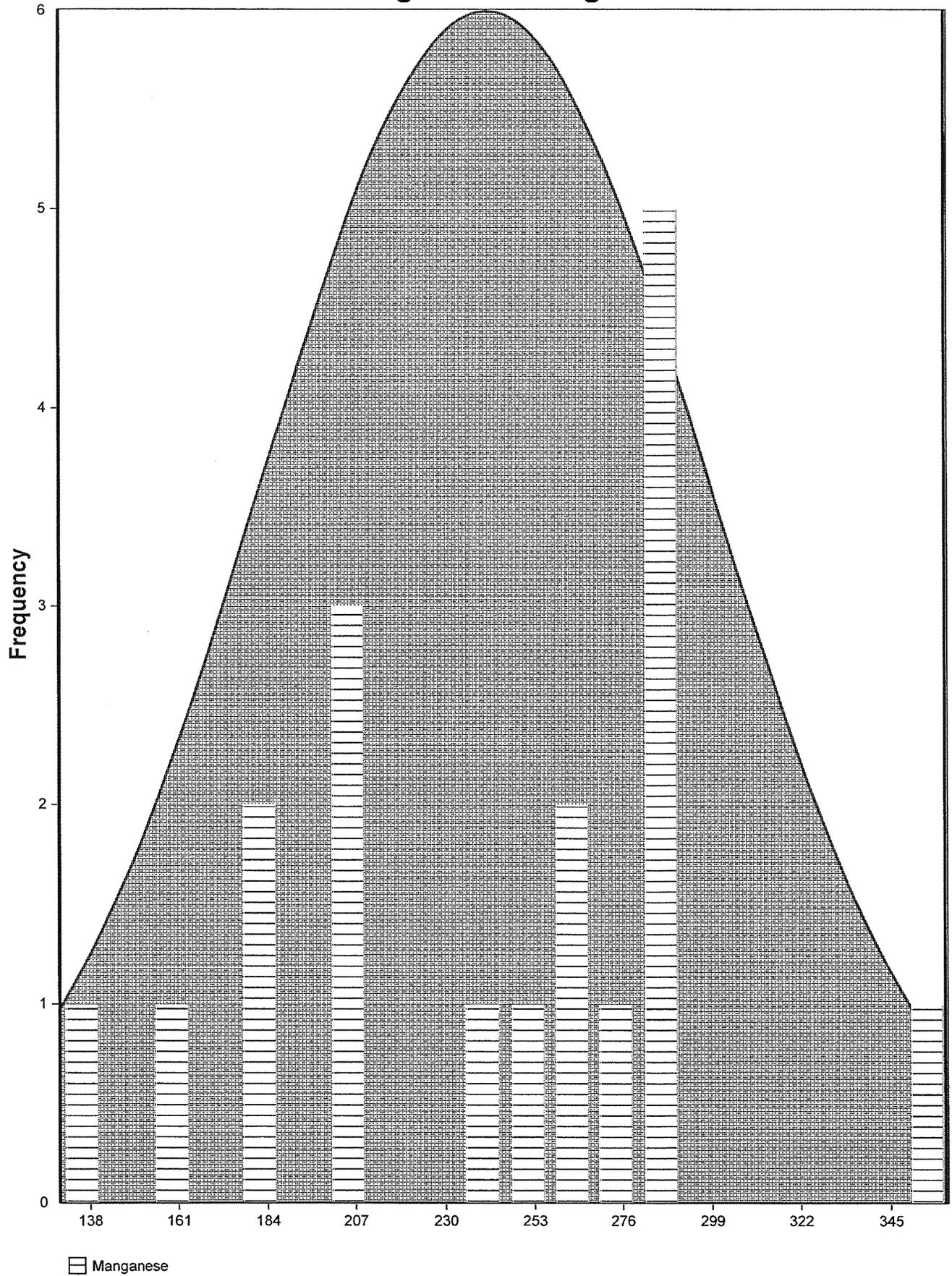
90% Percentile (z)	314.6
95% Percentile (z)	335.5
99% Percentile (z)	374.9
Tolerance Factor K	2.453
95% UTL with 95% Coverage	382.2
95% UPL (t)	343.8

Outlier Tests for Selected Variables	
<b>User Selected Options</b>	
From File	WorkSheet.wst
Full Precision	OFF
Test for Suspected Outliers with Dixon test	1
Test for Suspected Outliers with Rosner test	1
<b>Dixon's Outlier Test for Manganese</b>	
Number of data = 18	
10% critical value: 0.424	
5% critical value: 0.475	
1% critical value: 0.561	
<b>1. Data Value 360 is a Potential Outlier (Upper Tail)?</b>	
Test Statistic: 0.389	
For 10% significance level, 360 is not an outlier.	
For 5% significance level, 360 is not an outlier.	
For 1% significance level, 360 is not an outlier.	
<b>2. Data Value 130 is a Potential Outlier (Lower Tail)?</b>	
Test Statistic: 0.313	
For 10% significance level, 130 is not an outlier.	
For 5% significance level, 130 is not an outlier.	
For 1% significance level, 130 is not an outlier.	

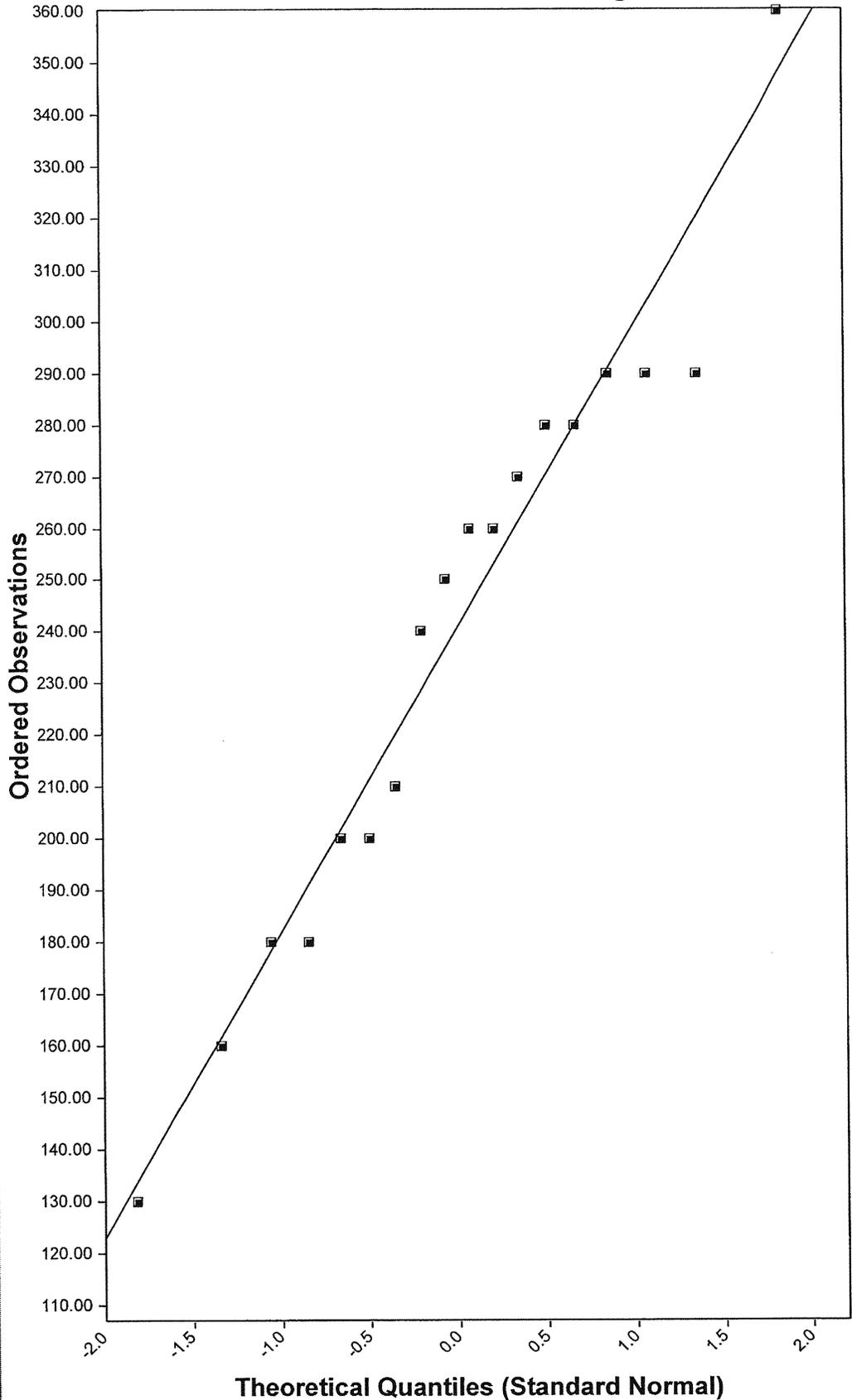
# Box Plot for Manganese



# Histogram for Manganese



# Normal Q-Q Plot for Manganese



## Manganese

n = 18  
Mean = 240.6  
Sd = 57.75  
Slope = 58.87  
Intercept = 240.6  
Correlation, R = 0.979  
Shapiro-Wilk Test  
Exact Test Value = 0.962  
Critical Val(0.05) = 0.897  
Data Appear Normal  
Approx. Test Value = 0.962  
p-Value = 0.628



Normal Background Statistics for Full Data Sets

User Selected Options

From File	WorkSheet_a.wst
Full Precision	OFF
Confidence Coefficient	95%
Coverage	95%
Different or Future K Values	1

NROS\_Mercury

Raw Statistics

Number of Valid Observations	17
Number of Distinct Observations	14
Minimum	0.0016
Maximum	0.018
Second Largest	0.016
Mean	0.0113
Geometric Mean	0.0102
First Quartile	0.00929
Median	0.012
Third Quartile	0.0133
SD	0.0039
Coefficient of Variation	0.346
Skewness	-0.713

Normal Distribution Test

Shapiro Wilk Test Statistic	0.968
5% Shapiro Wilk Critical Value	0.892

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

90% Percentile (z)	0.0163
95% Percentile (z)	0.0177
99% Percentile (z)	0.0203
Tolerance Factor K	2.486
95% UTL with 95% Coverage	0.021
95% UPL (t)	0.0183

Outlier Tests for Selected Variables

User Selected Options

From File    WorkSheet.wst

Full Precision    OFF

Test for Suspected Outliers with Dixon test    1

Test for Suspected Outliers for Rosner test    1

**Dixon's Outlier Test for Mercury**

Number of data = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

**1. Data Value 0.12 is a Potential Outlier (Upper Tail)?**

Test Statistic: 0.927

For 10% significance level, 0.12 is an outlier.

For 5% significance level, 0.12 is an outlier.

For 1% significance level, 0.12 is an outlier.

**2. Data Value 0.0016 is a Potential Outlier (Lower Tail)?**

Test Statistic: 0.431

For 10% significance level, 0.0016 is not an outlier.

For 5% significance level, 0.0016 is not an outlier.

For 1% significance level, 0.0016 is not an outlier.

Outlier Tests for Selected Variables

User Selected Options:

From File: WorkSheet\_a.wst

Full Precision: OFF

Test for Suspected Outliers with Dixon test: 1

Test for Suspected Outliers with Rosner test: 1

Dixon's Outlier Test for Mercury

Number of data = 15

10% critical value: 0.472

5% critical value: 0.525

1% critical value: 0.616

1. Data Value 0.018 is a Potential Outlier (Upper Tail)?

Test Statistic: 0.294

For 10% significance level, 0.018 is not an outlier.

For 5% significance level, 0.018 is not an outlier.

For 1% significance level, 0.018 is not an outlier.

2. Data Value 0.0016 is a Potential Outlier (Lower Tail)?

Test Statistic: 0.463

For 10% significance level, 0.0016 is not an outlier.

For 5% significance level, 0.0016 is not an outlier.

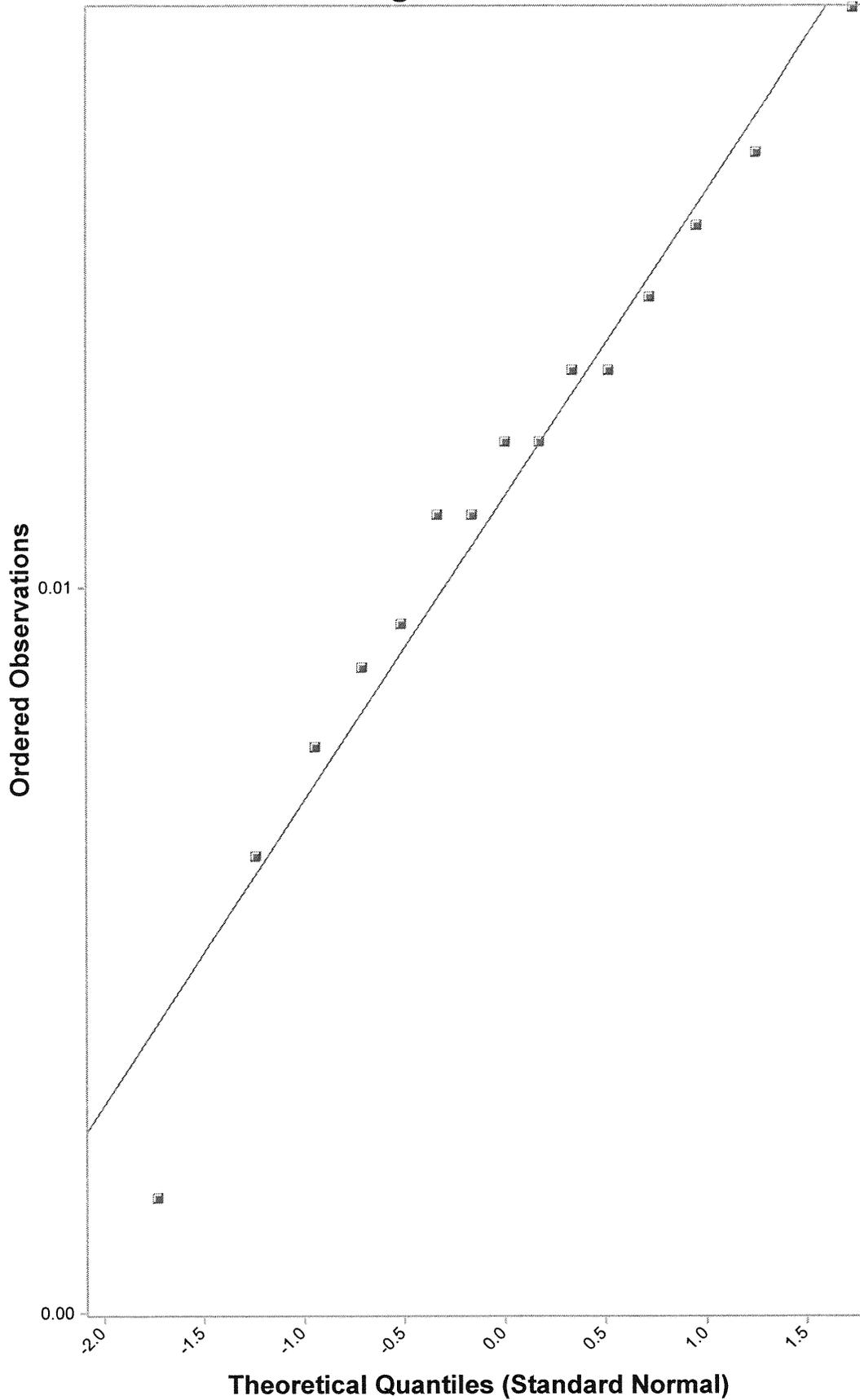
For 1% significance level, 0.0016 is not an outlier.

	0	1	2	3	4
	Mercury	D_Mercury	NROS_Mercury	LnROS_Mercury	GROS_Mercury
1	0.012	1	0.012	0.012	0.012
2	0.018	1	0.018	0.018	0.018
3	0.0095	1	0.0095	0.0095	0.0095
4	0.016	1	0.016	0.016	0.016
5	0.011	1	0.011	0.011	0.011
6	0.011	1	0.011	0.011	0.011
7	0.014	1	0.014	0.014	0.014
8	0.013	1	0.013	0.013	0.013
9	0.015	1	0.015	0.015	0.015
10	0.0078	1	0.0078	0.0078	0.0078
11	0.0016	1	0.0016	0.0016	0.0016
12	0.012	1	0.012	0.012	0.012
13	0.013	1	0.013	0.013	0.013
14	0.0089	1	0.0089	0.0089	0.0089
15	< 0.033	0	0.00929043670754515	0.00795440704374851	0.0096747048893058
16	0.0063	1	0.0063	0.0063	0.0063
17	<0.033	0	0.0132562299591215	0.0128578257294059	0.0138729664471379

↑  
Normal  
distribution  
data used  
for  
substitution

# Normal Q-Q Plot for Mercury

## Statistics using ROS Normal Estimates



### Mercury

n = 15

Mean = 0.0113

Sd = 0.0041

Slope = 0.0042

Intercept = 0.0113

Correlation, R = 0.98

Shapiro-Wilk Test

Exact Test Value = 0.969

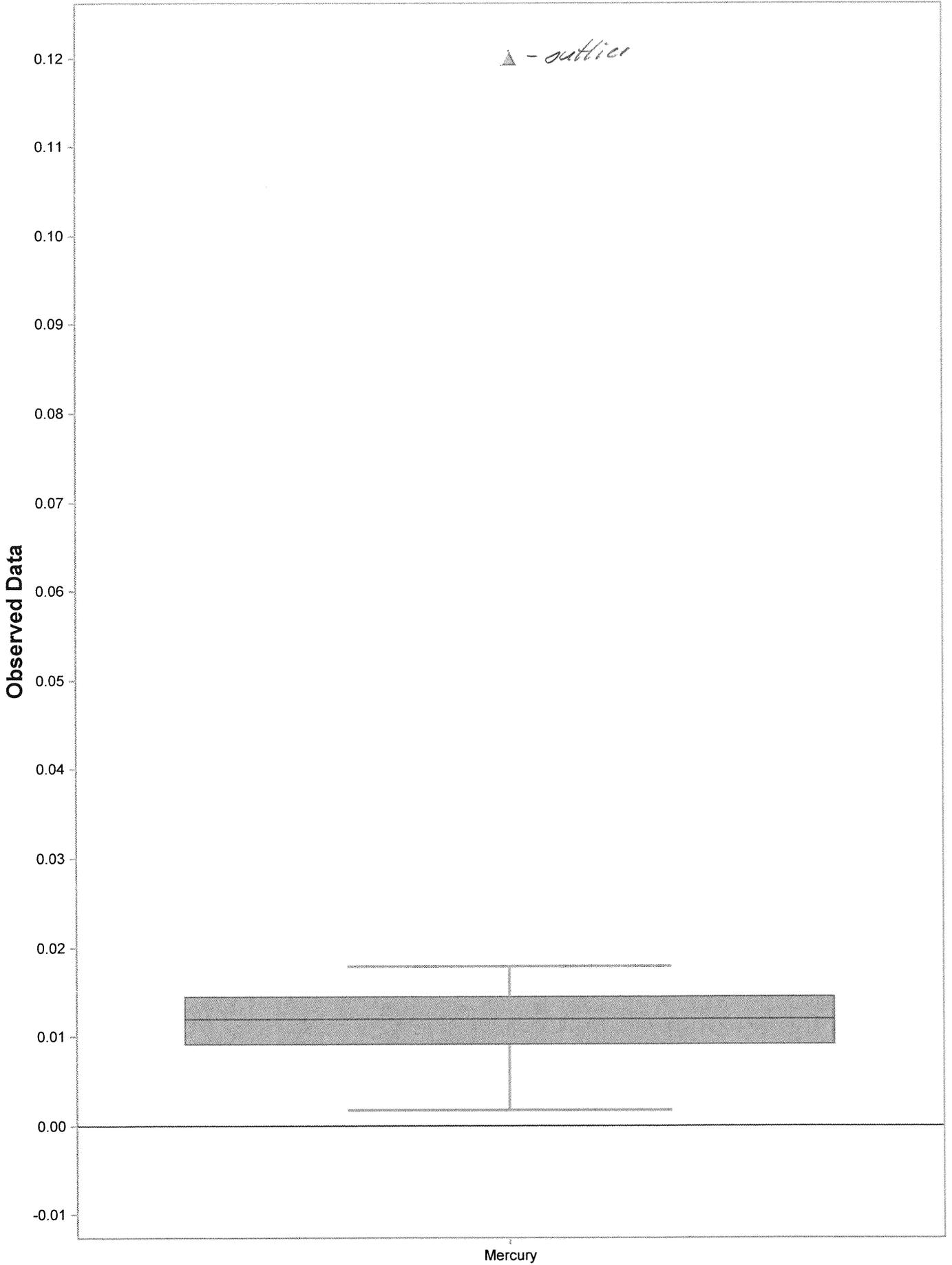
Critical Val(0.05) = 0.881

Data Appear Normal

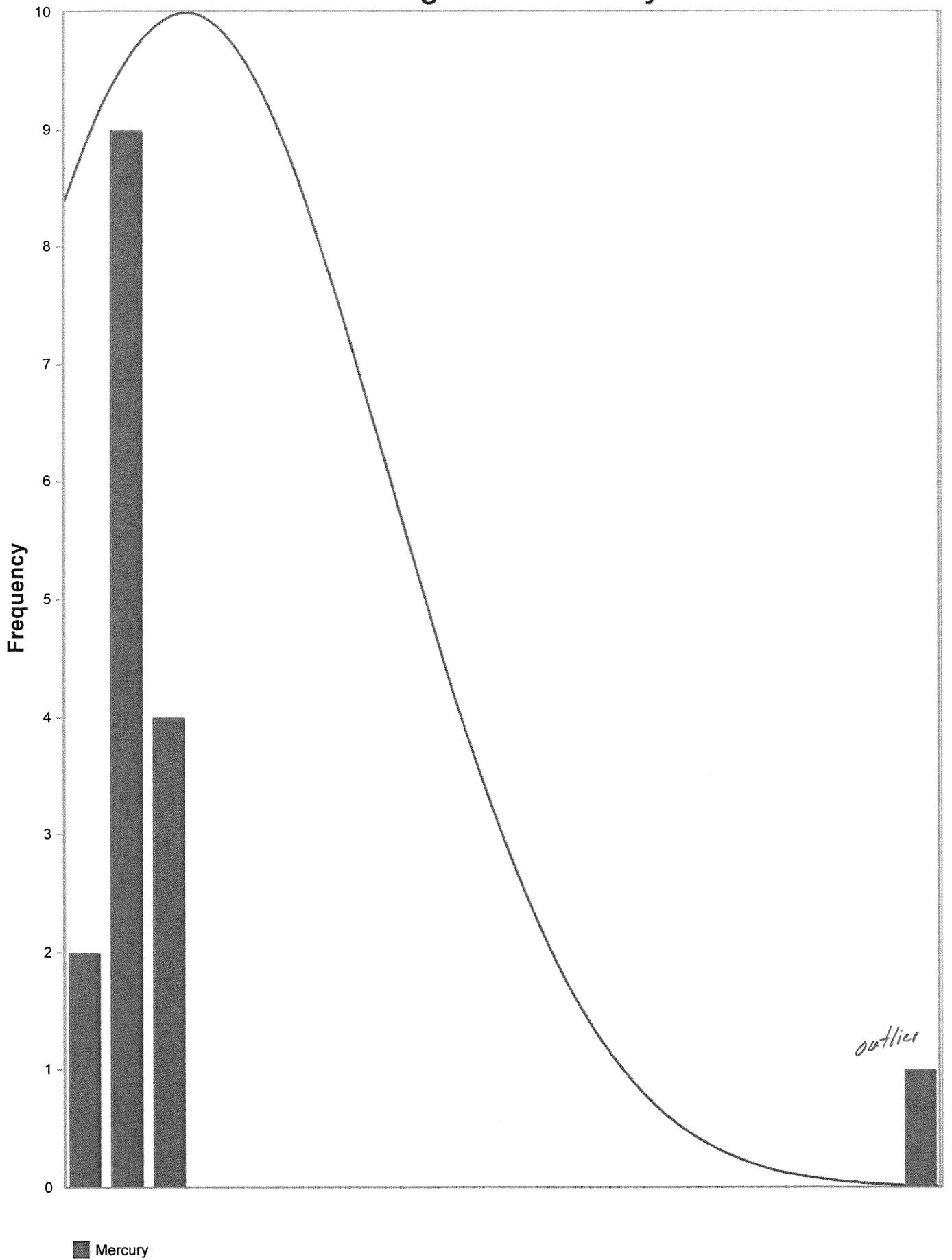
Approx. Test Value = 0.966

p-Value = 0.761

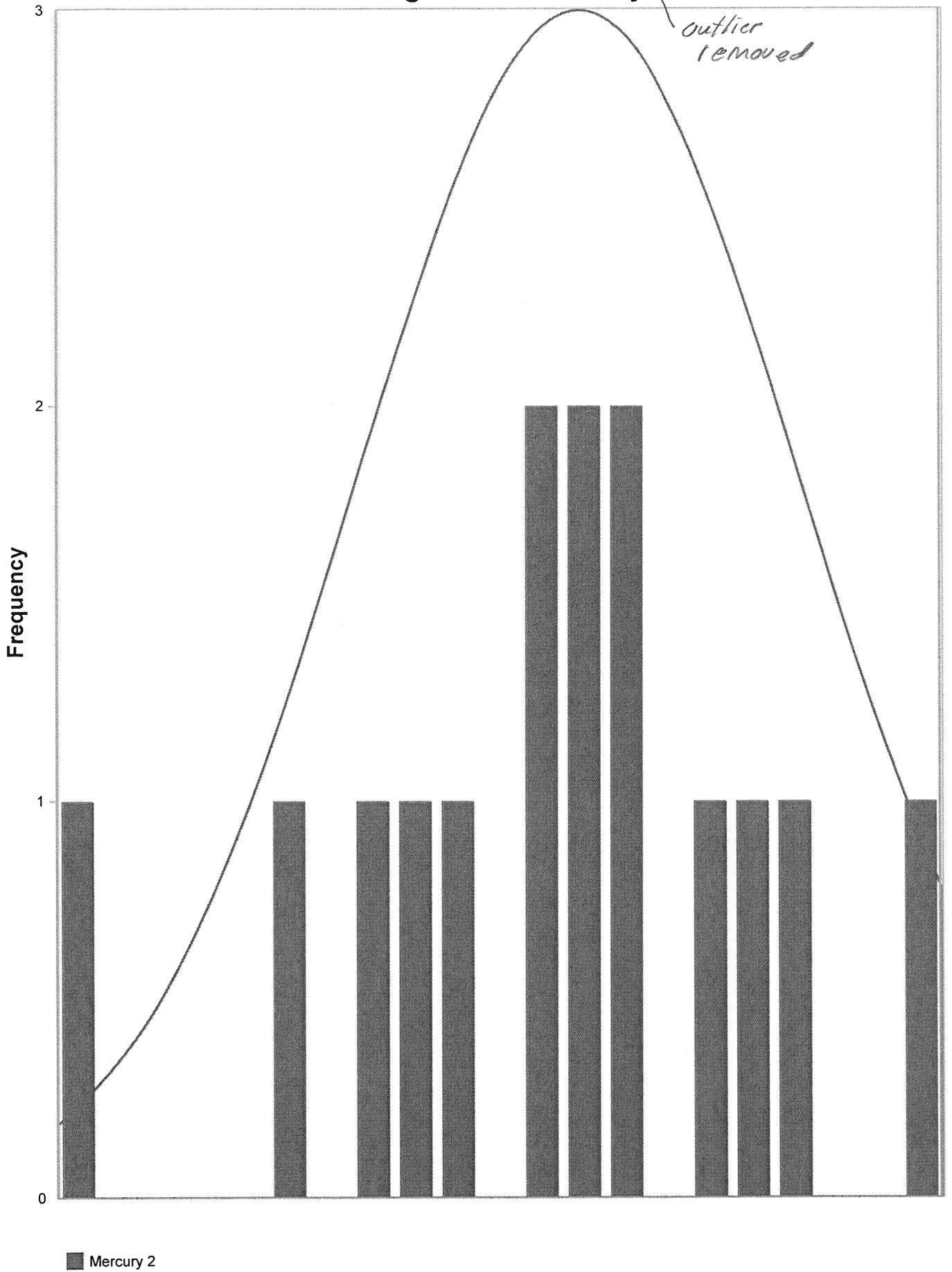
# Box Plot for Mercury



# Histogram for Mercury



Histogram for Mercury 2



Normal Background Statistics for Full Data Sets

User Selected Options

From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Coverage	95%
Different or Future K Values	1

Molybdenum

Raw Statistics

Number of Valid Observations	16
Number of Distinct Observations	10
Minimum	0.22
Maximum	0.42
Second Largest	0.37
Mean	0.306
Geometric Mean	0.301
First Quartile	0.27
Median	0.295
Third Quartile	0.338
SD	0.0546
Coefficient of Variation	0.179
Skewness	0.465

Normal Distribution Test

Shapiro Wilk Test Statistic	0.963
5% Shapiro Wilk Critical Value	0.887

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

90% Percentile (z)	0.376
95% Percentile (z)	0.396
99% Percentile (z)	0.433
Tolerance Factor K	2.524
95% UTL with 95% Coverage	0.444
95% UPL (t)	0.404

Outlier Tests for Selected Variables

User Selected Options

From File I:\Projects\Western Refining Company\GIANT\Bloomfield\NMED July 2007 Order\Site Backgr

Full Precision OFF

Test for Suspected Outliers with Dixon test 1

Test for Suspected Outliers with Rosner test 1

Dixon's Outlier Test for Molybdenum

Number of data = 18

10% critical value: 0.424

5% critical value: 0.475

1% critical value: 0.561

1. Data Value 0.9 is a Potential Outlier (Upper Tail)?

Test Statistic: 0.738

For 10% significance level, 0.9 is an outlier.

For 5% significance level, 0.9 is an outlier.

For 1% significance level, 0.9 is an outlier.

2. Data Value 0.22 is a Potential Outlier (Lower Tail)?

Test Statistic: 0.150

For 10% significance level, 0.22 is not an outlier.

For 5% significance level, 0.22 is not an outlier.

For 1% significance level, 0.22 is not an outlier.

Outlier Tests for Selected Variables

User Selected Options

From File WorkSheet.wst

Full Precision OFF

Test for Suspected Outliers with Dixon test 1

Test for Suspected Outliers with Rosner test 1

Dixon's Outlier Test for Molybdenum

Number of data = 17

10% critical value: 0.438

5% critical value: 0.49

1% critical value: 0.577

1. Data Value 0.7 is a Potential Outlier (Upper Tail)?

Test Statistic: 0.733

For 10% significance level, 0.7 is an outlier.

For 5% significance level, 0.7 is an outlier.

For 1% significance level, 0.7 is an outlier.

2. Data Value 0.22 is a Potential Outlier (Lower Tail)?

Test Statistic: 0.200

For 10% significance level, 0.22 is not an outlier.

For 5% significance level, 0.22 is not an outlier.

For 1% significance level, 0.22 is not an outlier.

Outlier Tests for Selected Variables

User Selected Options

From File    WorkSheet.wst

Full Precision    OFF

Test for Suspected Outliers with Dixon test    1

Test for Suspected Outliers with Rosner test    1

Dixon's Outlier Test for Molybdenum

Number of data = 16

10% critical value: 0.454

5% critical value: 0.507

1% critical value: 0.595

1. Data Value 0.42 is a Potential Outlier (Upper Tail)?

Test Statistic: 0.294

For 10% significance level, 0.42 is not an outlier.

For 5% significance level, 0.42 is not an outlier.

For 1% significance level, 0.42 is not an outlier.

2. Data Value 0.22 is a Potential Outlier (Lower Tail)?

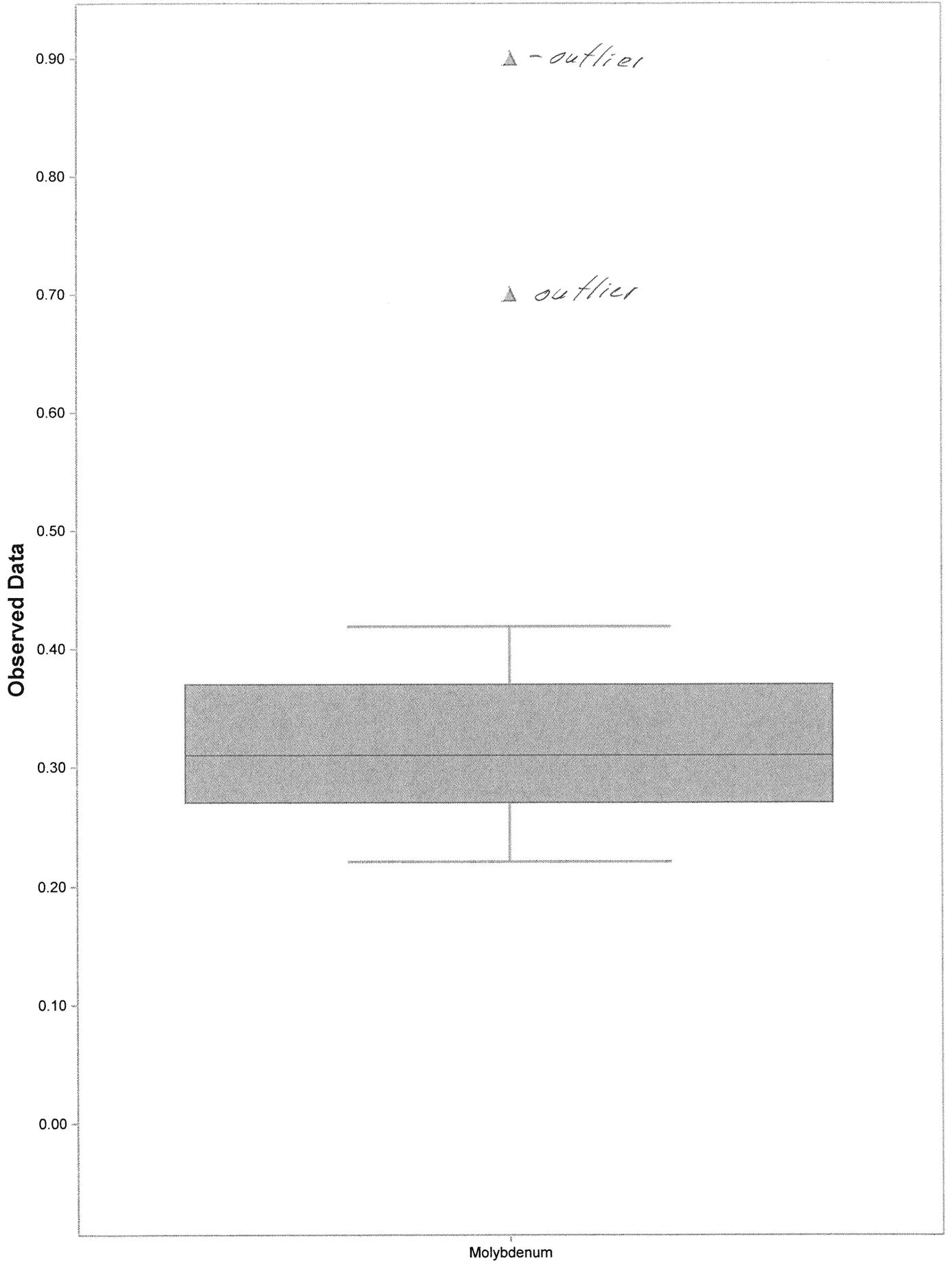
Test Statistic: 0.200

For 10% significance level, 0.22 is not an outlier.

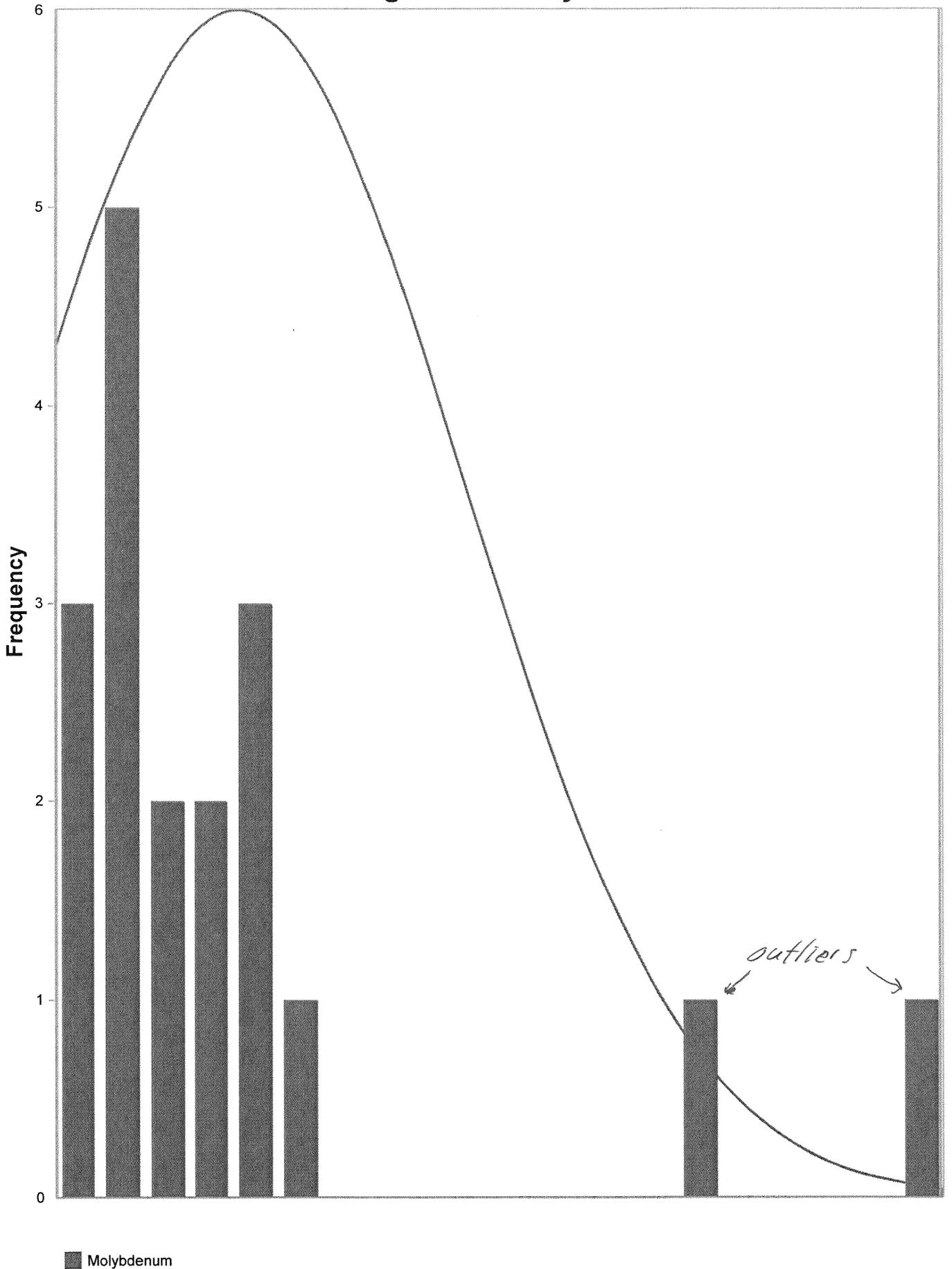
For 5% significance level, 0.22 is not an outlier.

For 1% significance level, 0.22 is not an outlier.

# Box Plot for Molybdenum

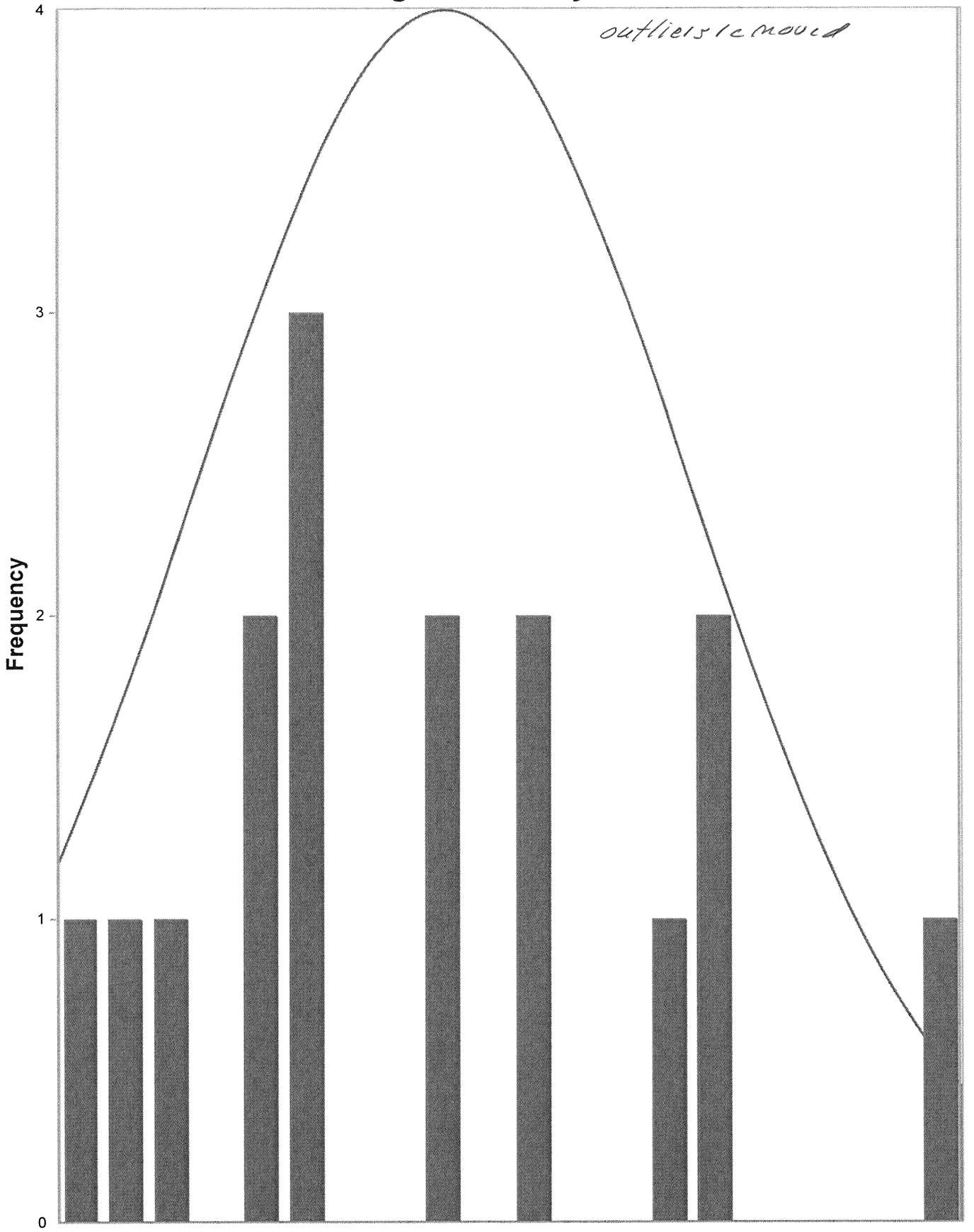


# Histogram for Molybdenum



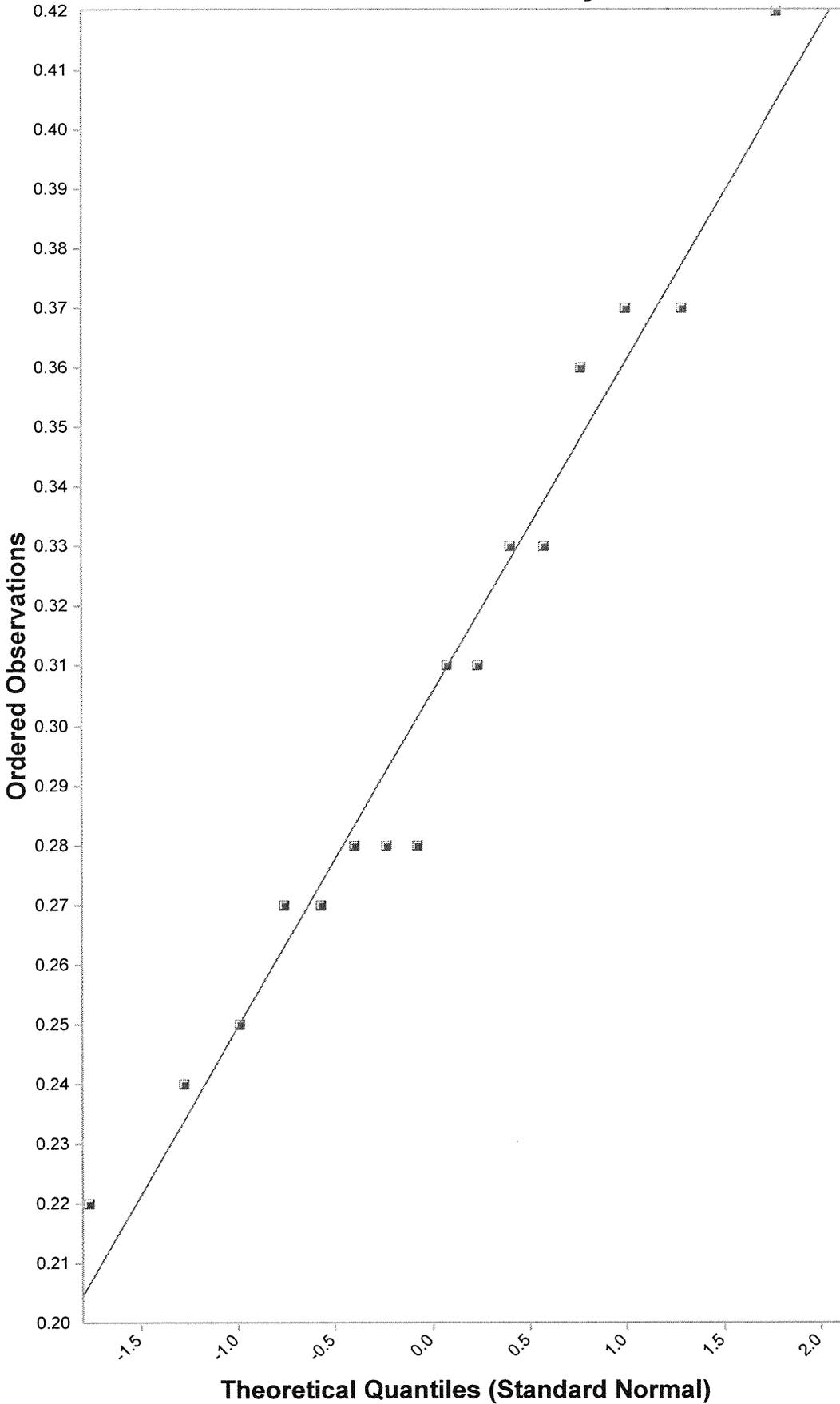
# Histogram for Molybdenum

*outliers removed*



■ Molybdenum

# Normal Q-Q Plot for Molybdenum



## Molybdenum

n = 16

Mean = 0.306

Sd = 0.0546

Slope = 0.0561

Intercept = 0.306

Correlation, R = 0.983

Shapiro-Wilk Test

Exact Test Value = 0.963

Critical Val(0.05) = 0.887

Data Appear Normal

Approx. Test Value = 0.965

p-Value = 0.717

■ Molybdenum



Normal Background Statistics for Full Data Sets

User Selected Options

From File	I:\Projects\Western Refining Company\GIANT\Bloomfield\NMED July 2007 Order\Site Background\June 2
Full Precision	OFF
Confidence Coefficient	95%
Coverage	95%
Different or Future K Values	1

Nickel

Raw Statistics

Number of Valid Observations	18
Number of Distinct Observations	18
Minimum	3
Maximum	7.6
Second Largest	7.4
Mean	5.4
Geometric Mean	5.239
First Quartile	4.525
Median	5.3
Third Quartile	6.475
SD	1.324
Coefficient of Variation	0.245
Skewness	-0.00428

Normal Distribution Test

Shapiro Wilk Test Statistic	0.976
5% Shapiro Wilk Critical Value	0.897

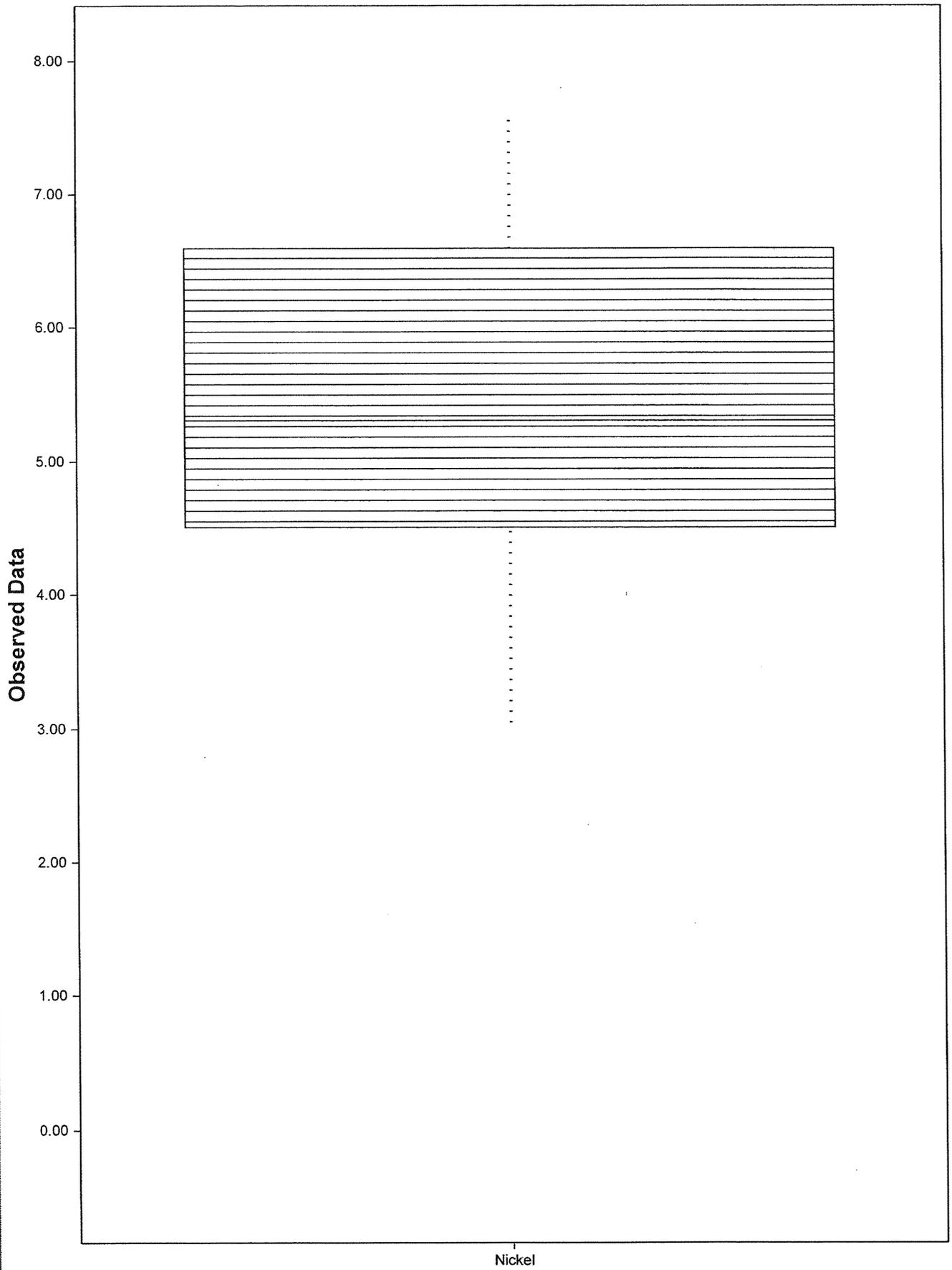
Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

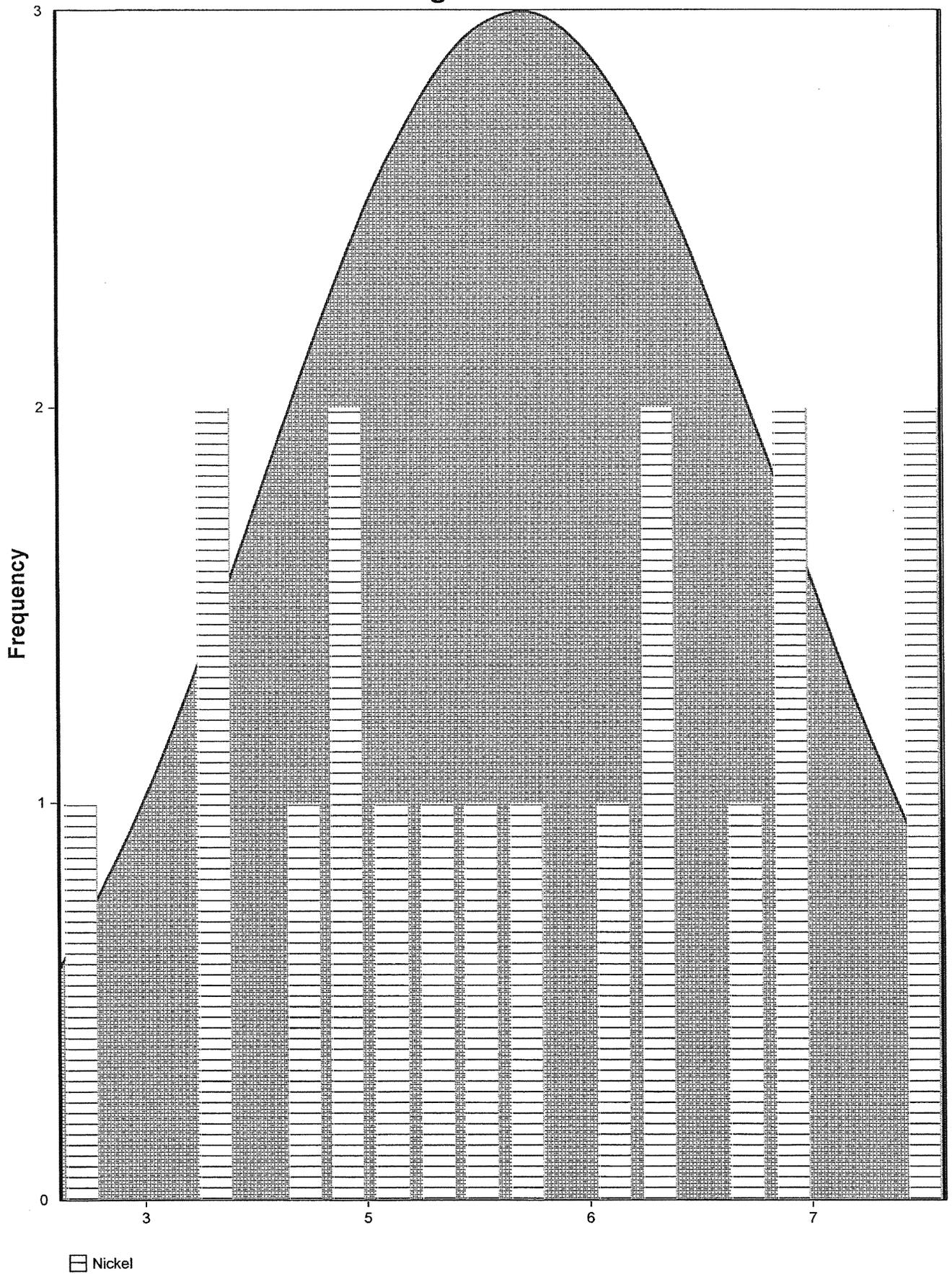
90% Percentile (z)	7.096
95% Percentile (z)	7.577
99% Percentile (z)	8.479
Tolerance Factor K	2.453
95% UTL with 95% Coverage	8.647
95% UPL (t)	7.766

Outlier Tests for Selected Variables	
<b>User Selected Options</b>	
From File	WorkSheet.wst
Full Precision	OFF
Test for Suspected Outliers with Dixon test	1
Test for Suspected Outliers with Rosner test	1
<b>Dixon's Outlier Test for Nickel</b>	
Number of data =	18
10% critical value:	0.424
5% critical value:	0.475
1% critical value:	0.561
<b>1. Data Value 7.6 is a Potential Outlier (Upper Tail)?</b>	
Test Statistic:	0.211
For 10% significance level, 7.6 is not an outlier.	
For 5% significance level, 7.6 is not an outlier.	
For 1% significance level, 7.6 is not an outlier.	
<b>2. Data Value 3 is a Potential Outlier (Lower Tail)?</b>	
Test Statistic:	0.211
For 10% significance level, 3 is not an outlier.	
For 5% significance level, 3 is not an outlier.	
For 1% significance level, 3 is not an outlier.	

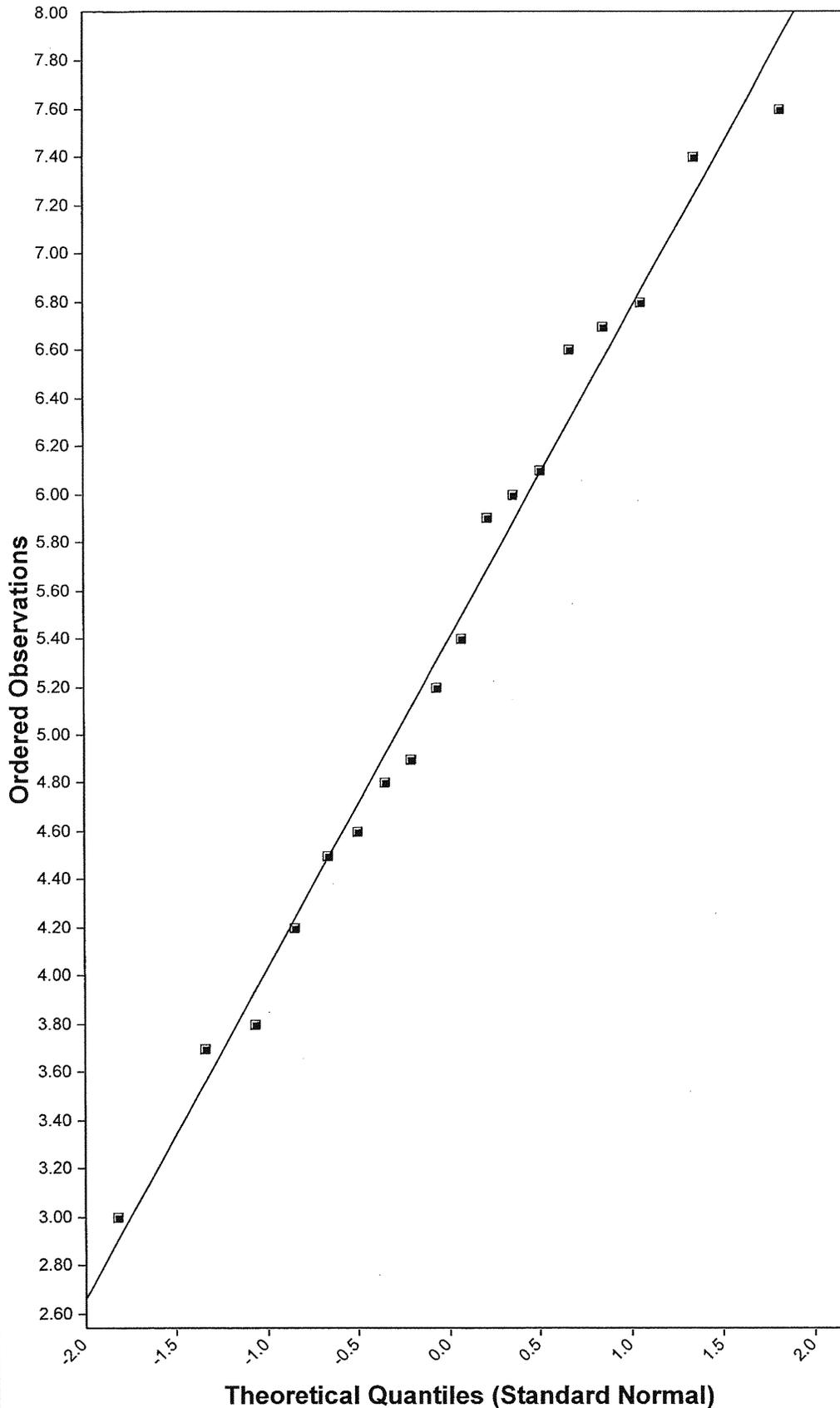
# Box Plot for Nickel



# Histogram for Nickel



# Normal Q-Q Plot for Nickel



## Nickel

n = 18

Mean = 5.4

Sd = 1.324

Slope = 1.368

Intercept = 5.4

Correlation, R = 0.993

Shapiro-Wilk Test

Exact Test Value = 0.976

Critical Val(0.05) = 0.897

Data Appear Normal

Approx. Test Value = 0.978

p-Value = 0.914



Normal Background Statistics for Full Data Sets

User Selected Options

From File	I:\Projects\Western Refining Company\GIANT\Bloomfield\NMED July 2007 Order\Site Background\June 2
Full Precision	OFF
Confidence Coefficient	95%
Coverage	95%
Different or Future K Values	1

Vanadium

Raw Statistics

Number of Valid Observations	18
Number of Distinct Observations	12
Minimum	11
Maximum	30
Second Largest	29
Mean	21.33
Geometric Mean	20.7
First Quartile	17.5
Median	22.5
Third Quartile	24
SD	5.111
Coefficient of Variation	0.24
Skewness	-0.2

Normal Distribution Test

Shapiro Wilk Test Statistic	0.976
5% Shapiro Wilk Critical Value	0.897

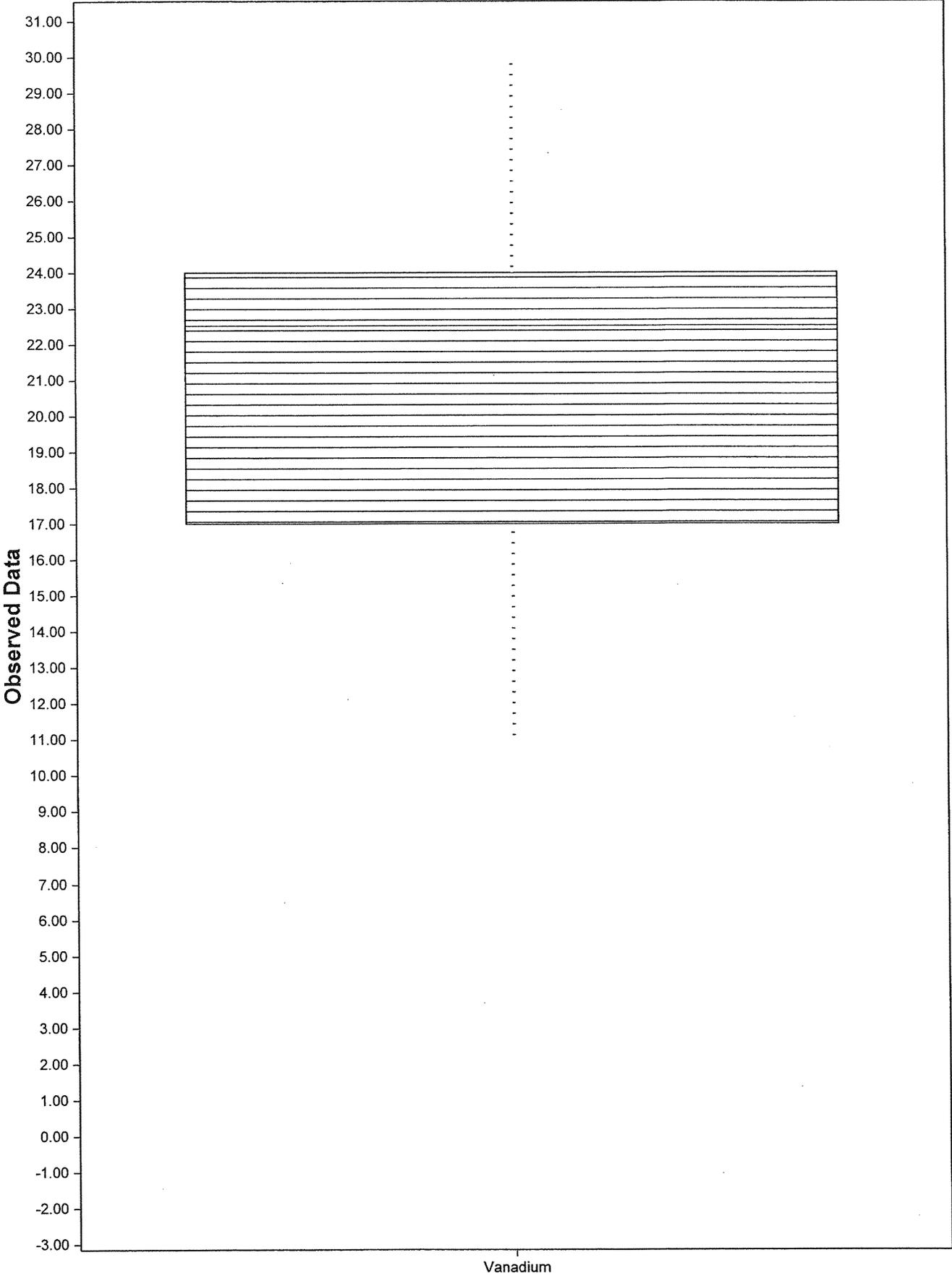
Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

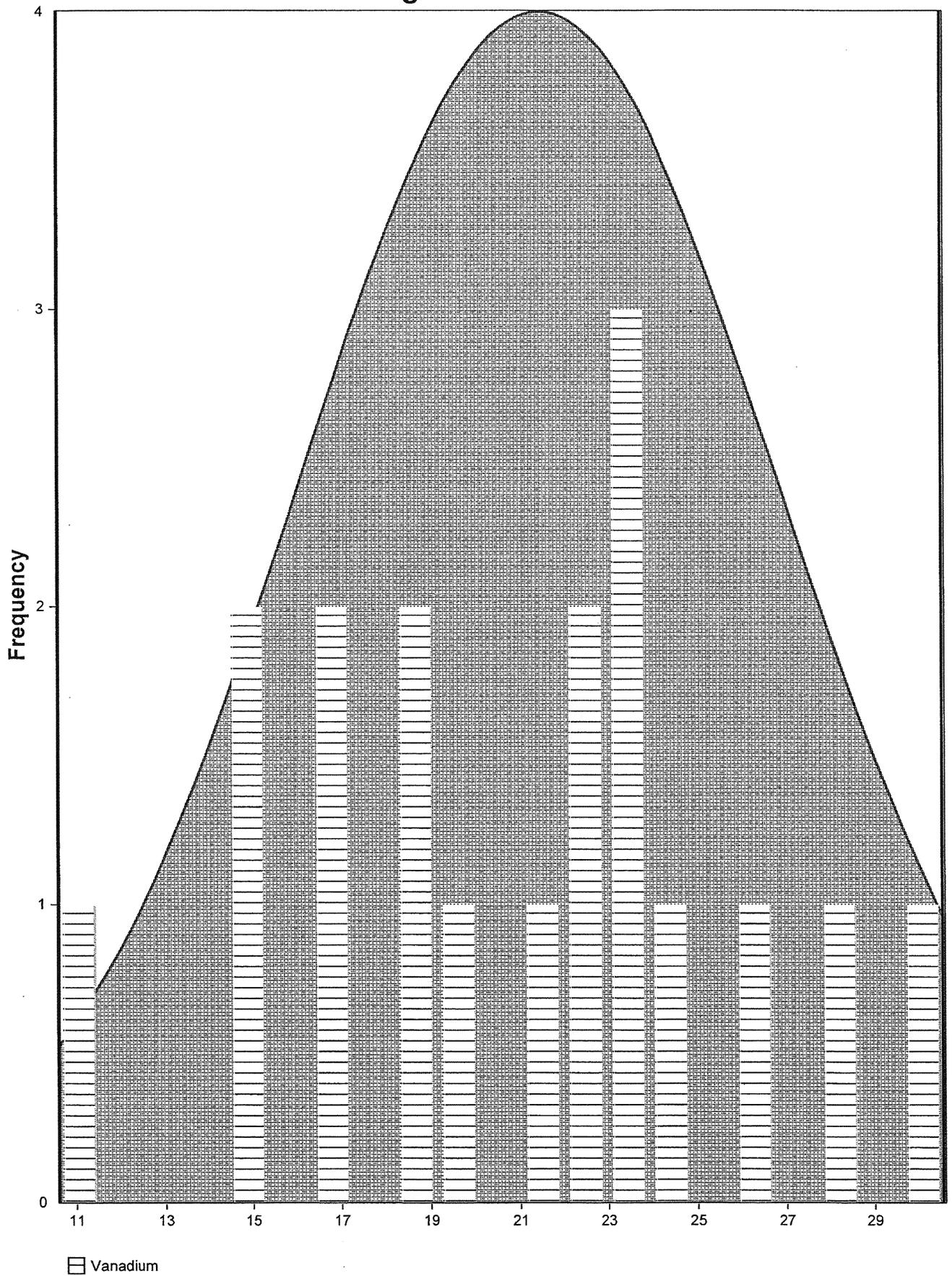
90% Percentile (z)	27.88
95% Percentile (z)	29.74
99% Percentile (z)	33.22
Tolerance Factor K	2.453
95% UTL with 95% Coverage	33.87
95% UPL (t)	30.47

Outlier Tests for Selected Variables	
User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Test for Suspected Outliers with Dixon test	1
Test for Suspected Outliers with Rosner test	1
<b>Dixon's Outlier Test for Vanadium</b>	
Number of data =	18
10% critical value:	0.424
5% critical value:	0.475
1% critical value:	0.561
<b>1. Data Value 30 is a Potential Outlier (Upper Tail)?</b>	
Test Statistic:	0.200
For 10% significance level, 30 is not an outlier.	
For 5% significance level, 30 is not an outlier.	
For 1% significance level, 30 is not an outlier.	
<b>2. Data Value 11 is a Potential Outlier (Lower Tail)?</b>	
Test Statistic:	0.250
For 10% significance level, 11 is not an outlier.	
For 5% significance level, 11 is not an outlier.	
For 1% significance level, 11 is not an outlier.	

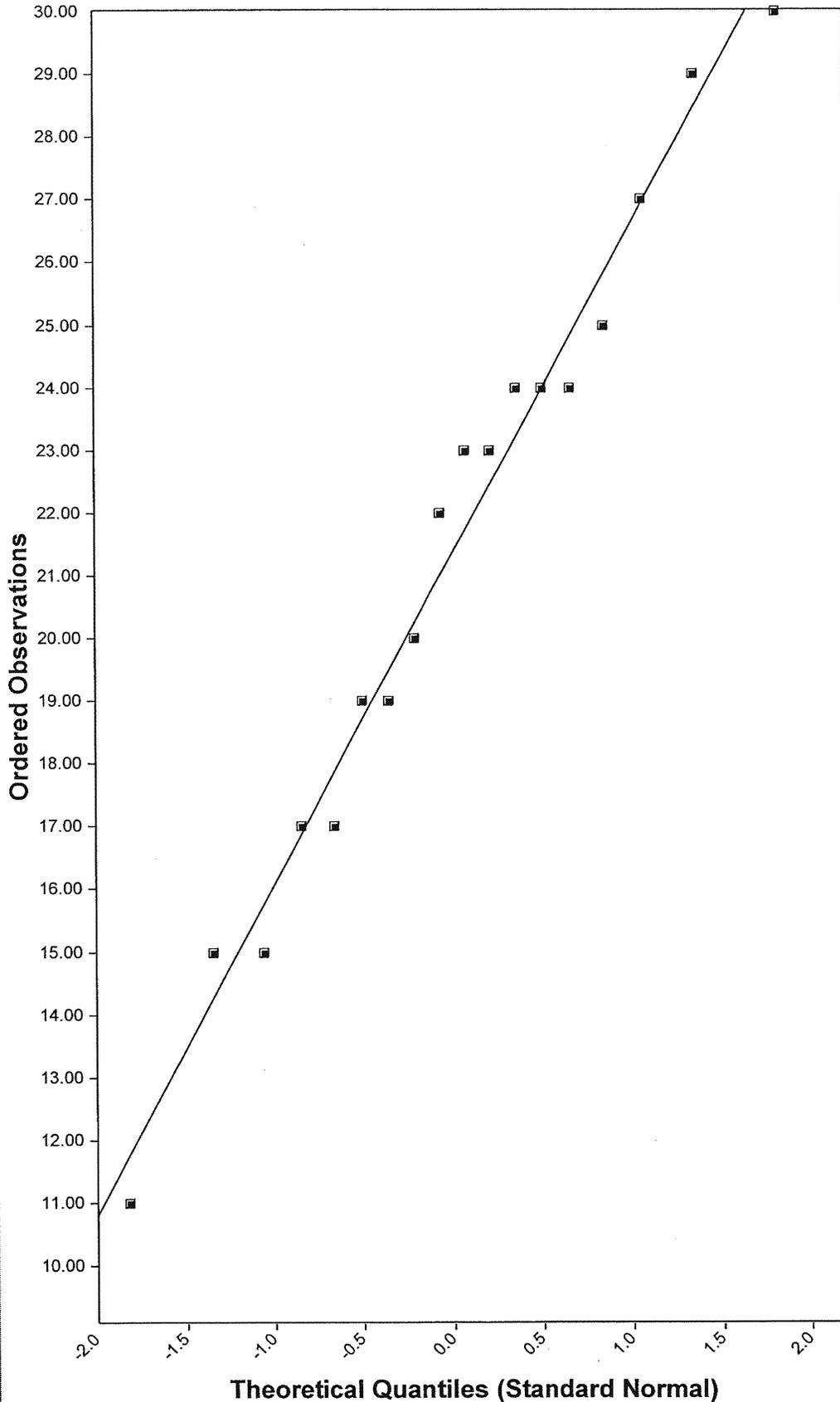
# Box Plot for Vanadium



# Histogram for Vanadium



# Normal Q-Q Plot for Vanadium



## Vanadium

n = 18

Mean = 21.33

Sd = 5.111

Slope = 5.266

Intercept = 21.33

Correlation, R = 0.99

Shapiro-Wilk Test

Exact Test Value = 0.976

Critical Val(0.05) = 0.897

Data Appear Normal

Approx. Test Value = 0.977

p-Value = 0.897



Normal Background Statistics for Full Data Sets

User Selected Options

From File I:\Projects\Western Refining Company\GIANT\Bloomfield\NMED July 2007 Order\Site Background\June 2

Full Precision OFF

Confidence Coefficient 95%

Coverage 95%

Different or Future K Values 1

Zinc

Raw Statistics

Number of Valid Observations	18
Number of Distinct Observations	13
Minimum	12
Maximum	30
Second Largest	29
Mean	21.44
Geometric Mean	20.8
First Quartile	19
Median	21
Third Quartile	25.75
SD	5.238
Coefficient of Variation	0.244
Skewness	-0.0596

Normal Distribution Test

Shapiro Wilk Test Statistic	0.967
5% Shapiro Wilk Critical Value	0.897

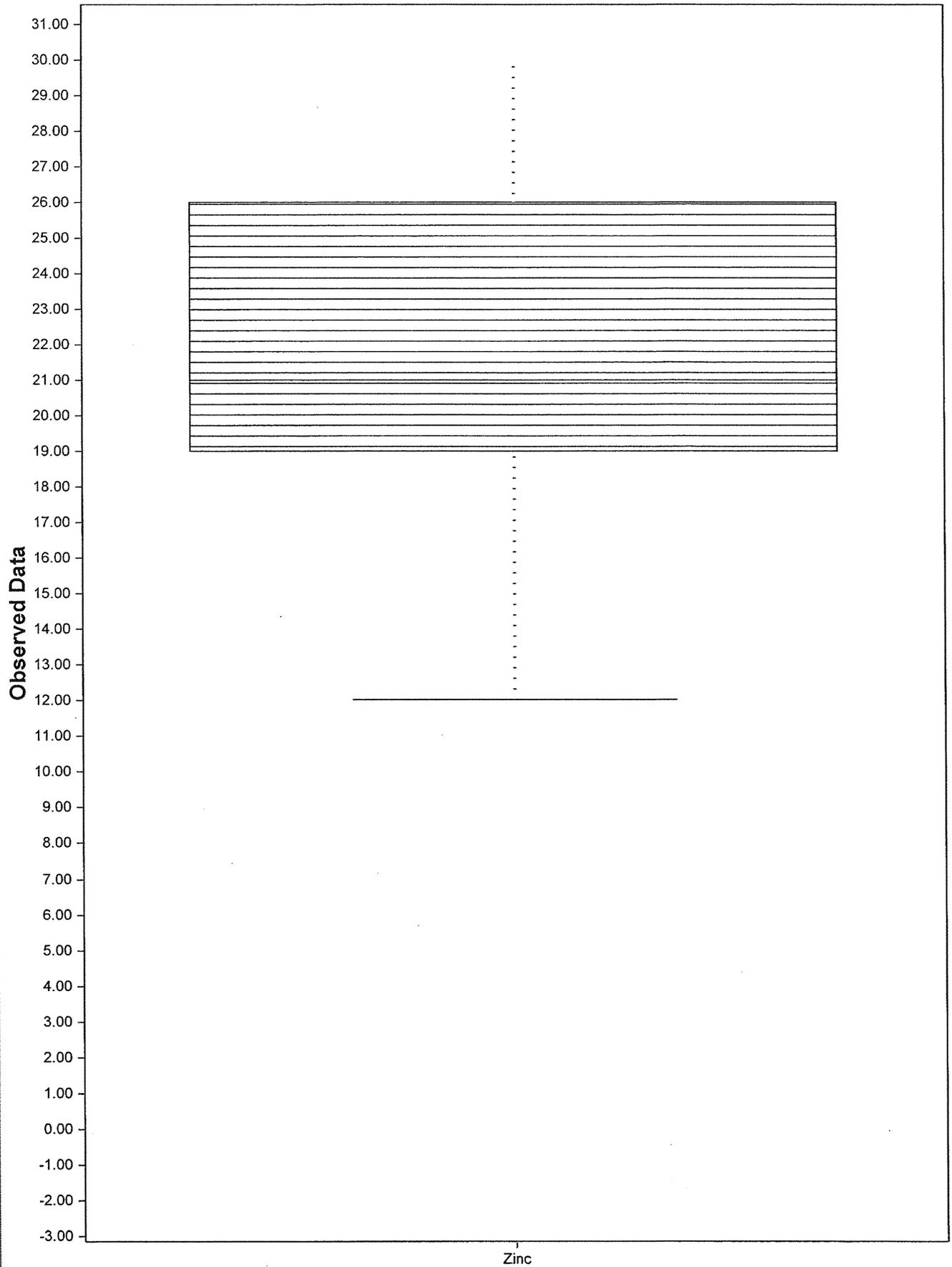
Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

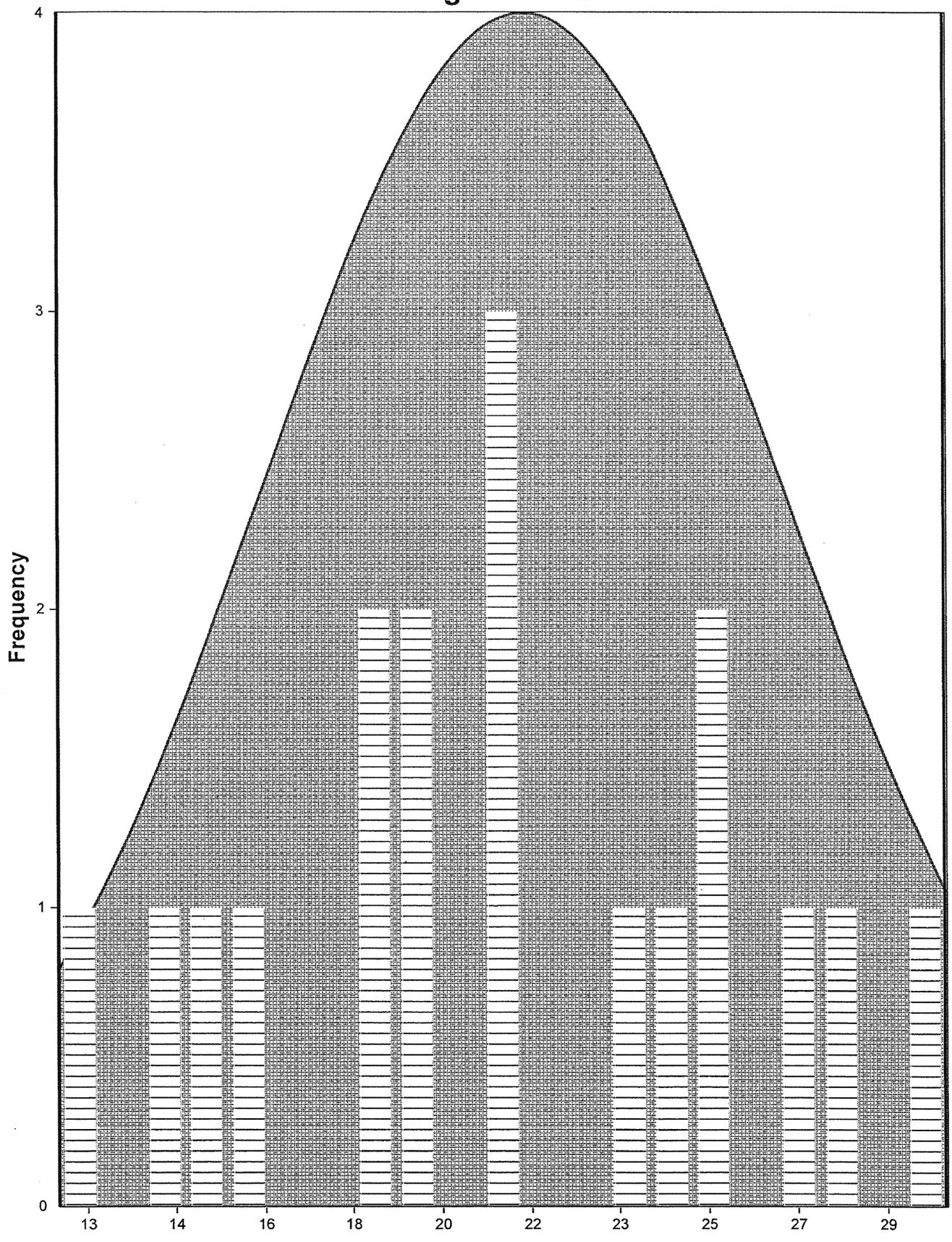
90% Percentile (z)	28.16
95% Percentile (z)	30.06
99% Percentile (z)	33.63
Tolerance Factor K	2.453
95% UTL with 95% Coverage	34.29
95% UPL (t)	30.81

Outlier Tests for Selected Variables	
User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Test for Suspected Outliers with Dixon test	1
Test for Suspected Outliers with Rosner test	1
Dixon's Outlier Test for Zinc	
Number of data = 18	
10% critical value: 0.424	
5% critical value: 0.475	
1% critical value: 0.561	
1. Data Value 30 is a Potential Outlier (Upper Tail)?	
Test Statistic: 0.133	
For 10% significance level, 30 is not an outlier.	
For 5% significance level, 30 is not an outlier.	
For 1% significance level, 30 is not an outlier.	
2. Data Value 12 is a Potential Outlier (Lower Tail)?	
Test Statistic: 0.188	
For 10% significance level, 12 is not an outlier.	
For 5% significance level, 12 is not an outlier.	
For 1% significance level, 12 is not an outlier.	

# Box Plot for Zinc

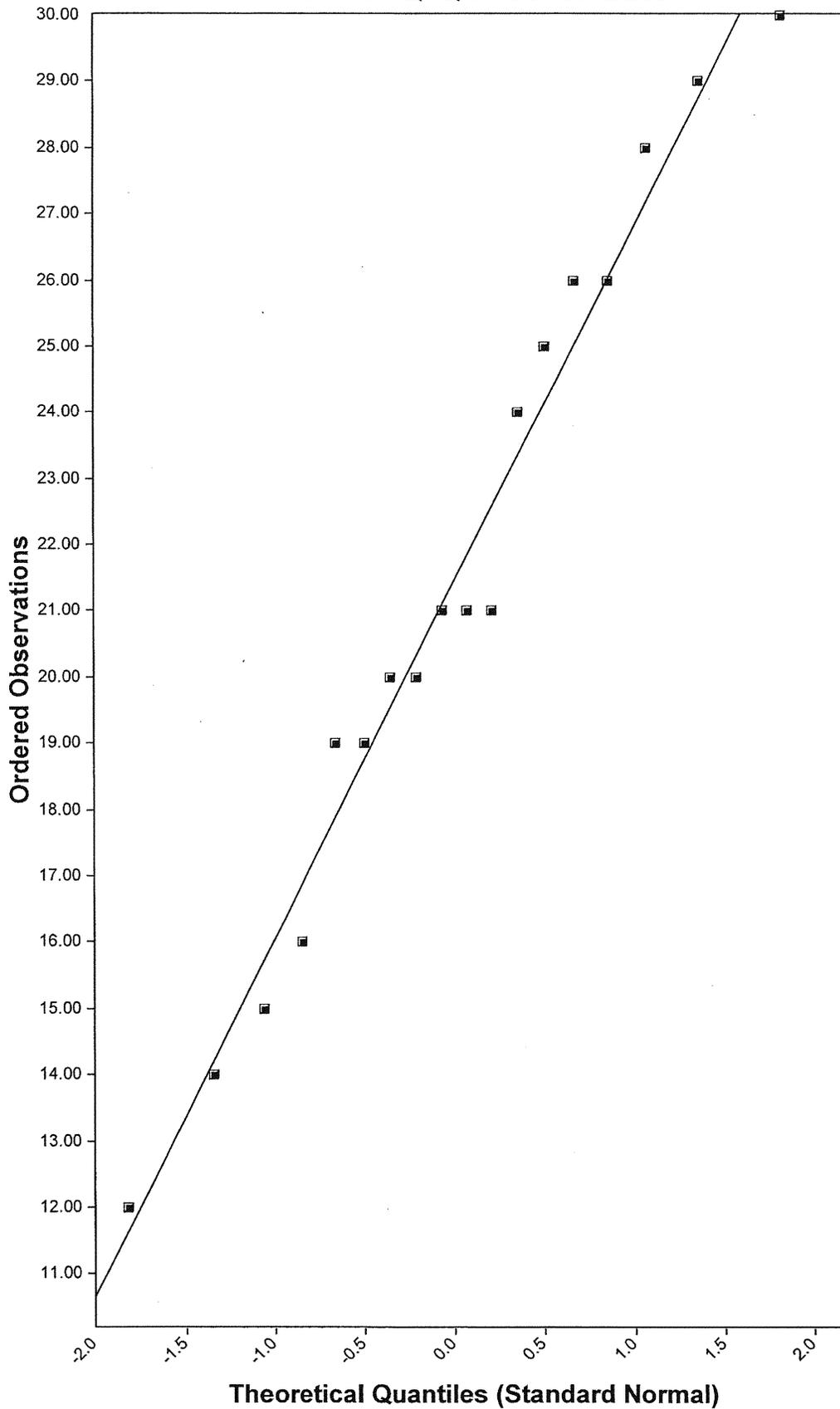


# Histogram for Zinc



□ Zinc

# Normal Q-Q Plot for Zinc



## Zinc

n = 18

Mean = 21.44

Sd = 5.238

Slope = 5.391

Intercept = 21.44

Correlation, R = 0.988

Shapiro-Wilk Test

Exact Test Value = 0.967

Critical Val(0.05) = 0.897

Data Appear Normal

Approx. Test Value = 0.969

p-Value = 0.769