GW - 28

2019
AGWMR
(1)

2020

From:	Dade, Randy
To:	Chavez, Carl J, EMNRD
Cc:	Dade, Randy
Subject:	[EXT] 2019 Annual Discharge Report, HollyFrontier Navajo Refining LLC, Artesia Refinery, Discharge Permit GW-28
Date:	Tuesday, June 16, 2020 7:12:44 AM
Attachments:	2019 Annual Discharge Report Transmittal Letter.pdf 2019 GW-028 Annual Discharge Report FINAL_06152020.pdf

Carl,

Please find attached the 2019 Annual Discharge Report, HollyFrontier Navajo Refining LLC, Artesia Refinery, Discharge Permit GW-28. I will be uploading an electronic version to the OCD website. If you have any comments or questions, please contact me.

Thanks for all your help that you provide, Randy.

Lewis R. (Randy) Dade
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The HollyFrontier Companies
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HOLLYFRONTIER.

June 15, 2020

Mr. Carl Chavez
New Mexico Energy, Minerals and Natural Resources Department
Oil Conservation Division
5200 Oakland Avenue N.E., Suite 100
Albuquerque, NM 87113

Re: Submittal of the *2019 Annual Discharge Report* and the *2019 Annual Groundwater Monitoring Report* for the HollyFrontier Navajo Refining LLC, Artesia Refinery Discharge Permit GW-028

Dear Mr. Chavez:

Please find attached the *2019 Annual Discharge Report* and the *2019 Annual Groundwater Monitoring Report*, which fulfill requirements of Section 2.E of Discharge Permit GW-028. No hard copy will be submitted at this time.

If you have any questions or comments regarding this report, please feel free to contact me at 575-746-5487 or Robert Combs at 575-746-5382.

Sincerely,

Scott M. Denton
Environmental Manager
HollyFrontier Navajo Refining LLC

cc: HollyFrontier: R. Combs, J. Leik, R. Dade
TRC: J. Speer, C. Smith, D. Helbert

2019 Annual Discharge Permit Report, GW-028

June 15, 2020

HollyFrontier Navajo Refining LLC
Artesia Refinery, GW-028

Prepared For:

HollyFrontier Navajo Refining LLC
501 E Main Street,
Artesia, NM 88210

Prepared By:

TRC
505 East Huntland Drive, Suite 250
Austin, TX 78752

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ATTACHMENTS

Attachment A *2019 Annual Groundwater Monitoring Report*, February 2020
(Separate Electronic File)

ABBREVIATION AND ACRONYM LIST

ACO	Agreed Compliance Order
AOC	Area of concern
bbl	barrel
bpd	barrels per day
BTEX	Benzene, toluene, ethylbenzene, and xylene
CGWSL	Critical Groundwater Screening Level
COCs	Constituents of concern
DRO	Diesel range organics
gpm	Gallons per minute
GRO	Gasoline range organics
HFNR	HollyFrontier Navajo Refining LLC
MTBE	Methyl tert-butyl ether
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
O&M	Operation and maintenance
OCD	Oil Conservation Division
ORP	Oxidation-reduction potential
PSH	Phase-separated hydrocarbon
PCC	Post Closure Care
POTW	Publicly Owned Treatment Works
Praxair	Praxair Services, Inc.
RCRA	Resource Conservation and Recovery Act
RO	Reverse osmosis
SPLP	Synthetic precipitation leaching procedure
SSL	Soil screening levels
SVOC	Semi-volatile organic compound
SWMU	Solid Waste Management Unit
TDS	Total dissolved solids
TEL	Tetra Ethyl Lead
TPH	Total petroleum hydrocarbons
UIC	Underground Injection Control
VOC	Volatile organic compound
WDW	Water Disposal Well
WQCC	Water Quality Control Commission

Introduction

This report was prepared to fulfill the requirement in Section 2.E. of the Discharge Permit GW-028 (GW-028) for the HollyFrontier Navajo Refining LLC (HFNR) Artesia Refinery (refinery) located at 501 East Main Street in Artesia, New Mexico. The requirement specifies that an Annual Report be submitted to the Oil Conservation Division (OCD) by June 15 following the reporting (calendar) year and should include:

1. Summary of major refinery activities and events.
2. Summary of all discharge activities.
3. Summary of all leaks, spills, and releases and corrective actions taken.
4. Summary of discovery of any new vadose zone or groundwater contamination.
5. Summary of wastewater volumes disposed of, sold, or treated onsite.
6. Documentation regarding the closure of any Underground Injection Control (UIC) Class V wells.
7. A description of groundwater monitoring and remediation activities conducted throughout the year.
8. Summary tables of groundwater data.
9. Copies of laboratory analytical data sheets with quality assurance/quality control information.
10. Contour maps for each aquifer depicting the potentiometric gradient for each monitoring event.
11. Isoconcentration maps of major constituents of concerns (COCs) for each monitoring event.
12. Phase-separated hydrocarbon (PSH) thickness isopleth maps for each monitoring event.
13. Plots of static water elevation versus time in key wells.
14. Tabulation of the volumes of PSH removed.
15. Conclusions and recommendations.

1.0 Major Refinery Activities for 2019

The refinery conducted normal operations during 2019. Additional capital projects were completed to improve operability. No new tanks or refinery units were built in 2019.

1.1 Discharge Permit GW-028 Modifications

The previous GW-028 (dated August 22, 2012) was set to expire on October 21, 2016. HFNR submitted an application for renewal of and modification to GW-028 on June 23, 2016 (at least 120 days prior to expiration). OCD notified HFNR that the application was administratively complete on July 28, 2016, and HFNR proceeded to complete all required public notices.

On September 9, 2016, OCD notified HFNR that the renewal application did not propose a definitive alternative, or the information required to evaluate such alternative, to replace land application of reverse osmosis (RO) reject water discharge. As such, OCD would not issue an approval or disapproval of the renewal application until such information was provided. On September 23, 2016, HFNR entered into Agreed Compliance Order (ACO) No. WQA-OCD-CO-2016-1 (the 2016 Order) which allowed continued RO discharge operations (per Condition III.1.a.iii of the 2016 Order) while progressing with the Discharge Permit renewal application.

On October 21, 2016, HFNR notified OCD of the selection of underground injection as the alternative disposal method for the RO reject stream in accordance with Condition III.1.a.i of the 2016 Order. HFNR submitted a revised Discharge Permit renewal application reflecting the selection of underground injection (through a Class I disposal well) as the alternative disposal method on January 13, 2017. OCD issued a renewal to GW-028 on May 25, 2017, the Order was terminated on June 21, 2017, and a modification of GW-028 was issued on June 29, 2017. The renewed GW-028 included a stipulation that land application of the RO reject water must cease upon the completion of the new Class I disposal well, but not later than October 31, 2018. The OCD issued modifications of GW-028 on October 25, 2018, and December 14, 2018, which extended the deadline for land application of RO reject water due to delays in operational completion of the new Class I disposal well.

HFNR is continuing to work with OCD for permitting the sale of treated refinery effluent for reuse in the oilfield.

1.2 RO Reject Water Discharge

From January 1 to January 22, 2019, HFNR discharged RO reject water to the refinery's onsite fields, in accordance with GW-028 which allows for discharge of RO reject water to the refinery's onsite fields. The land application of RO reject water was discontinued after January 22, 2019, as described below. GW-028 requires sampling and analyzing RO reject water for Water Quality Control Commission (WQCC) constituents. HFNR collected a grab sample of RO reject water from the point of discharge on January 18, 2019, prior to the cessation of land application of RO reject water. Laboratory analytical reports are provided in Appendix A.3.

1.3 Injection Well WDW-4 (Class I Disposal Well)

HFNR selected to install a fourth injection well (WDW-4) as an alternate disposal method for the RO reject water, as specified in the revised permit application. Installation of WDW-4 and associated piping was completed in late 2018 and the well became operational on January 16, 2019. The well was utilized for injection of water beginning on January 23, 2019.

1.4 RO Reject Fields Investigation and Abatement Plan

On August 20, 2015, HFNR submitted a *Reverse Osmosis Reject Fields Hydrogeologic and Water Quality Evaluation* memo to the OCD that fulfilled the Site investigation requirements of Section 6.D of the former GW-028 (dated August 22, 2012). A subsequent revision to this memo was submitted to OCD on January 19, 2016, to provide corrections to the RO reject stream water quality results. HFNR met with the OCD and New Mexico Environment Department (NMED) at the OCD office on March 11, 2016, to discuss the results of the background groundwater evaluation (submitted to NMED and OCD in September 2015) as well as the hydrogeologic model and loading report. No agreement was reached regarding the results and recommendations of either of these evaluations.

HFNR began discussions with OCD in March 2017 regarding the potential to abate WQCC constituents in the RO reject water and in the RO reject discharge fields via phytoremediation. HFNR conducted a phytoremediation feasibility study at the RO reject fields from August 2017 to March 2018. Results of the phytoremediation feasibility study were documented in the *Phytoremediation Feasibility Study Summary Report* that was included as an appendix to the required Abatement Plan, described below.

GW-028 requires discharge of RO reject water to the fields to cease upon the completion of a Class I injection well and submittal of an Abatement Plan within 60 days of cessation of discharge of RO reject water to the fields. As described above, WDW-4 became operational in January 2019 and land application of RO reject water ceased after January 22, 2019.

HFNR submitted to OCD a *Stage 1 Abatement Plan for the Reverse Osmosis Reject Discharge Fields* on March 21, 2019 and an *Amendment of the March 2019 Stage 1 Abatement Plan for the Reverse Osmosis Reject Discharge Fields* on May 24, 2019. HFNR is characterizing the RO reject fields after cessation of land application of RO reject water to support development of a Stage 2 Abatement Plan, as agreed by OCD and HFNR in a meeting on May 16, 2019, and in accordance with the May 2019 *Amendment of the March 2019 Stage 1 Abatement Plan for the Reverse Osmosis Reject Discharge Fields.*

2.0 Summary of Discharge Activities

HFNR's primary discharges are treated wastewater from the wastewater treatment plant (WWTP) effluent and the RO reject water. The WWTP effluent is discharged to HFNR's injection wells (WDW-1, WDW-2, WDW-3 and WDW-4) and to the City of Artesia's Publicly Owned Treatment Works (POTW). RO reject water was land applied from January 1 to January 22,

2019. After January 22, 2019, RO reject water is further processed in a secondary RO unit, which produces a permeate stream which is utilized in the refinery's cooling towers, and the reject stream from that unit is ultimately discharged to HFNR's injection wells or the City of Artesia's POTW. The details of each discharge are provided in the following sub-sections.

2.1 Injection Wells

The injection rates, volume, and quality of treated wastewater disposed of in the injection wells are reported quarterly to OCD, in addition to monthly C-115 reports. Injection rates and volumes are also summarized in a table provided as Appendix A.1. The total injected water volume for 2019 was 6,240,894 barrels.

2.2 POTW

The flow rates and volumes of treated wastewater discharged to the City of Artesia POTW are recorded monthly and provided as Appendix A.2. The total transferred water volume for 2019 was 1,156,176 gallons or 27,528 barrels.

HFNR continued to discharge the blow-down from cooling towers to the City of Artesia POTW in 2019. The total volume of blow-down discharged to the City of Artesia POTW based on an average rate of 86 gallons per minute (gpm) is estimated to be 45,800,640 gallons, or 1,090,491 barrels.

2.3 Reverse Osmosis Reject Water

The RO reject water was land applied under GW-028 to onsite fields from January 1, 2019 through January 22, 2019, when the new injection well, WDW-4, was utilized for RO reject water disposal. The supply lines to the RO fields were capped and the main valve was shut off, preventing further discharge of RO reject water to the fields.

The RO process is fed by fresh groundwater provided by either the refinery's agricultural supply wells or purchased from the City of Artesia. The RO reject fluids contain concentrated salts (primarily chloride, fluoride, and sulfate) and elevated total dissolved solids (TDS). The stream was sampled on January 18, 2019 in accordance with GW-028. Laboratory analytical reports are provided in Appendix A.3.

The RO reject fluid flow rate was continuously recorded with the process historian and copies are provided in Appendix A.3. Based on the data from the process historian and on the logs, the total discharged RO reject water volume for the 22 days of land discharge in January 2019 was 10,289,760 gallons, or 244,994 barrels. The average daily discharge rate was 11,136 barrels per day. There were no exceedances of the permitted discharge rate in 2019.

3.0 Summary of All Leaks, Spills, and Releases

The refinery had four reportable spills under GW-028 in 2019. Each spill was reported to the OCD and addressed as described below.

3.1 March 26, 2019 – Tank 106 Release

Approximately 40 to 50 barrels of sour water was released on March 26, 2019, from Tank 106 due to a local gauge and transmitter malfunction. The release was entirely contained within the Tank 106 secondary containment, which consists of earthen berms. The tank level was reduced to prevent further release. Over 40 barrels of free liquids were recovered and placed into the refinery wastewater treatment system, upstream of the oil/water separator. Impacted soil was removed and placed into roll off bins. The initial C-141 Release Notification for this release was submitted to OCD on March 27, 2019.

Soil assessment activities were conducted in June 2019. Assessment results indicated benzene, toluene, ethylbenzene, and xylene (BTEX), chloride, total petroleum hydrocarbons (TPH), and benzene were present in soil at concentrations above their respective closure criteria, but below their applicable NMED Construction Worker soil screening levels (SSLs). TPH was present in soil above NMED Construction Worker SSLs. Worker protection corrective measures, including placement of clean soil and gravel over the release area, were implemented. The impacts were located in an area that contains sensitive refinery equipment and that is already identified as area of concern 3 (AOC 3) in the refinery's RCRA Post-Closure Care Permit (PCC) Permit and is therefore already subject to investigation and corrective action under the direction of the NMED. Therefore, HFNR requested a variance from the requirements to assess and remediate to 19.15.29.12 NMAC Table 1 standards. A Site Characterization, Assessment, and Closure Report was submitted to the New Mexico OCD on September 20, 2019, and included a request for a variance to 19.15.29.11(A)(5), 19.15.29.11(B), and 19.15.29.12 NMAC and a final C-141 (Site Assessment/Characterization and Closure).

3.2 May 28, 2019 – Cooling Tower Blowdown Sampling Station Release

Non-hazardous cooling tower blowdown water was released on May 28, 2019, from plastic tubing near a sampling station on the cooling tower blowdown line. The line was shut down and the tubing was repaired. The initial C-141 Release Notification for this release was submitted to New Mexico OCD on May 30, 2019.

Soil assessment activities were conducted in June 2019. Assessment results indicated BTEX, fluoride, sulfate, phenol, and arsenic concentrations were below their respective closure or screening criteria. Assessment results indicated chloride and TPH were present in soil at concentrations above their respective closure criteria, but significantly below their applicable NMED Construction Worker SSLs. The impacts were located in an area containing sensitive refinery infrastructure and distribution, and variability of TPH and chloride concentrations across the release are indicate they are not attributable to the May 2019 release. Therefore, HFNR requested that corrective action of impacted soil be deferred until the infrastructure is removed in accordance with 19.15.29.12 NMAC. A Site Characterization, Assessment, and Closure Report was submitted to the New Mexico OCD on August 28, 2019, and included the request for deferred corrective action and a final C-141 (Site Assessment/Characterization and Closure).

During a call in December 2019, OCD confirmed that 19.15.29 NMAC is not applicable to the refinery. During that call, it was determined that in order to address refinery releases, HFNR

must review 20.6.2 NMAC to determine a basis for OCD to allow releases to remain in place or accept a risk-based approach to remediation after release characterization. Additionally, HFNR must develop environmental investigation, characterization, and remediation guidelines for OCD to consider and approve. A Draft *HFNR Release Response and Characterization Plan* was submitted to the OCD on June 1, 2020 for OCD's review and comment. HFNR will continue to monitor shallow groundwater immediately beneath the release area on a semi-annual basis as part of the refinery's groundwater monitoring program.

3.3 September 3, 2019 – Cooling Tower Blowdown Sampling Station Release

Non-hazardous cooling tower blowdown water was released on September 3, 2019, from tubing near a sample station on the refinery's cooling tower blowdown line to the City of Artesia's POTW. The release location and impacted area are nearly identical to the May 28, 2019 cooling tower blowdown sampling station release, and extent of the release area was entirely contained within the refinery fence line. The sample station was isolated, the tubing was repaired, and the impacted area was marked and defined. The initial C-141 Release Notification for this release was submitted to New Mexico OCD on September 4, 2019. A final C-141 was submitted on September 9, 2019.

Further action for this release will be consistent with the May 2019 cooling tower release. HFNR will continue to monitor shallow groundwater immediately beneath the release area on a semi-annual basis as part of the refinery's groundwater monitoring program.

3.4 November 8, 2019 – Tank 401

During a tank inspection by Praxair Services, Inc. (Praxair), moist soil was observed at the base of T-401, an above ground storage tank containing gasoline blendstock. Praxair tested existing probes for detection of their inoculant. Initial tests suggested that the inoculant detections may have been only from the interstitial space between the two tank floors. Subsequent testing indicated tracer compound was detected below the secondary floor at probe 6, as described in the Praxair Tracer Tight Leak Test Report, dated November 8, 2019, submitted with the initial C-141 Release Notification, submitted to the New Mexico OCD on November 22, 2019. The release was not confirmed to be greater than 5 barrels. The tank was removed from service and was emptied for inspection. A final C-141 report is in development. HFNR will continue to monitor shallow groundwater immediately beneath the release area on a semi-annual basis as part of the refinery's groundwater monitoring program.

4.0 Summary of New Groundwater Contamination

Groundwater contamination and changes in existing constituents are discussed in Section 7 of the *2019 Annual Groundwater Monitoring Report* that was submitted to the NMED on February 28, 2020 (and attached to this report). Groundwater conditions measured during 2019 semiannual events were generally consistent with historical results as summarized below:

- The presence and distribution of PSH were generally consistent with previous monitoring results, with minor fluctuations. PSH thicknesses across the refinery are stable to

declining over time with the exception in select wells (KWB-10R, MW-112, MW-127, and MW-128, MW-137, MW-138) located in the Field East of Refinery and North Refinery that are attributed to reductions in groundwater elevations. PSH thicknesses are inversely affected by fluctuations in groundwater elevations, which generally decreased 2017 through 2019, consistent with drought conditions across New Mexico during this time.

- Concentrations of COCs in groundwater have generally remained stable over time, although increasing trends were noted in select wells in specific areas of interest. The limited number of increasing COC concentration trends observed since 2011 have generally exhibited stabilizing trends over the most recent sampling events. During 2019 and previous years, the following COCs were detected in groundwater at concentrations in exceedance of their respective critical groundwater screening level (CGWSL):
    - TPH gasoline range organics (GRO) and diesel range organics (DRO);
    - Select volatile organic compounds (VOCs) including target COCs benzene, toluene, ethylbenzene, xylenes, methyl tert-butyl ether (MTBE), and naphthalene;
    - Select total metals including target COC arsenic; and
    - Water quality parameters chloride, fluoride, sulfate, TDS, and nitrate/nitrite.
- Semi-volatile organic compounds (SVOCs) were detected in groundwater at concentrations in exceedance of their respective CGWLS in samples collected from select wells in the vicinity of Solid Waste Management Units (SWMUs) 20 and 22 (North Refinery and TEL wells).
- Many of the concentrations of inorganic COCs (manganese, chloride, fluoride, nitrate/nitrite, sulfate, and TDS) noted as “exceedances” of CGWSLs in 2019 may actually be similar to and reflective of background groundwater concentrations, as detailed in the background groundwater evaluation that was submitted to NMED and OCD in September 2015.
- The PSH and groundwater recovery system operated throughout 2019; more information is provided in Section 14 below.

5.0 Summary of All Wastewater Volumes Disposed of, Sold, or Treated Onsite

No waste is disposed, sold, or treated onsite.

As described above, wastewater is treated in the refinery WWTP and discharged to either HFNR’s injection wells (WDW-1, WDW-2, WDW-3, or WDW-4) or the City of Artesia POTW, both of which are located outside of the refinery (i.e., offsite). The onsite WWTP treated approximately 6,268,422 barrels of wastewater in 2019.

As described above, RO reject water was land applied to onsite fields from January 1 to January 22, 2019. Approximately 244,994 barrels of RO reject water were applied to the RO fields in 2019. RO reject water is no longer applied to onsite fields and is now utilized in the

refinery's cooling towers and ultimately discharged to HFNR's injection wells or the City of Artesia's POTW.

6.0 Documentation Regarding the Closure of Any UIC Class V Wells

No UIC Class V wells were closed during 2019.

7.0 A Description of Groundwater Monitoring and Remediation Activities Conducted Throughout the Year

Groundwater monitoring and remediation activities conducted at the refinery in 2019 are described in the attached *2019 Annual Groundwater Monitoring Report*. Groundwater monitoring activities, including sample collection procedures, decontamination procedures, sample handling procedures, and investigation-derived waste management, are described in Section 2 of the *2019 Annual Groundwater Monitoring Report*. Remediation activities, including PSH recovery, are described in Section 6 of the *2019 Annual Groundwater Monitoring Report*.

8.0 Summary Tables of Groundwater Data

Summary tables of groundwater data including water quality, purging parameters, groundwater elevation, and PSH thickness are provided in the attached *2019 Annual Groundwater Monitoring Report*, as specified below.

8.1 Well Gauging Results (Groundwater Elevation and PSH Thickness)

Well gauging results for both 2019 semiannual monitoring events are presented in Table 1 of the attached *2019 Annual Groundwater Monitoring Report.* Well gauging results include depth to water measurements, depth to PSH (if present) measurements, and groundwater elevations. Well gauging results for routine PSH recovery operation and maintenance (O&M) activities are summarized in Appendix F of the *2019 Annual Groundwater Monitoring Report*.

8.2 Field-Measured Purging Parameters

Groundwater quality parameters measured in the field at each well during 2019 groundwater purging and sampling activities are summarized in Table 2 of the attached *2019 Annual Groundwater Monitoring Report*. Groundwater quality parameters include pH, temperature, specific conductance, oxidation-reduction potential (ORP), dissolved oxygen, and turbidity. Observations of relative water quality (color and odor) are also included in Table 2 of the *2019 Annual Groundwater Monitoring Report*.

8.3 Laboratory Analytical Results (Water Quality)

Laboratory analytical results of all wells sampled in 2019, and during at least the three previous sampling events, are summarized in Tables 4A through 4D of the attached *2019 Annual Groundwater Monitoring Report* as follows:

- Table 4A – Total petroleum hydrocarbons (GRO and DRO) and select VOCs (VOCs that have had at least one detected value reported above the CGWSL in more than one well in 2019)
- Table 4B – Total Metals
- Table 4C – Water quality parameters (TDS, nitrate/nitrite, major cations, major anions) and Cyanide
- Table 4D – Select SVOCs (SVOCs that have had at least one detected value in at least one well in 2019)

Analytical results of all detected COCs are summarized in tables that are included in Appendix C of the attached *2019 Annual Groundwater Monitoring Report*.

9.0 Copies of Laboratory Analytical Data Sheets with Quality Assurance/Quality Control Information

Copies of laboratory analytical reports are provided in Appendix C of the attached *2019 Annual Groundwater Monitoring Report*. Laboratory analytical results were reviewed and validated. The data validation and a discussion of any data quality exceptions are provided in Appendix E of the attached *2019 Annual Groundwater Monitoring Report*.

10.0 Contour Maps for Each Aquifer Depicting the Potentiometric Gradient for Each Monitoring Event

Groundwater potentiometric surface maps based on the 2019 semiannual gauging results for the shallow saturated zone and the valley fill zone are presented in Figures 4 through 7 of the attached *2019 Annual Groundwater Monitoring Report*.

11.0 Isoconcentration Maps of Major Constituents of Concern for Each Monitoring Event

The extent of the CGWSL exceedance areas of the following target COCs based on the 2019 semiannual sampling results are presented on Figures 10 through 19 of the attached *2019 Annual Groundwater Monitoring Report*: DRO, arsenic, benzene, naphthalene, and MTBE. The extent of the CGWSL exceedance areas of the following water quality parameters based on the 2019 semiannual sampling results are presented on Figures 20 through 29 of the attached *2019 Annual Groundwater Monitoring Report*: chloride, fluoride, sulfate, nitrate/nitrite, and TDS.

12.0 PSH Thickness Isopleth Maps for Each Monitoring Event

The presence of PSH and measured PSH thicknesses based on the 2019 semiannual gauging results are shown on Figures 8 and 9 of the attached *2019 Annual Groundwater Monitoring Report*.

13.0 Plots of Static Water Elevation Versus Time in Key Wells

Plots presenting PSH thicknesses and static groundwater elevations over time for wells that have historically contained measurable PSH are provided in Appendix D of the attached *2019 Annual Groundwater Monitoring Report*.

14.0 Tabulation of the Volumes of PSH Removed

Volumes of groundwater and PSH recovered by the recovery system during 2019 are summarized in Table 5 of the attached *2019 Annual Groundwater Monitoring Report* and additional recovery details are provided in Appendix F of the *2019 Annual Groundwater Monitoring Report*. An estimated 4,389,902 gallons (104,521 barrels) of groundwater and an estimated 182,749 gallons (4,351 barrels) of PSH were recovered through operation of the automated recovery system in 2019. Further details of the recovery system operation are discussed in Section 6 of the attached *2019 Annual Groundwater Monitoring Report*.

15.0 Conclusions and Recommendations

Discharge activities at the refinery during 2019 were conducted in accordance with GW-028. Groundwater conditions at the refinery are generally consistent with previous years. Land application of RO reject water was conducted in accordance with GW-028 from January 1 to January 22, 2019. Land application was discontinued, and after January 22, 2019, RO reject water is further processed in a secondary RO unit, which produces a permeate stream which is utilized in the refinery's cooling towers, and the reject stream from that unit is ultimately discharged to HFNR's injection wells or the City of Artesia's POTW. RO reject water will continue to be utilized in the cooling towers and will not be land applied.

APPENDIX A
Refinery Discharges

APPENDIX A.1
Refinery Discharges - Treated Wastewater to Injection Wells

2019 ANNUAL DISCHARGE PERMIT REPORT
HOLLYFRONTIER NAVAJO REFINING LLC - ARTESIA REFINERY
DISCHARGE PERMIT GW-028
APPENDIX A.1
SUMMARY OF TREATED WASTEWATER TO INJECTION WELLS

Month (2019)	API No. and Well Name	Volume (bbl)	Average Pressure (psig)
January	30-015-27592 WDW - 1	263,589	1,272
	30-015-20894 WDW - 2	75,463	1,262
	30-015-26575 WDW - 3	92,469	1,177
	30-015-44677 WDW - 4	202,560	58
February	30-015-27592 WDW - 1	188,160	1,270
	30-015-20894 WDW - 2	61,440	1,252
	30-015-26575 WDW - 3	66,240	1,116
	30-015-44677 WDW - 4	228,480	50
March	30-015-27592 WDW - 1	132,857	1,184
	30-015-20894 WDW - 2	53,143	1,157
	30-015-26575 WDW - 3	59,520	1,064
	30-015-44677 WDW - 4	279,531	80
April	30-015-27592 WDW - 1	138,857	1,240
	30-015-20894 WDW - 2	48,343	1,141
	30-015-26575 WDW - 3	52,457	1,047
	30-015-44677 WDW - 4	240,686	70
May	30-015-27592 WDW - 1	148,800	1,283
	30-015-20894 WDW - 2	62,709	1,215
	30-015-26575 WDW - 3	64,834	1,064
	30-015-44677 WDW - 4	223,200	75
June	30-015-27592 WDW - 1	134,743	1,223
	30-015-20894 WDW - 2	62,743	1,247
	30-015-26575 WDW - 3	55,543	1,031
	30-015-44677 WDW - 4	274,629	98
July	30-015-27592 WDW - 1	139,234	1,219
	30-015-20894 WDW - 2	60,583	1,224
	30-015-26575 WDW - 3	73,337	1,045
	30-015-44677 WDW - 4	272,091	102
August	30-015-27592 WDW - 1	129,669	1,099
	30-015-20894 WDW - 2	54,206	1,160
	30-015-26575 WDW - 3	81,840	1,062
	30-015-44677 WDW - 4	312,480	115
September	30-015-27592 WDW - 1	126,514	1,133
	30-015-20894 WDW - 2	48,343	1,137
	30-015-26575 WDW - 3	51,429	993
	30-015-44677 WDW - 4	246,857	101
October	30-015-27592 WDW - 1	125,417	1,117
	30-015-20894 WDW - 2	46,766	1,142
	30-015-26575 WDW - 3	69,086	1,033
	30-015-44677 WDW - 4	247,646	100
November	30-015-27592 WDW - 1	134,743	1,246
	30-015-20894 WDW - 2	45,257	1,227
	30-015-26575 WDW - 3	49,371	1,052
	30-015-44677 WDW - 4	231,429	100
December	30-015-27592 WDW - 1	123,291	1,117
	30-015-20894 WDW - 2	38,263	1,207
	30-015-26575 WDW - 3	53,143	1,097
	30-015-44677 WDW - 4	268,903	109

2019 Cumulative Volume:	bbls
30-015-27592 WDW - 1	1,785,874
30-015-20894 WDW - 2	657,259
30-015-26575 WDW - 3	769,269
30-015-44677 WDW - 4	3,028,492
Total Injected fluids	**6,240,894**

Average Pressure	psig
30-015-27592 WDW - 1	1,200
30-015-20894 WDW - 2	1,198
30-015-26575 WDW - 3	1,065
30-015-44677 WDW - 4	88

Notes:

API: American Petroleum Institute

bbl: barrel

psig: pounds per square inch gauge

APPENDIX A.2
Refinery Discharges - Treated Wastewater to City of Artesia POTW

2019 ANNUAL DISCHARGE PERMIT REPORT
HOLLYFRONTIER NAVAJO REFINING LLC - ARTESIA REFINERY
DISCHARGE PERMIT GW-028
APPENDIX A.2
SUMMARY OF TREATED WASTEWATER TO THE CITY OF ARTESIA

Refinery WWTP to City of Artesia POTW		
Month (2019)	**Rate (gpm)**	**Volume (gal)**
January	4	178,560
February	2	89,280
March	2	89,280
April	0.1	4,464
May	0.6	26,784
June	2.5	111,600
July	0.4	151,776
August	3.7	165,168
September	1.4	62,496
October	2.3	102,672
November	2.1	93,744
December	1.8	80,352

Average Rate (gpm)	**1.91**
Cummulative gallons	**1,156,176**
Cummulative barrels	**27,528**

Notes:

POTW: Publicly-Owned Treatment Works

WWTP: Wastewater Treatment Plant

gpm: gallons per minute

gal: gallons

2019 ANNUAL DISCHARGE PERMIT REPORT
HOLLYFRONTIER NAVAJO REFINING LLC - ARTESIA REFINERY
DISCHARGE PERMIT GW-028
APPENDIX A.2
SUMMARY OF COOLING TOWER BLOW-DOWN TO THE CITY OF ARTESIA

Cooling Tower Blow-Down to City of Artesia POTW		
Month (2019)	**Rate (gpm)**	**Volume (gal)**
January	73	3,258,720
February	75	3,348,000
March	89	3,972,960
April	92	4,106,880
May	99	4,419,360
June	98	4,374,720
July	104	4,642,560
August	97	4,330,080
September	83	3,705,120
October	83	3,705,120
November	63	2,812,320
December	70	3,124,800

Average (gpm)	**86**
Cummulative gallons	**45,800,640**
Cummulative barrels	**1,090,491**

Notes:

POTW: Publicly-Owned Treatment Works

gpm: gallons per minute

gal: gallons

APPENDIX A.3
Refinery Discharges - RO Reject Water Discharge

2019 ANNUAL DISCHARGE PERMIT REPORT
HOLLYFRONTIER NAVAJO REFINING LLC - ARTESIA REFINERY
DISCHARGE PERMIT GW-028
APPENDIX A.3
DAILY AND MONTHLY RO DISCHARGE SUMMARY

January 2019 - RO Reject Flow/Discharge Measurements					
Skid Location:	**South**	**North**	**Middle**	**Combined Discharge**	**Combined Discharge**
Measurement:	**Daily Flow**	**Daily Flow**	**Daily Flow**		
Units:	**GPM**	**GPM**	**GPM**	**GPM**	**BPD**
1/1/19	161.66	0.05	162.43	324.13	11,113.03
1/2/19	162.08	0.04	175.01	337.13	11,558.84
1/3/19	161.86	0.04	174.48	336.38	11,533.04
1/4/19	162.07	0.04	174.65	336.76	11,546.17
1/5/19	161.37	0.05	173.89	335.31	11,496.19
1/6/19	145.29	0.05	152.94	298.28	10,226.60
1/7/19	138.63	0.06	141.43	280.13	9,604.41
1/8/19	162.53	0.06	159.88	322.46	11,055.92
1/9/19	189.56	0.44	160.14	350.14	12,004.96
1/10/19	178.74	58.15	95.06	331.95	11,381.00
1/11/19	170.32	181.47	0.03	351.82	12,062.49
1/12/19	91.60	180.68	76.75	349.03	11,966.66
1/13/19	0.00	152.60	175.00	327.60	11,231.94
1/14/19	0.00	150.41	177.48	327.89	11,241.80
1/15/19	0.00	151.54	177.72	329.25	11,288.72
1/16/19	0.00	149.46	174.58	324.05	11,110.12
1/17/19	0.05	138.39	174.58	313.02	10,732.01
1/18/19	81.94	76.81	173.34	332.09	11,385.93
1/19/19	170.69	0.05	173.82	344.56	11,813.42
1/20/19	141.54	0.05	175.87	317.46	10,884.38
1/21/19	158.78	0.05	170.51	329.34	11,291.64
1/22/19*	124.13	0.06	122.70	246.90	8,465.02
				Total (bbl):	**244,994.30**
				Total (gal):	**10,289,760.49**

Notes:

* Land application of RO discharge was discontinued after January 22, 2019.

RO: Reverse osmosis

bbl: barrel

BPD: barrels per day

gal: gallon

GPM: gallons per minute

HALL ENVIRONMENTAL ANALYSIS LABORATORY

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

February 06, 2019

Scott Denton

Navajo Refining Company
P.O. Box 159
Artesia, NM 88211-0159
TEL: (575) 748-3311
FAX

RE: RO Reject OrderNo.: 1901787

Dear Scott Denton:

Hall Environmental Analysis Laboratory received 2 sample(s) on 1/21/2019 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 or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. 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. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. 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.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0901

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: R.O. Reject
Project: RO Reject
Collection Date: 1/18/2019 1:35:00 PM
Lab ID: 1901787-001 **Matrix:** AQUEOUS **Received Date:** 1/21/2019 8:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8011/504.1: EDB						Analyst: **JME**
1,2-Dibromoethane	ND	0.0093		µg/L	1	1/23/2019 7:52:01 PM
EPA METHOD 8082A: PCB'S						Analyst: **TOM**
Aroclor 1016	ND	1.0		µg/L	1	1/30/2019 2:45:30 PM
Aroclor 1221	ND	1.0		µg/L	1	1/30/2019 2:45:30 PM
Aroclor 1232	ND	1.0		µg/L	1	1/30/2019 2:45:30 PM
Aroclor 1242	ND	1.0		µg/L	1	1/30/2019 2:45:30 PM
Aroclor 1248	ND	1.0		µg/L	1	1/30/2019 2:45:30 PM
Aroclor 1254	ND	1.0		µg/L	1	1/30/2019 2:45:30 PM
Aroclor 1260	ND	1.0		µg/L	1	1/30/2019 2:45:30 PM
Surr: Decachlorobiphenyl	72.0	24.8-102		%Rec	1	1/30/2019 2:45:30 PM
Surr: Tetrachloro-m-xylene	70.4	15.6-106		%Rec	1	1/30/2019 2:45:30 PM
EPA METHOD 8015M/D: DIESEL RANGE						Analyst: **CLP**
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	1/23/2019 9:36:21 AM
Motor Oil Range Organics (MRO)	ND	5.0		mg/L	1	1/23/2019 9:36:21 AM
Surr: DNOP	108	70-130		%Rec	1	1/23/2019 9:36:21 AM
EPA METHOD 8310: PAHS						Analyst: **TOM**
Naphthalene	ND	3.0		µg/L	1	1/30/2019 2:08:37 PM
1-Methylnaphthalene	ND	3.0		µg/L	1	1/30/2019 2:08:37 PM
2-Methylnaphthalene	ND	3.0		µg/L	1	1/30/2019 2:08:37 PM
Acenaphthylene	ND	3.0		µg/L	1	1/30/2019 2:08:37 PM
Acenaphthene	ND	3.0		µg/L	1	1/30/2019 2:08:37 PM
Fluorene	ND	0.80		µg/L	1	1/30/2019 2:08:37 PM
Phenanthrene	ND	0.60		µg/L	1	1/30/2019 2:08:37 PM
Anthracene	ND	0.60		µg/L	1	1/30/2019 2:08:37 PM
Fluoranthene	ND	0.30		µg/L	1	1/30/2019 2:08:37 PM
Pyrene	ND	0.40		µg/L	1	1/30/2019 2:08:37 PM
Benz(a)anthracene	ND	0.070		µg/L	1	1/30/2019 2:08:37 PM
Chrysene	ND	0.20		µg/L	1	1/30/2019 2:08:37 PM
Benzo(b)fluoranthene	ND	0.10		µg/L	1	1/30/2019 2:08:37 PM
Benzo(k)fluoranthene	ND	0.070		µg/L	1	1/30/2019 2:08:37 PM
Benzo(a)pyrene	ND	0.070		µg/L	1	1/30/2019 2:08:37 PM
Dibenz(a,h)anthracene	ND	0.12		µg/L	1	1/30/2019 2:08:37 PM
Benzo(g,h,i)perylene	ND	0.12		µg/L	1	1/30/2019 2:08:37 PM
Indeno(1,2,3-cd)pyrene	ND	0.25		µg/L	1	1/30/2019 2:08:37 PM
Surr: Benzo(e)pyrene	62.8	48.8-93.3		%Rec	1	1/30/2019 2:08:37 PM
EPA METHOD 300.0: ANIONS						Analyst: **smb**
Fluoride	2.3	0.10		mg/L	1	1/21/2019 12:47:38 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

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D	Sample Diluted Due to Matrix	E	Value above quantitation range
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Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: R.O. Reject
Project: RO Reject
Collection Date: 1/18/2019 1:35:00 PM
Lab ID: 1901787-001 **Matrix:** AQUEOUS **Received Date:** 1/21/2019 8:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: **smb**
Chloride	370	10		mg/L	20	1/21/2019 1:26:13 PM
Sulfate	2000	25		mg/L	50	1/30/2019 12:13:46 AM
Nitrate+Nitrite as N	1.3	1.0		mg/L	5	1/21/2019 6:22:02 PM
EPA METHOD 200.7: DISSOLVED METALS						Analyst: **bcv**
Aluminum	ND	0.020		mg/L	1	1/24/2019 5:13:02 PM
Barium	0.065	0.0020		mg/L	1	1/24/2019 5:13:02 PM
Beryllium	ND	0.0020		mg/L	1	1/24/2019 5:13:02 PM
Boron	0.11	0.040		mg/L	1	1/24/2019 5:13:02 PM
Cadmium	ND	0.0020		mg/L	1	1/24/2019 5:13:02 PM
Calcium	700	10		mg/L	10	1/24/2019 5:40:37 PM
Chromium	ND	0.0060		mg/L	1	1/24/2019 5:13:02 PM
Cobalt	ND	0.0060		mg/L	1	1/24/2019 5:13:02 PM
Copper	ND	0.0060		mg/L	1	1/24/2019 5:13:02 PM
Iron	ND	0.020		mg/L	1	1/24/2019 5:13:02 PM
Magnesium	220	5.0		mg/L	5	1/24/2019 5:19:53 PM
Manganese	ND	0.0020		mg/L	1	1/24/2019 5:13:02 PM
Molybdenum	ND	0.0080		mg/L	1	1/24/2019 5:13:02 PM
Nickel	ND	0.010		mg/L	1	1/24/2019 5:13:02 PM
Potassium	4.5	1.0		mg/L	1	1/24/2019 5:13:02 PM
Silver	0.010	0.0050		mg/L	1	1/24/2019 5:13:02 PM
Sodium	210	5.0		mg/L	5	1/24/2019 5:19:53 PM
Vanadium	ND	0.050		mg/L	1	1/24/2019 5:13:02 PM
Zinc	0.025	0.010		mg/L	1	1/24/2019 5:13:02 PM
EPA 200.8: DISSOLVED METALS						Analyst: **DBK**
Antimony	ND	0.0010		mg/L	1	1/24/2019 2:39:19 PM
Arsenic	0.0018	0.0010		mg/L	1	1/24/2019 2:39:19 PM
Lead	ND	0.00050		mg/L	1	1/24/2019 2:39:19 PM
Selenium	0.0090	0.0010		mg/L	1	1/24/2019 2:39:19 PM
Thallium	ND	0.00050		mg/L	1	1/24/2019 2:39:19 PM
Uranium	0.0061	0.00050		mg/L	1	1/24/2019 2:39:19 PM
EPA METHOD 245.1: MERCURY						Analyst: **pmf**
Mercury	ND	0.00020		mg/L	1	1/24/2019 7:53:16 PM
EPA METHOD 8260B: VOLATILES						Analyst: **AG**
Benzene	ND	1.0		µg/L	1	1/22/2019 5:39:03 PM
Toluene	2.9	1.0		µg/L	1	1/22/2019 5:39:03 PM
Ethylbenzene	ND	1.0		µg/L	1	1/22/2019 5:39:03 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/22/2019 5:39:03 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

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D	Sample Diluted Due to Matrix	E	Value above quantitation range
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PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
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Collection Date: 1/18/2019 1:35:00 PM
Lab ID: 1901787-001 **Matrix:** AQUEOUS **Received Date:** 1/21/2019 8:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: **AG**
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/22/2019 5:39:03 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/22/2019 5:39:03 PM
Chloroform	ND	1.0		µg/L	1	1/22/2019 5:39:03 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/22/2019 5:39:03 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/22/2019 5:39:03 PM
Methylene Chloride	ND	3.0		µg/L	1	1/22/2019 5:39:03 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/22/2019 5:39:03 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/22/2019 5:39:03 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/22/2019 5:39:03 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/22/2019 5:39:03 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/22/2019 5:39:03 PM
Vinyl chloride	ND	1.0		µg/L	1	1/22/2019 5:39:03 PM
Xylenes, Total	ND	1.5		µg/L	1	1/22/2019 5:39:03 PM
Surr: 1,2-Dichloroethane-d4	110	70-130		%Rec	1	1/22/2019 5:39:03 PM
Surr: 4-Bromofluorobenzene	107	70-130		%Rec	1	1/22/2019 5:39:03 PM
Surr: Dibromofluoromethane	108	70-130		%Rec	1	1/22/2019 5:39:03 PM
Surr: Toluene-d8	104	70-130		%Rec	1	1/22/2019 5:39:03 PM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **AG**
Gasoline Range Organics (GRO)	ND	0.050		mg/L	1	1/22/2019 5:39:03 PM
Surr: BFB	99.7	70-130		%Rec	1	1/22/2019 5:39:03 PM
TOTAL PHENOLICS BY SW-846 9067						Analyst: **CLP**
Phenolics	ND	2.5		µg/L	1	1/30/2019
EPA 8270D: SEMIVOLATILES						Analyst: **PAC**
Atrazine	ND	0.010		µg/L	1	1/25/2019
1,2,4-Trichlorobenzene	ND	0.010		µg/L	1	1/25/2019
2,4,6-Trichlorophenol	ND	0.010		µg/L	1	1/25/2019
2,4-Dichlorophenol	ND	0.010		µg/L	1	1/25/2019
2,4-Dimethylphenol	ND	0.010		µg/L	1	1/25/2019
2,4-Dinitrophenol	ND	0.010		µg/L	1	1/25/2019
2,4-Dinitrotoluene	ND	0.010		µg/L	1	1/25/2019
2,6-Dinitrotoluene	ND	0.010		µg/L	1	1/25/2019
2-Chloronaphthalene	ND	0.0010		µg/L	1	1/25/2019
2-Chlorophenol	ND	0.010		µg/L	1	1/25/2019
2-Nitrophenol	ND	0.010		µg/L	1	1/25/2019
3,3´-Dichlorobenzidine	ND	0.010		µg/L	1	1/25/2019
4,6-Dinitro-2-methylphenol	ND	0.010		µg/L	1	1/25/2019
4-Bromophenyl phenyl ether	ND	0.010		µg/L	1	1/25/2019
4-Chloro-3-methylphenol	ND	0.010		µg/L	1	1/25/2019

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

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D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: R.O. Reject
Project: RO Reject
Collection Date: 1/18/2019 1:35:00 PM
Lab ID: 1901787-001
Matrix: AQUEOUS
Received Date: 1/21/2019 8:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA 8270D: SEMIVOLATILES						Analyst: **PAC**
4-Chlorophenyl phenyl ether	ND	0.010		µg/L	1	1/25/2019
4-Nitrophenol	ND	0.010		µg/L	1	1/25/2019
Acenaphthene	ND	0.0010		µg/L	1	1/25/2019
Acenaphthylene	ND	0.0010		µg/L	1	1/25/2019
Anthracene	ND	0.0010		µg/L	1	1/25/2019
Benzidine	ND	0.010		µg/L	1	1/25/2019
Benzo(g,h,i)perylene	ND	0.0010		µg/L	1	1/25/2019
Benz(a)anthracene	ND	0.0010		µg/L	1	1/25/2019
Benzo(a)pyrene	ND	0.0010		µg/L	1	1/25/2019
Benzo(b)fluoranthene	ND	0.0010		µg/L	1	1/25/2019
Benzo(k)fluoranthene	ND	0.0010		µg/L	1	1/25/2019
Bis(2-chloroethoxy)methane	ND	0.010		µg/L	1	1/25/2019
Bis(2-chloroethyl)ether	ND	0.010		µg/L	1	1/25/2019
Bis(2-chloroisopropyl)ether	ND	0.010		µg/L	1	1/25/2019
Bis(2-ethylhexyl)phthalate	ND	0.0030		µg/L	1	1/25/2019
Butyl benzyl phthalate	ND	0.0030		µg/L	1	1/25/2019
Chrysene	ND	0.0010		µg/L	1	1/25/2019
Dibenz(a,h)anthracene	ND	0.0010		µg/L	1	1/25/2019
Diethyl phthalate	ND	0.0030		µg/L	1	1/25/2019
Dimethyl phthalate	ND	0.0030		µg/L	1	1/25/2019
Di-n-butyl phthalate	ND	0.0030		µg/L	1	1/25/2019
Di-n-octyl phthalate	ND	0.0030		µg/L	1	1/25/2019
Fluoranthene	ND	0.0010		µg/L	1	1/25/2019
Fluorene	ND	0.0010		µg/L	1	1/25/2019
Hexachlorobenzene	ND	0.0010		µg/L	1	1/25/2019
Hexachlorobutadiene	ND	0.010		µg/L	1	1/25/2019
Hexachlorocyclopentadiene	ND	0.010		µg/L	1	1/25/2019
Hexachloroethane	ND	0.010		µg/L	1	1/25/2019
Indeno(1,2,3-cd)pyrene	ND	0.0010		µg/L	1	1/25/2019
Isophorone	ND	0.010		µg/L	1	1/25/2019
Naphthalene	ND	0.0010		µg/L	1	1/25/2019
Nitrobenzene	ND	0.010		µg/L	1	1/25/2019
N-Nitrosodimethylamine	ND	0.010		µg/L	1	1/25/2019
N-Nitrosodi-n-propylamine	ND	0.010		µg/L	1	1/25/2019
N-Nitrosodiphenylamine	ND	0.010		µg/L	1	1/25/2019
Pentachlorophenol	ND	0.010		µg/L	1	1/25/2019
Phenanthrene	ND	0.0010		µg/L	1	1/25/2019
Phenol	ND	0.010		µg/L	1	1/25/2019
Pyrene	ND	0.0010		µg/L	1	1/25/2019

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Qualifiers:

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Project: RO Reject
Collection Date: 1/18/2019 1:35:00 PM
Lab ID: 1901787-001 **Matrix:** AQUEOUS **Received Date:** 1/21/2019 8:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA 335.4: TOTAL CYANIDE SUBBED						Analyst: **PAC**
Cyanide	ND	0.00500		mg/L	1	1/29/2019
EPA 903.1: RA 226 AND EPA 904.0: RA 228-SUBBED						Analyst: **PAC**
Radium-226	2.21	0.741		pCi/L	1	1/29/2019
Radium-226 ±	0.903	0.741		pCi/L	1	1/29/2019
Radium-228	0.0923	0.645		pCi/L	1	1/29/2019
Radium-228 ±	0.288	0.645		pCi/L	1	1/29/2019
SM2510B: SPECIFIC CONDUCTANCE						Analyst: **MRA**
Conductivity	4300	5.0		µmhos/c	1	1/21/2019 4:11:55 PM
SM4500-H+B / 9040C: PH						Analyst: **MRA**
pH	8.02		H	pH units	1	1/21/2019 4:11:55 PM
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: **KS**
Total Dissolved Solids	4020	20.0	*	mg/L	1	1/23/2019 3:44:00 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: Trip Blank
Project: RO Reject
Collection Date:
Lab ID: 1901787-002
Matrix: TRIP BLANK
Received Date: 1/21/2019 8:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8011/504.1: EDB						Analyst: **JME**
1,2-Dibromoethane	ND	0.0097		µg/L	1	1/23/2019 8:51:15 PM
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**
Benzene	ND	1.0		µg/L	1	1/23/2019 6:30:47 AM
Toluene	ND	1.0		µg/L	1	1/23/2019 6:30:47 AM
Ethylbenzene	ND	1.0		µg/L	1	1/23/2019 6:30:47 AM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/23/2019 6:30:47 AM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/23/2019 6:30:47 AM
Carbon Tetrachloride	ND	1.0		µg/L	1	1/23/2019 6:30:47 AM
Chloroform	ND	1.0		µg/L	1	1/23/2019 6:30:47 AM
1,1-Dichloroethane	ND	1.0		µg/L	1	1/23/2019 6:30:47 AM
1,1-Dichloroethene	ND	1.0		µg/L	1	1/23/2019 6:30:47 AM
Methylene Chloride	ND	3.0		µg/L	1	1/23/2019 6:30:47 AM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/23/2019 6:30:47 AM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/23/2019 6:30:47 AM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/23/2019 6:30:47 AM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/23/2019 6:30:47 AM
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/23/2019 6:30:47 AM
Vinyl chloride	ND	1.0		µg/L	1	1/23/2019 6:30:47 AM
Xylenes, Total	ND	1.5		µg/L	1	1/23/2019 6:30:47 AM
Surr: 1,2-Dichloroethane-d4	103	70-130		%Rec	1	1/23/2019 6:30:47 AM
Surr: 4-Bromofluorobenzene	101	70-130		%Rec	1	1/23/2019 6:30:47 AM
Surr: Dibromofluoromethane	138	70-130	S	%Rec	1	1/23/2019 6:30:47 AM
Surr: Toluene-d8	103	70-130		%Rec	1	1/23/2019 6:30:47 AM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**

06-Feb-19

Client: Navajo Refining Company

Project: RO Reject

Sample ID **MB-B**	SampType: **MBLK**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **PBW**	Batch ID: **B57243**	RunNo: **57243**
Prep Date:	Analysis Date: **1/24/2019**	SeqNo: **1914910** 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	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								
Iron	ND	0.020								
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								

Sample ID **LLLCS-B**	SampType: **LCSLL**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **BatchQC**	Batch ID: **B57243**	RunNo: **57243**
Prep Date:	Analysis Date: **1/24/2019**	SeqNo: **1914911** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020	0.01000	0	129	50	150			
Barium	ND	0.0020	0.002000	0	94.4	50	150			
Beryllium	ND	0.0020	0.002000	0	99.7	50	150			
Boron	ND	0.040	0.04000	0	97.1	50	150			
Cadmium	ND	0.0020	0.002000	0	67.2	50	150			
Calcium	ND	1.0	0.5000	0	104	50	150			
Chromium	ND	0.0060	0.006000	0	92.2	50	150			
Cobalt	0.0065	0.0060	0.006000	0	108	50	150			
Copper	ND	0.0060	0.006000	0	68.8	50	150			
Iron	0.021	0.020	0.02000	0	105	50	150			
Magnesium	ND	1.0	0.5000	0	103	50	150			
Manganese	ND	0.0020	0.002000	0	96.5	50	150			
Molybdenum	ND	0.0080	0.008000	0	80.0	50	150			
Nickel	ND	0.010	0.005000	0	70.3	50	150			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**
06-Feb-19

Client: Navajo Refining Company
Project: RO Reject

Sample ID	**LLLCS-B**	SampType: **LCSLL**		TestCode: **EPA Method 200.7: Dissolved Metals**					
Client ID:	**BatchQC**	Batch ID: **B57243**		RunNo: **57243**					
Prep Date:		Analysis Date: **1/24/2019**		SeqNo: **1914911**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Potassium	ND	1.0	0.5000	0	104	50	150			
Silver	ND	0.0050	0.005000	0	83.4	50	150			
Sodium	ND	1.0	0.5000	0	117	50	150			
Vanadium	ND	0.050	0.01000	0	88.0	50	150			
Zinc	ND	0.010	0.005000	0	126	50	150			

Sample ID	**LCS-B**	SampType: **LCS**		TestCode: **EPA Method 200.7: Dissolved Metals**					
Client ID:	**LCSW**	Batch ID: **B57243**		RunNo: **57243**					
Prep Date:		Analysis Date: **1/24/2019**		SeqNo: **1914912**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.55	0.020	0.5000	0	109	85	115			
Barium	0.49	0.0020	0.5000	0	98.2	85	115			
Beryllium	0.50	0.0020	0.5000	0	99.3	85	115			
Boron	0.51	0.040	0.5000	0	102	85	115			
Cadmium	0.50	0.0020	0.5000	0	99.6	85	115			
Calcium	50	1.0	50.00	0	99.0	85	115			
Chromium	0.49	0.0060	0.5000	0	97.8	85	115			
Cobalt	0.48	0.0060	0.5000	0	95.5	85	115			
Copper	0.50	0.0060	0.5000	0	99.3	85	115			
Iron	0.49	0.020	0.5000	0	97.6	85	115			
Magnesium	50	1.0	50.00	0	100	85	115			
Manganese	0.48	0.0020	0.5000	0	96.8	85	115			
Molybdenum	0.49	0.0080	0.5000	0	98.5	85	115			
Nickel	0.49	0.010	0.5000	0	97.1	85	115			
Potassium	50	1.0	50.00	0	99.3	85	115			
Silver	0.10	0.0050	0.1000	0	102	85	115			
Sodium	51	1.0	50.00	0	101	85	115			
Vanadium	0.50	0.050	0.5000	0	99.1	85	115			
Zinc	0.48	0.010	0.5000	0	96.2	85	115			

Sample ID	**1901787-001GMS**	SampType: **MS**		TestCode: **EPA Method 200.7: Dissolved Metals**					
Client ID:	**R.O. Reject**	Batch ID: **B57243**		RunNo: **57243**					
Prep Date:		Analysis Date: **1/24/2019**		SeqNo: **1915074**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.55	0.020	0.5000	0	109	70	130			
Barium	0.52	0.0020	0.5000	0.06527	91.7	70	130			
Beryllium	0.52	0.0020	0.5000	0.0003350	103	70	130			
Boron	0.61	0.040	0.5000	0.1099	100	70	130			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**
06-Feb-19

Client: Navajo Refining Company
Project: RO Reject

Sample ID	**1901787-001GMS**	SampType: **MS**		TestCode: **EPA Method 200.7: Dissolved Metals**					
Client ID:	**R.O. Reject**	Batch ID: **B57243**		RunNo: **57243**					
Prep Date:		Analysis Date: **1/24/2019**		SeqNo: **1915074**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cadmium	0.48	0.0020	0.5000	0	95.6	70	130			
Chromium	0.44	0.0060	0.5000	0	87.2	70	130			
Cobalt	0.45	0.0060	0.5000	0	89.7	70	130			
Copper	0.52	0.0060	0.5000	0.002356	103	70	130			
Iron	0.50	0.020	0.5000	0	100	70	130			
Manganese	0.48	0.0020	0.5000	0	96.3	70	130			
Molybdenum	0.44	0.0080	0.5000	0	88.3	70	130			
Nickel	0.45	0.010	0.5000	0	89.9	70	130			
Potassium	53	1.0	50.00	4.528	96.9	70	130			
Silver	0.091	0.0050	0.1000	0.01047	80.3	70	130			
Vanadium	0.48	0.050	0.5000	0.01386	93.7	70	130			
Zinc	0.47	0.010	0.5000	0.02475	89.1	70	130			

Sample ID	**1901787-001GMSD**	SampType: **MSD**		TestCode: **EPA Method 200.7: Dissolved Metals**					
Client ID:	**R.O. Reject**	Batch ID: **B57243**		RunNo: **57243**					
Prep Date:		Analysis Date: **1/24/2019**		SeqNo: **1915075**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.55	0.020	0.5000	0	110	70	130	0.461	20	
Barium	0.53	0.0020	0.5000	0.06527	93.0	70	130	1.20	20	
Beryllium	0.52	0.0020	0.5000	0.0003350	103	70	130	0.258	20	
Boron	0.62	0.040	0.5000	0.1099	102	70	130	1.46	20	
Cadmium	0.48	0.0020	0.5000	0	97.0	70	130	1.40	20	
Chromium	0.44	0.0060	0.5000	0	87.9	70	130	0.767	20	
Cobalt	0.45	0.0060	0.5000	0	90.5	70	130	0.924	20	
Copper	0.53	0.0060	0.5000	0.002356	105	70	130	1.42	20	
Iron	0.51	0.020	0.5000	0	103	70	130	2.28	20	
Manganese	0.49	0.0020	0.5000	0	97.1	70	130	0.820	20	
Molybdenum	0.45	0.0080	0.5000	0	89.5	70	130	1.30	20	
Nickel	0.46	0.010	0.5000	0	91.2	70	130	1.48	20	
Potassium	55	1.0	50.00	4.528	101	70	130	4.22	20	
Silver	0.092	0.0050	0.1000	0.01047	81.0	70	130	0.802	20	
Vanadium	0.49	0.050	0.5000	0.01386	94.7	70	130	1.01	20	
Zinc	0.47	0.010	0.5000	0.02475	90.0	70	130	0.963	20	

Sample ID	**1901787-001GMS**	SampType: **MS**		TestCode: **EPA Method 200.7: Dissolved Metals**					
Client ID:	**R.O. Reject**	Batch ID: **B57243**		RunNo: **57243**					
Prep Date:		Analysis Date: **1/24/2019**		SeqNo: **1915077**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**
06-Feb-19

Client: Navajo Refining Company
Project: RO Reject

Sample ID	**1901787-001GMS**	SampType: **MS**		TestCode: **EPA Method 200.7: Dissolved Metals**					
Client ID:	**R.O. Reject**	Batch ID: **B57243**		RunNo: **57243**					
Prep Date:		Analysis Date: **1/24/2019**		SeqNo: **1915077**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Magnesium	470	5.0	250.0	216.0	100	70	130			
Sodium	470	5.0	250.0	212.8	103	70	130			

Sample ID	**1901787-001GMSD**	SampType: **MSD**		TestCode: **EPA Method 200.7: Dissolved Metals**					
Client ID:	**R.O. Reject**	Batch ID: **B57243**		RunNo: **57243**					
Prep Date:		Analysis Date: **1/24/2019**		SeqNo: **1915078**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Magnesium	470	5.0	250.0	216.0	102	70	130	0.864	20	
Sodium	480	5.0	250.0	212.8	107	70	130	1.85	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
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QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**

06-Feb-19

Client: Navajo Refining Company

Project: RO Reject

Sample ID	**MB**	SampType:	**MBLK**	TestCode:	**EPA 200.8: Dissolved Metals**					
Client ID:	**PBW**	Batch ID:	**B57230**	RunNo:	**57230**					
Prep Date:		Analysis Date:	**1/24/2019**	SeqNo:	**1914365**	Units:	**mg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	ND	0.0010								
Arsenic	ND	0.0010								
Lead	ND	0.00050								
Selenium	ND	0.0010								
Thallium	ND	0.00050								
Uranium	ND	0.00050								

Sample ID	**MSLLLCS**	SampType:	**LCSLL**	TestCode:	**EPA 200.8: Dissolved Metals**					
Client ID:	**BatchQC**	Batch ID:	**B57230**	RunNo:	**57230**					
Prep Date:		Analysis Date:	**1/24/2019**	SeqNo:	**1914366**	Units:	**mg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	ND	0.0010	0.001000	0	94.3	50	150			
Arsenic	0.0011	0.0010	0.001000	0	108	50	150			
Lead	ND	0.00050	0.0005000	0	94.7	50	150			
Selenium	0.0011	0.0010	0.001000	0	106	50	150			
Thallium	ND	0.00050	0.0005000	0	93.4	50	150			
Uranium	ND	0.00050	0.0005000	0	94.2	50	150			

Sample ID	**MSLCS**	SampType:	**LCS**	TestCode:	**EPA 200.8: Dissolved Metals**					
Client ID:	**LCSW**	Batch ID:	**B57230**	RunNo:	**57230**					
Prep Date:		Analysis Date:	**1/24/2019**	SeqNo:	**1914367**	Units:	**mg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.023	0.0010	0.02500	0	92.7	85	115			
Arsenic	0.024	0.0010	0.02500	0	95.4	85	115			
Lead	0.012	0.00050	0.01250	0	94.0	85	115			
Selenium	0.024	0.0010	0.02500	0	95.8	85	115			
Thallium	0.012	0.00050	0.01250	0	94.3	85	115			
Uranium	0.012	0.00050	0.01250	0	93.9	85	115			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
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QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**
06-Feb-19

Client: Navajo Refining Company
Project: RO Reject

Sample ID	**MB-42793**	SampType: **MBLK**			TestCode: **EPA Method 245.1: Mercury**					
Client ID:	**PBW**	Batch ID: **42793**			RunNo: **57245**					
Prep Date:	**1/24/2019**	Analysis Date: **1/24/2019**			SeqNo: **1914854**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.00020								

Sample ID	**LCS-42793**	SampType: **LCS**			TestCode: **EPA Method 245.1: Mercury**					
Client ID:	**LCSW**	Batch ID: **42793**			RunNo: **57245**					
Prep Date:	**1/24/2019**	Analysis Date: **1/24/2019**			SeqNo: **1914855**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0049	0.00020	0.005000	0	98.9	80	120			

Sample ID	**1901832-001CMS**	SampType: **MS**			TestCode: **EPA Method 245.1: Mercury**					
Client ID:	**BatchQC**	Batch ID: **42793**			RunNo: **57245**					
Prep Date:	**1/24/2019**	Analysis Date: **1/24/2019**			SeqNo: **1914859**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0049	0.00020	0.005000	0	98.3	75	125			

Sample ID	**1901832-001CMSD**	SampType: **MSD**			TestCode: **EPA Method 245.1: Mercury**					
Client ID:	**BatchQC**	Batch ID: **42793**			RunNo: **57245**					
Prep Date:	**1/24/2019**	Analysis Date: **1/24/2019**			SeqNo: **1914860**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0048	0.00020	0.005000	0	95.2	75	125	3.26	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**

06-Feb-19

Client: Navajo Refining Company

Project: RO Reject

Sample ID **MB**	SampType: **MBLK**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **R57149**	RunNo: **57149**
Prep Date:	Analysis Date: **1/21/2019**	SeqNo: **1911765** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.10								
Chloride	ND	0.50								
Nitrate+Nitrite as N	ND	0.20								

Sample ID **LCS**	SampType: **LCS**	TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW**	Batch ID: **R57149**	RunNo: **57149**
Prep Date:	Analysis Date: **1/21/2019**	SeqNo: **1911766** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.48	0.10	0.5000	0	96.4	90	110			
Chloride	4.8	0.50	5.000	0	95.5	90	110			
Nitrate+Nitrite as N	3.5	0.20	3.500	0	99.1	90	110			

Sample ID **1901787-001EMS**	SampType: **MS**	TestCode: **EPA Method 300.0: Anions**
Client ID: **R.O. Reject**	Batch ID: **R57149**	RunNo: **57149**
Prep Date:	Analysis Date: **1/21/2019**	SeqNo: **1911772** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	3.0	0.10	0.5000	2.347	125	66.7	127			

Sample ID **1901787-001EMSD**	SampType: **MSD**	TestCode: **EPA Method 300.0: Anions**
Client ID: **R.O. Reject**	Batch ID: **R57149**	RunNo: **57149**
Prep Date:	Analysis Date: **1/21/2019**	SeqNo: **1911773** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	3.0	0.10	0.5000	2.347	125	66.7	127	0.0950	20	

Sample ID **1901792-001BMS**	SampType: **MS**	TestCode: **EPA Method 300.0: Anions**
Client ID: **BatchQC**	Batch ID: **R57149**	RunNo: **57149**
Prep Date:	Analysis Date: **1/21/2019**	SeqNo: **1911802** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.83	0.10	0.5000	0.3410	98.4	66.7	127			
Nitrate+Nitrite as N	5.6	0.20	3.500	2.098	100	70	117			

Sample ID **1901792-001BMSD**	SampType: **MSD**	TestCode: **EPA Method 300.0: Anions**
Client ID: **BatchQC**	Batch ID: **R57149**	RunNo: **57149**
Prep Date:	Analysis Date: **1/21/2019**	SeqNo: **1911803** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**

06-Feb-19

Client: Navajo Refining Company

Project: RO Reject

Sample ID	**1901792-001BMSD**	SampType:	**MSD**		TestCode:	**EPA Method 300.0: Anions**				
Client ID:	**BatchQC**	Batch ID:	**R57149**		RunNo:	**57149**				
Prep Date:		Analysis Date:	**1/21/2019**		SeqNo:	**1911803**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.83	0.10	0.5000	0.3410	98.3	66.7	127	0.0414	20	
Nitrate+Nitrite as N	5.6	0.20	3.500	2.098	101	70	117	0.447	20	

Sample ID	**MB**	SampType:	**MBLK**		TestCode:	**EPA Method 300.0: Anions**				
Client ID:	**PBW**	Batch ID:	**R57344**		RunNo:	**57344**				
Prep Date:		Analysis Date:	**1/29/2019**		SeqNo:	**1918656**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	ND	0.50								

Sample ID	**LCS**	SampType:	**LCS**		TestCode:	**EPA Method 300.0: Anions**				
Client ID:	**LCSW**	Batch ID:	**R57344**		RunNo:	**57344**				
Prep Date:		Analysis Date:	**1/29/2019**		SeqNo:	**1918657**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	10	0.50	10.00	0	102	90	110			

Sample ID	**1901A59-001BMS**	SampType:	**MS**		TestCode:	**EPA Method 300.0: Anions**				
Client ID:	**BatchQC**	Batch ID:	**R57344**		RunNo:	**57344**				
Prep Date:		Analysis Date:	**1/29/2019**		SeqNo:	**1918659**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	45	0.50	10.00	33.48	117	74.9	123			

Sample ID	**1901A59-001BMSD**	SampType:	**MSD**		TestCode:	**EPA Method 300.0: Anions**				
Client ID:	**BatchQC**	Batch ID:	**R57344**		RunNo:	**57344**				
Prep Date:		Analysis Date:	**1/29/2019**		SeqNo:	**1918660**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	45	0.50	10.00	33.48	120	74.9	123	0.623	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**
06-Feb-19

Client: Navajo Refining Company
Project: RO Reject

Sample ID	**MB-42735**	SampType: **MBLK**		TestCode: **EPA Method 8011/504.1: EDB**					
Client ID:	**PBW**	Batch ID: **42735**		RunNo: **57205**					
Prep Date:	**1/23/2019**	Analysis Date: **1/23/2019**		SeqNo: **1913435**		Units: **µg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,2-Dibromoethane	ND	0.010								

Sample ID	**LCS-42735**	SampType: **LCS**		TestCode: **EPA Method 8011/504.1: EDB**					
Client ID:	**LCSW**	Batch ID: **42735**		RunNo: **57205**					
Prep Date:	**1/23/2019**	Analysis Date: **1/23/2019**		SeqNo: **1913437**		Units: **µg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,2-Dibromoethane	0.085	0.010	0.1000	0	85.3	70	130			

Sample ID	**1901787-001BMS**	SampType: **MS**		TestCode: **EPA Method 8011/504.1: EDB**					
Client ID:	**R.O. Reject**	Batch ID: **42735**		RunNo: **57205**					
Prep Date:	**1/23/2019**	Analysis Date: **1/23/2019**		SeqNo: **1913497**		Units: **µg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,2-Dibromoethane	0.067	0.0093	0.09333	0	72.2	55	125			

Sample ID	**1901787-001BMSD**	SampType: **MSD**		TestCode: **EPA Method 8011/504.1: EDB**					
Client ID:	**R.O. Reject**	Batch ID: **42735**		RunNo: **57205**					
Prep Date:	**1/23/2019**	Analysis Date: **1/23/2019**		SeqNo: **1913499**		Units: **µg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,2-Dibromoethane	0.061	0.0093	0.09333	0	65.0	55	125	10.4	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**

06-Feb-19

Client: Navajo Refining Company

Project: RO Reject

Sample ID	**MB-42745**	SampType:	**MBLK**		TestCode:	**EPA Method 8015M/D: Diesel Range**				
Client ID:	**PBW**	Batch ID:	**42745**		RunNo:	**57173**				
Prep Date:	**1/22/2019**	Analysis Date:	**1/23/2019**		SeqNo:	**1913176**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	1.0								
Motor Oil Range Organics (MRO)	ND	5.0								
Surr: DNOP	0.98		1.000		98.2	70	130			

Sample ID	**LCS-42745**	SampType:	**LCS**		TestCode:	**EPA Method 8015M/D: Diesel Range**				
Client ID:	**LCSW**	Batch ID:	**42745**		RunNo:	**57173**				
Prep Date:	**1/22/2019**	Analysis Date:	**1/23/2019**		SeqNo:	**1913177**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	5.6	1.0	5.000	0	112	71.8	135			
Surr: DNOP	0.50		0.5000		99.8	70	130			

Sample ID	**1901789-001BMS**	SampType:	**MS**		TestCode:	**EPA Method 8015M/D: Diesel Range**				
Client ID:	**BatchQC**	Batch ID:	**42745**		RunNo:	**57173**				
Prep Date:	**1/22/2019**	Analysis Date:	**1/23/2019**		SeqNo:	**1913184**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	5.6	1.0	5.000	0	112	68.1	137			
Surr: DNOP	0.50		0.5000		99.3	70	130			

Sample ID	**1901789-001BMSD**	SampType:	**MSD**		TestCode:	**EPA Method 8015M/D: Diesel Range**				
Client ID:	**BatchQC**	Batch ID:	**42745**		RunNo:	**57173**				
Prep Date:	**1/22/2019**	Analysis Date:	**1/23/2019**		SeqNo:	**1913185**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	5.7	1.0	5.000	0	114	68.1	137	2.02	20	
Surr: DNOP	0.50		0.5000		99.4	70	130	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**

06-Feb-19

Client: Navajo Refining Company

Project: RO Reject

Sample ID	**MB-42803**	SampType:	**MBLK**	TestCode:	**EPA Method 8082A: PCB's**					
Client ID:	**PBW**	Batch ID:	**42803**	RunNo:	**57368**					
Prep Date:	**1/24/2019**	Analysis Date:	**1/30/2019**	SeqNo:	**1919398**	Units:	**µg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aroclor 1016	ND	1.0								
Aroclor 1221	ND	1.0								
Aroclor 1232	ND	1.0								
Aroclor 1242	ND	1.0								
Aroclor 1248	ND	1.0								
Aroclor 1254	ND	1.0								
Aroclor 1260	ND	1.0								
Surr: Decachlorobiphenyl	1.9		2.500		76.0	24.8	102			
Surr: Tetrachloro-m-xylene	0.95		2.500		38.0	15.6	106			

Sample ID	**LCS-42803**	SampType:	**LCS**	TestCode:	**EPA Method 8082A: PCB's**					
Client ID:	**LCSW**	Batch ID:	**42803**	RunNo:	**57368**					
Prep Date:	**1/24/2019**	Analysis Date:	**1/30/2019**	SeqNo:	**1919399**	Units:	**µg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aroclor 1016	2.6	1.0	5.000	0	52.6	25.9	120			
Aroclor 1260	2.7	1.0	5.000	0	54.5	38.4	134			
Surr: Decachlorobiphenyl	1.3		2.500		52.0	24.8	102			
Surr: Tetrachloro-m-xylene	1.2		2.500		46.8	15.6	106			

Sample ID	**LCSD-42803**	SampType:	**LCSD**	TestCode:	**EPA Method 8082A: PCB's**					
Client ID:	**LCSS02**	Batch ID:	**42803**	RunNo:	**57368**					
Prep Date:	**1/24/2019**	Analysis Date:	**1/30/2019**	SeqNo:	**1919400**	Units:	**µg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aroclor 1016	3.9	1.0	5.000	0	77.8	25.9	120	38.5	17.9	R
Aroclor 1260	3.9	1.0	5.000	0	78.1	38.4	134	35.7	16.2	R
Surr: Decachlorobiphenyl	1.8		2.500		74.0	24.8	102	0	0	
Surr: Tetrachloro-m-xylene	1.8		2.500		71.2	15.6	106	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**

06-Feb-19

Client: Navajo Refining Company

Project: RO Reject

Sample ID **rb2**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **B57169**	RunNo: **57169**
Prep Date:	Analysis Date: **1/22/2019**	SeqNo: **1912409** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								
Ethylbenzene	ND	1.0								
1,2-Dichloroethane (EDC)	ND	1.0								
1,2-Dibromoethane (EDB)	ND	1.0								
Carbon Tetrachloride	ND	1.0								
Chloroform	ND	1.0								
1,1-Dichloroethane	ND	1.0								
1,1-Dichloroethene	ND	1.0								
Methylene Chloride	ND	3.0								
1,1,2,2-Tetrachloroethane	ND	2.0								
Tetrachloroethene (PCE)	ND	1.0								
1,1,1-Trichloroethane	ND	1.0								
1,1,2-Trichloroethane	ND	1.0								
Trichloroethene (TCE)	ND	1.0								
Vinyl chloride	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	10		10.00		103	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		101	70	130			
Surr: Dibromofluoromethane	10		10.00		101	70	130			
Surr: Toluene-d8	11		10.00		108	70	130			

Sample ID **100ng lcs2**	SampType: **LCS**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **LCSW**	Batch ID: **B57169**	RunNo: **57169**
Prep Date:	Analysis Date: **1/22/2019**	SeqNo: **1912410** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	18	1.0	20.00	0	88.8	70	130			
Toluene	19	1.0	20.00	0	97.2	70	130			
1,1-Dichloroethene	19	1.0	20.00	0	97.4	70	130			
Trichloroethene (TCE)	17	1.0	20.00	0	84.4	70	130			
Surr: 1,2-Dichloroethane-d4	10		10.00		101	70	130			
Surr: 4-Bromofluorobenzene	9.9		10.00		99.3	70	130			
Surr: Dibromofluoromethane	10		10.00		101	70	130			
Surr: Toluene-d8	10		10.00		104	70	130			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**

06-Feb-19

Client: Navajo Refining Company

Project: RO Reject

Sample ID **1901787-001a ms2**	SampType: **MS**	TestCode: **EPA Method 8260B: VOLATILES**							
Client ID: **R.O. Reject**	Batch ID: **B57169**	RunNo: **57169**							
Prep Date:	Analysis Date: **1/23/2019**	SeqNo: **1912412**	Units: **µg/L**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	18	1.0	20.00	0	87.9	70	130			
Toluene	20	1.0	20.00	0	99.3	70	130			
1,1-Dichloroethene	19	1.0	20.00	0	95.0	67.6	130			
Trichloroethene (TCE)	16	1.0	20.00	0	81.0	70	130			
Surr: 1,2-Dichloroethane-d4	11		10.00		108	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		99.6	70	130			
Surr: Dibromofluoromethane	10		10.00		102	70	130			
Surr: Toluene-d8	10		10.00		103	70	130			

Sample ID **1901787-001a msd2**	SampType: **MSD**	TestCode: **EPA Method 8260B: VOLATILES**							
Client ID: **R.O. Reject**	Batch ID: **B57169**	RunNo: **57169**							
Prep Date:	Analysis Date: **1/23/2019**	SeqNo: **1912413**	Units: **µg/L**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	17	1.0	20.00	0	82.6	70	130	6.15	20	
Toluene	19	1.0	20.00	0	94.9	70	130	4.58	20	
1,1-Dichloroethene	18	1.0	20.00	0	92.1	67.6	130	3.08	20	
Trichloroethene (TCE)	16	1.0	20.00	0	79.7	70	130	1.65	20	
Surr: 1,2-Dichloroethane-d4	11		10.00		105	70	130	0	0	
Surr: 4-Bromofluorobenzene	10		10.00		101	70	130	0	0	
Surr: Dibromofluoromethane	10		10.00		102	70	130	0	0	
Surr: Toluene-d8	9.9		10.00		99.2	70	130	0	0	

Sample ID **100ng lcs**	SampType: **LCS**	TestCode: **EPA Method 8260B: VOLATILES**							
Client ID: **LCSW**	Batch ID: **B57171**	RunNo: **57171**							
Prep Date:	Analysis Date: **1/22/2019**	SeqNo: **1912422**	Units: **µg/L**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	21	1.0	20.00	0	104	70	130			
Toluene	20	1.0	20.00	0	99.3	70	130			
1,1-Dichloroethene	20	1.0	20.00	0	101	70	130			
Trichloroethene (TCE)	19	1.0	20.00	0	93.1	70	130			
Surr: 1,2-Dichloroethane-d4	10		10.00		105	70	130			
Surr: 4-Bromofluorobenzene	11		10.00		107	70	130			
Surr: Dibromofluoromethane	11		10.00		106	70	130			
Surr: Toluene-d8	10		10.00		103	70	130			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**
06-Feb-19

Client: Navajo Refining Company
Project: RO Reject

Sample ID **rb**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **B57171**	RunNo: **57171**
Prep Date:	Analysis Date: **1/22/2019**	SeqNo: **1912429** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								
Ethylbenzene	ND	1.0								
1,2-Dichloroethane (EDC)	ND	1.0								
1,2-Dibromoethane (EDB)	ND	1.0								
Carbon Tetrachloride	ND	1.0								
Chloroform	ND	1.0								
1,1-Dichloroethane	ND	1.0								
1,1-Dichloroethene	ND	1.0								
Methylene Chloride	ND	3.0								
1,1,2,2-Tetrachloroethane	ND	2.0								
Tetrachloroethene (PCE)	ND	1.0								
1,1,1-Trichloroethane	ND	1.0								
1,1,2-Trichloroethane	ND	1.0								
Trichloroethene (TCE)	ND	1.0								
Vinyl chloride	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	11		10.00		107	70	130			
Surr: 4-Bromofluorobenzene	11		10.00		107	70	130			
Surr: Dibromofluoromethane	11		10.00		109	70	130			
Surr: Toluene-d8	10		10.00		100	70	130			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**
06-Feb-19

Client: Navajo Refining Company
Project: RO Reject

Sample ID **MB-R57443**	SampType: **MBLK**	TestCode: **EPA 8270D: Semivolatiles**
Client ID: **PBW**	Batch ID: **R57443**	RunNo: **57443**
Prep Date:	Analysis Date: **1/25/2019**	SeqNo: **1921674** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Atrazine	ND	0.010								
1,2,4-Trichlorobenzene	ND	0.010								
2,4,6-Trichlorophenol	ND	0.010								
2,4-Dichlorophenol	ND	0.010								
2,4-Dimethylphenol	ND	0.010								
2,4-Dinitrophenol	ND	0.010								
2,4-Dinitrotoluene	ND	0.010								
2,6-Dinitrotoluene	ND	0.010								
2-Chloronaphthalene	ND	0.0010								
2-Chlorophenol	ND	0.010								
2-Nitrophenol	ND	0.010								
3,3´-Dichlorobenzidine	ND	0.010								
4,6-Dinitro-2-methylphenol	ND	0.010								
4-Bromophenyl phenyl ether	ND	0.010								
4-Chloro-3-methylphenol	ND	0.010								
4-Chlorophenyl phenyl ether	ND	0.010								
4-Nitrophenol	ND	0.010								
Acenaphthene	ND	0.0010								
Acenaphthylene	ND	0.0010								
Anthracene	ND	0.0010								
Benzidine	ND	0.010								
Benzo(g,h,i)perylene	ND	0.0010								
Benz(a)anthracene	ND	0.0010								
Benzo(a)pyrene	ND	0.0010								
Benzo(b)fluoranthene	ND	0.0010								
Benzo(k)fluoranthene	ND	0.0010								
Bis(2-chloroethoxy)methane	ND	0.010								
Bis(2-chloroethyl)ether	ND	0.010								
Bis(2-chloroisopropyl)ether	ND	0.010								
Bis(2-ethylhexyl)phthalate	ND	0.0030								
Butyl benzyl phthalate	ND	0.0030								
Chrysene	ND	0.0010								
Dibenz(a,h)anthracene	ND	0.0010								
Diethyl phthalate	ND	0.0030								
Dimethyl phthalate	ND	0.0030								
Di-n-butyl phthalate	ND	0.0030								
Di-n-octyl phthalate	ND	0.0030								
Fluoranthene	ND	0.0010								
Fluorene	ND	0.0010								

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**

06-Feb-19

Client: Navajo Refining Company

Project: RO Reject

Sample ID **MB-R57443**	SampType: **MBLK**	TestCode: **EPA 8270D: Semivolatiles**
Client ID: **PBW**	Batch ID: **R57443**	RunNo: **57443**
Prep Date:	Analysis Date: **1/25/2019**	SeqNo: **1921674** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Hexachlorobenzene	ND	0.0010								
Hexachlorobutadiene	ND	0.010								
Hexachlorocyclopentadiene	ND	0.010								
Hexachloroethane	ND	0.010								
Indeno(1,2,3-cd)pyrene	ND	0.0010								
Isophorone	ND	0.010								
Naphthalene	ND	0.0010								
Nitrobenzene	ND	0.010								
N-Nitrosodimethylamine	ND	0.010								
N-Nitrosodi-n-propylamine	ND	0.010								
N-Nitrosodiphenylamine	ND	0.010								
Pentachlorophenol	ND	0.010								
Phenanthrene	ND	0.0010								
Phenol	ND	0.010								
Pyrene	ND	0.0010								

Sample ID **LCS-R57443**	SampType: **LCS**	TestCode: **EPA 8270D: Semivolatiles**
Client ID: **LCSW**	Batch ID: **R57443**	RunNo: **57443**
Prep Date:	Analysis Date: **1/25/2019**	SeqNo: **1921675** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Atrazine	0.039		0.05000	0	78.2	39	141			
1,2,4-Trichlorobenzene	0.026		0.05000	0	53.0	24	120			
2,4,6-Trichlorophenol	0.037		0.05000	0	73.8	42	120			
2,4-Dichlorophenol	0.029		0.05000	0	58.6	36	120			
2,4-Dimethylphenol	0.029		0.05000	0	58.6	33	120			
2,4-Dinitrophenol	0.043		0.05000	0	85.4	10	120			
2,4-Dinitrotoluene	0.039		0.05000	0	78.6	49	124			
2,6-Dinitrotoluene	0.036		0.05000	0	71.4	46	120			
2-Chloronaphthalene	0.030		0.05000	0	61.0	37	120			
2-Chlorophenol	0.029		0.05000	0	57.2	25	120			
2-Nitrophenol	0.033		0.05000	0	65.6	31	120			
3,3´-Dichlorobenzidine	0.037		0.05000	0	73.8	44	120			
4,6-Dinitro-2-methylphenol	0.042		0.05000	0	84.4	38	138			
4-Bromophenyl phenyl ether	0.037		0.05000	0	74.8	45	120			
4-Chloro-3-methylphenol	0.031		0.05000	0	62.6	40	120			
4-Chlorophenyl phenyl ether	0.034		0.05000	0	68.0	44	120			
4-Nitrophenol	0.015		0.05000	0	29.2	10	120			
Acenaphthene	0.036		0.05000	0	72.4	41	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
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QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**

06-Feb-19

Client: Navajo Refining Company

Project: RO Reject

Sample ID **LCS-R57443**	SampType: **LCS**	TestCode: **EPA 8270D: Semivolatiles**
Client ID: **LCSW**	Batch ID: **R57443**	RunNo: **57443**
Prep Date:	Analysis Date: **1/25/2019**	SeqNo: **1921675** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthylene	0.035		0.05000	0	70.4	43	120			
Anthracene	0.038		0.05000	0	76.8	45	120			
Benzidine	0.019		0.05000	0	38.6	1	120			
Benzo(g,h,i)perylene	0.043		0.05000	0	85.8	48	121			
Benz(a)anthracene	0.038		0.05000	0	77.0	47	120			
Benzo(a)pyrene	0.040		0.05000	0	79.2	47	120			
Benzo(b)fluoranthene	0.042		0.05000	0	84.2	46	120			
Benzo(k)fluoranthene	0.041		0.05000	0	81.2	46	120			
Bis(2-chloroethoxy)methane	0.031		0.05000	0	61.8	33	120			
Bis(2-chloroethyl)ether	0.033		0.05000	0	65.4	23	120			
Bis(2-chloroisopropyl)ether	0.032		0.05000	0	64.0	28	120			
Bis(2-ethylhexyl)phthalate	0.039		0.05000	0	77.8	43	122			
Butyl benzyl phthalate	0.039		0.05000	0	77.2	43	121			
Chrysene	0.037		0.05000	0	74.4	48	120			
Dibenz(a,h)anthracene	0.039		0.05000	0	77.8	47	120			
Diethyl phthalate	0.039		0.05000	0	77.6	48	122			
Dimethyl phthalate	0.035		0.05000	0	70.4	48	120			
Di-n-butyl phthalate	0.039		0.05000	0	78.6	49	121			
Di-n-octyl phthalate	0.041		0.05000	0	81.8	42	125			
Fluoranthene	0.037		0.05000	0	73.8	51	120			
Fluorene	0.034		0.05000	0	67.6	47	120			
Hexachlorobenzene	0.035		0.05000	0	70.0	44	120			
Hexachlorobutadiene	0.029		0.05000	0	57.8	19	120			
Hexachlorocyclopentadiene	0.022		0.05000	0	44.0	15	120			
Hexachloroethane	0.028		0.05000	0	57.0	15	120			
Indeno(1,2,3-cd)pyrene	0.038		0.05000	0	75.0	49	122			
Isophorone	0.031		0.05000	0	61.2	36	120			
Naphthalene	0.027		0.05000	0	53.8	27	120			
Nitrobenzene	0.030		0.05000	0	59.2	27	120			
N-Nitrosodimethylamine	0.019		0.05000	0	38.6	10	120			
N-Nitrosodi-n-propylamine	0.032		0.05000	0	64.0	31	120			
N-Nitrosodiphenylamine	0.032		0.05000	0	65.0	47	120			
Pentachlorophenol	0.038		0.05000	0	76.0	23	120			
Phenanthrene	0.034		0.05000	0	67.0	46	120			
Phenol	0.013		0.05000	0	26.2	10	120			
Pyrene	0.037		0.05000	0	73.2	47	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**

06-Feb-19

Client: Navajo Refining Company

Project: RO Reject

Sample ID **MB-42802**	SampType: **MBLK**	TestCode: **EPA Method 8310: PAHs**
Client ID: **PBW**	Batch ID: **42802**	RunNo: **57348**
Prep Date: **1/24/2019**	Analysis Date: **1/30/2019**	SeqNo: **1919614** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Naphthalene	ND	3.0								
1-Methylnaphthalene	ND	3.0								
2-Methylnaphthalene	ND	3.0								
Acenaphthylene	ND	3.0								
Acenaphthene	ND	3.0								
Fluorene	ND	0.80								
Phenanthrene	ND	0.60								
Anthracene	ND	0.60								
Fluoranthene	ND	0.30								
Pyrene	ND	0.40								
Benz(a)anthracene	ND	0.070								
Chrysene	ND	0.20								
Benzo(b)fluoranthene	ND	0.10								
Benzo(k)fluoranthene	ND	0.070								
Benzo(a)pyrene	ND	0.070								
Dibenz(a,h)anthracene	ND	0.12								
Benzo(g,h,i)perylene	ND	0.12								
Indeno(1,2,3-cd)pyrene	ND	0.25								
Surr: Benzo(e)pyrene	13		20.00		67.1	48.8	93.3			

Sample ID **LCS-42802**	SampType: **LCS**	TestCode: **EPA Method 8310: PAHs**
Client ID: **LCSW**	Batch ID: **42802**	RunNo: **57348**
Prep Date: **1/24/2019**	Analysis Date: **1/30/2019**	SeqNo: **1919615** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Naphthalene	45	3.0	80.00	0	56.7	23.8	80.3			
1-Methylnaphthalene	45	3.0	80.20	0	55.7	23.4	81.9			
2-Methylnaphthalene	45	3.0	80.00	0	56.0	22.9	81.4			
Acenaphthylene	51	3.0	80.20	0	64.0	42.6	86.6			
Acenaphthene	47	3.0	80.00	0	58.6	40.2	83.4			
Fluorene	4.9	0.80	8.020	0	61.6	44.3	85			
Phenanthrene	2.5	0.60	4.020	0	61.4	42	95.2			
Anthracene	2.6	0.60	4.020	0	65.7	57	87.4			
Fluoranthene	5.3	0.30	8.020	0	66.2	55.7	88.9			
Pyrene	4.6	0.40	8.020	0	58.0	49.5	95			
Benz(a)anthracene	0.54	0.070	0.8020	0	67.3	51.9	98.9			
Chrysene	2.6	0.20	4.020	0	63.4	51	95.6			
Benzo(b)fluoranthene	0.64	0.10	1.002	0	63.9	50	95.2			
Benzo(k)fluoranthene	0.33	0.070	0.5000	0	66.0	55.7	91.5			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
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QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**

06-Feb-19

Client: Navajo Refining Company

Project: RO Reject

Sample ID **LCS-42802**	SampType: **LCS**	TestCode: **EPA Method 8310: PAHs**							
Client ID: **LCSW**	Batch ID: **42802**	RunNo: **57348**							
Prep Date: **1/24/2019**	Analysis Date: **1/30/2019**	SeqNo: **1919615**	Units: **µg/L**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzo(a)pyrene	0.32	0.070	0.5020	0	63.7	47.3	98.2			
Dibenz(a,h)anthracene	0.68	0.12	1.002	0	67.9	51.8	99.1			
Benzo(g,h,i)perylene	0.65	0.12	1.000	0	65.0	51	99.3			
Indeno(1,2,3-cd)pyrene	1.3	0.25	2.004	0	66.4	51.5	96.4			
Surr: Benzo(e)pyrene	14		20.00		71.1	48.8	93.3			

Sample ID **LCSD-42802**	SampType: **LCSD**	TestCode: **EPA Method 8310: PAHs**							
Client ID: **LCSS02**	Batch ID: **42802**	RunNo: **57348**							
Prep Date: **1/24/2019**	Analysis Date: **1/30/2019**	SeqNo: **1919616**	Units: **µg/L**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Naphthalene	37	3.0	80.00	0	46.4	23.8	80.3	20.1	34.8	
1-Methylnaphthalene	38	3.0	80.20	0	47.7	23.4	81.9	15.6	33	
2-Methylnaphthalene	38	3.0	80.00	0	47.5	22.9	81.4	16.4	33.3	
Acenaphthylene	45	3.0	80.20	0	56.4	42.6	86.6	12.7	30	
Acenaphthene	42	3.0	80.00	0	52.4	40.2	83.4	11.3	30	
Fluorene	4.5	0.80	8.020	0	56.0	44.3	85	9.54	24.8	
Phenanthrene	2.3	0.60	4.020	0	56.2	42	95.2	8.88	30.2	
Anthracene	2.4	0.60	4.020	0	59.7	57	87.4	9.52	22.3	
Fluoranthene	4.9	0.30	8.020	0	61.3	55.7	88.9	7.62	24.2	
Pyrene	4.3	0.40	8.020	0	53.9	49.5	95	7.36	24.4	
Benz(a)anthracene	0.49	0.070	0.8020	0	61.1	51.9	98.9	9.71	31.3	
Chrysene	2.4	0.20	4.020	0	59.2	51	95.6	6.90	25.5	
Benzo(b)fluoranthene	0.60	0.10	1.002	0	59.9	50	95.2	6.45	25	
Benzo(k)fluoranthene	0.30	0.070	0.5000	0	60.0	55.7	91.5	9.52	32.7	
Benzo(a)pyrene	0.29	0.070	0.5020	0	57.8	47.3	98.2	9.84	33.2	
Dibenz(a,h)anthracene	0.65	0.12	1.002	0	64.9	51.8	99.1	4.51	25.1	
Benzo(g,h,i)perylene	0.61	0.12	1.000	0	61.0	51	99.3	6.35	31.8	
Indeno(1,2,3-cd)pyrene	1.2	0.25	2.004	0	62.4	51.5	96.4	6.20	26.8	
Surr: Benzo(e)pyrene	13		20.00		63.8	48.8	93.3	0		

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**
06-Feb-19

Client: Navajo Refining Company
Project: RO Reject

Sample ID	**MB-42880**	SampType: **MBLK**			TestCode: **Total Phenolics by SW-846 9067**					
Client ID:	**PBW**	Batch ID: **42880**			RunNo: **57339**					
Prep Date:	**1/30/2019**	Analysis Date: **1/30/2019**			SeqNo: **1918540**		Units: **µg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phenolics	ND	2.5								

Sample ID	**LCS-42880**	SampType: **LCS**			TestCode: **Total Phenolics by SW-846 9067**					
Client ID:	**LCSW**	Batch ID: **42880**			RunNo: **57339**					
Prep Date:	**1/30/2019**	Analysis Date: **1/30/2019**			SeqNo: **1918541**		Units: **µg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phenolics	17	2.5	20.00	0	85.6	57.7	149			

Sample ID	**1901787-001CMS**	SampType: **MS**			TestCode: **Total Phenolics by SW-846 9067**					
Client ID:	**R.O. Reject**	Batch ID: **42880**			RunNo: **57339**					
Prep Date:	**1/30/2019**	Analysis Date: **1/30/2019**			SeqNo: **1918543**		Units: **µg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phenolics	28	2.5	20.00	0	141	70.1	127			S

Sample ID	**1901787-001CMSD**	SampType: **MSD**			TestCode: **Total Phenolics by SW-846 9067**					
Client ID:	**R.O. Reject**	Batch ID: **42880**			RunNo: **57339**					
Prep Date:	**1/30/2019**	Analysis Date: **1/30/2019**			SeqNo: **1918544**		Units: **µg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phenolics	24	2.5	20.00	0	122	70.1	127	14.3	23.8	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**
06-Feb-19

Client: Navajo Refining Company
Project: RO Reject

Sample ID	**MB-R57443**	SampType: **MBLK**		TestCode: **EPA 335.4: Total Cyanide Subbed**					
Client ID:	**PBW**	Batch ID: **R57443**		RunNo: **57443**					
Prep Date:		Analysis Date: **1/29/2019**		SeqNo: **1921729**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cyanide	ND	0.00500								

Sample ID	**LCS-R57443**	SampType: **LCS**		TestCode: **EPA 335.4: Total Cyanide Subbed**					
Client ID:	**LCSW**	Batch ID: **R57443**		RunNo: **57443**					
Prep Date:		Analysis Date: **1/29/2019**		SeqNo: **1921730**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cyanide	0.0973		0.1000	0	97.3	85	115			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**
06-Feb-19

Client: Navajo Refining Company
Project: RO Reject

Sample ID	**lcs-1 99.0uS eC**	SampType: **lcs**			TestCode: **SM2510B: Specific Conductance**					
Client ID:	**LCSW**	Batch ID: **R57160**			RunNo: **57160**					
Prep Date:		Analysis Date: **1/21/2019**			SeqNo: **1911988**		Units: **µmhos/cm**			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Conductivity		98	5.0	99.00	0	98.9	80	120			

Sample ID	**1901628-002c dup**	SampType: **dup**			TestCode: **SM2510B: Specific Conductance**					
Client ID:	**BatchQC**	Batch ID: **R57160**			RunNo: **57160**					
Prep Date:		Analysis Date: **1/21/2019**			SeqNo: **1911991**		Units: **µmhos/cm**			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Conductivity		6100	5.0						0.394	20	

Sample ID	**1901748-002c dup**	SampType: **dup**			TestCode: **SM2510B: Specific Conductance**					
Client ID:	**BatchQC**	Batch ID: **R57160**			RunNo: **57160**					
Prep Date:		Analysis Date: **1/21/2019**			SeqNo: **1912002**		Units: **µmhos/cm**			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Conductivity		6000	5.0						0.299	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**

06-Feb-19

Client: Navajo Refining Company

Project: RO Reject

Sample ID	**1901789-002ams**	SampType:	**MS**		TestCode:	**EPA Method 8015D: Gasoline Range**					
Client ID:	**BatchQC**	Batch ID:	**R57171**		RunNo:	**57171**					
Prep Date:		Analysis Date:	**1/22/2019**		SeqNo:	**1912400**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Gasoline Range Organics (GRO)	0.52	0.050	0.5000	0	104	63.4	130				
Surr: BFB	9.8		10.00		97.7	70	130				

Sample ID	**1901789-002amsd**	SampType:	**MSD**		TestCode:	**EPA Method 8015D: Gasoline Range**					
Client ID:	**BatchQC**	Batch ID:	**R57171**		RunNo:	**57171**					
Prep Date:		Analysis Date:	**1/22/2019**		SeqNo:	**1912401**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Gasoline Range Organics (GRO)	0.49	0.050	0.5000	0	98.2	63.4	130	5.62	20		
Surr: BFB	9.7		10.00		96.8	70	130	0	0		

Sample ID	**2.5ug gro lcs**	SampType:	**LCS**		TestCode:	**EPA Method 8015D: Gasoline Range**					
Client ID:	**LCSW**	Batch ID:	**R57171**		RunNo:	**57171**					
Prep Date:		Analysis Date:	**1/22/2019**		SeqNo:	**1912406**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Gasoline Range Organics (GRO)	0.53	0.050	0.5000	0	106	70	130				
Surr: BFB	9.8		10.00		98.0	70	130				

Sample ID	**rb**	SampType:	**MBLK**		TestCode:	**EPA Method 8015D: Gasoline Range**					
Client ID:	**PBW**	Batch ID:	**R57171**		RunNo:	**57171**					
Prep Date:		Analysis Date:	**1/22/2019**		SeqNo:	**1912407**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Gasoline Range Organics (GRO)	ND	0.050									
Surr: BFB	9.7		10.00		96.6	70	130				

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**
06-Feb-19

Client: Navajo Refining Company
Project: RO Reject

Sample ID	**1901628-002c dup**	SampType: **dup**			TestCode: **SM4500-H+B / 9040C: pH**					
Client ID:	**BatchQC**	Batch ID: **R57160**			RunNo: **57160**					
Prep Date:		Analysis Date: **1/21/2019**			SeqNo: **1912023**		Units: **pH units**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
pH	7.85									H

Sample ID	**1901748-002c dup**	SampType: **dup**			TestCode: **SM4500-H+B / 9040C: pH**					
Client ID:	**BatchQC**	Batch ID: **R57160**			RunNo: **57160**					
Prep Date:		Analysis Date: **1/21/2019**			SeqNo: **1912043**		Units: **pH units**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
pH	8.53									*H

Qualifiers:

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D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**
06-Feb-19

Client: Navajo Refining Company
Project: RO Reject

Sample ID	**MB-R57324**	SampType:	**MBLK**	TestCode:	**EPA 903.1: Ra 226 and EPA 904.0: Ra 228-Subbed**
Client ID:	**PBW**	Batch ID:	**R57324**	RunNo:	**57324**
Prep Date:		Analysis Date:	**1/29/2019**	SeqNo:	**1917743** Units: **pCi/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Radium-226	0.654	0.754								
Radium-226 ±	0.561	0.754								
Radium-228	0.636	0.555								
Radium-228 ±	0.324	0.555								

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1901787**

06-Feb-19

Client: Navajo Refining Company

Project: RO Reject

Sample ID	**MB-42739**	SampType:	**MBLK**		TestCode:	**SM2540C MOD: Total Dissolved Solids**				
Client ID:	**PBW**	Batch ID:	**42739**		RunNo:	**57198**				
Prep Date:	**1/22/2019**	Analysis Date:	**1/23/2019**		SeqNo:	**1913205**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	ND	20.0								

Sample ID	**LCS-42739**	SampType:	**LCS**		TestCode:	**SM2540C MOD: Total Dissolved Solids**				
Client ID:	**LCSW**	Batch ID:	**42739**		RunNo:	**57198**				
Prep Date:	**1/22/2019**	Analysis Date:	**1/23/2019**		SeqNo:	**1913206**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	1010	20.0	1000	0	101	80	120			

Sample ID	**1901741-003ADUP**	SampType:	**DUP**		TestCode:	**SM2540C MOD: Total Dissolved Solids**				
Client ID:	**BatchQC**	Batch ID:	**42739**		RunNo:	**57198**				
Prep Date:	**1/22/2019**	Analysis Date:	**1/23/2019**		SeqNo:	**1913209**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	328	20.0						0.608	5	

Sample ID	**1901760-002ADUP**	SampType:	**DUP**		TestCode:	**SM2540C MOD: Total Dissolved Solids**				
Client ID:	**BatchQC**	Batch ID:	**42739**		RunNo:	**57198**				
Prep Date:	**1/22/2019**	Analysis Date:	**1/23/2019**		SeqNo:	**1913213**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	578	20.0						0.173	5	*

Qualifiers:

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D	Sample Diluted Due to Matrix	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	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

HALL ENVIRONMENTAL ANALYSIS LABORATORY

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

Sample Log-In Check List

Client Name: **NAVAJO REFINING CO** Work Order Number: **1901787** RcptNo: **1**

Received By: **Erin Melendrez** **1/21/2019 8:20:00 AM**

Completed By: **Erin Melendrez** **1/21/2019 9:45:41 AM**

Reviewed By: ENM 1/21/19

LB: DAD 1/21/19

Chain of Custody

1. Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2. How was the sample delivered?	FedEx		

Log In

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

# of preserved bottles checked for pH: 5:1 (2 or 12 unless noted)

Adjusted? NO

Checked by: DAD 1/21/19

1/21/19

DAD 1/21/19

Special Handling (if applicable)

15. 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:

16. Additional remarks:

17. **Cooler Information**

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	2.8	Good	Yes			

Chain-of-Custody Record

Client: Navajo Refinery

Mailing Address: P.O. Box 159 Artesia, NM 88211-0159

Phone #: 575-748-3311

email or Fax#: 575-746-5451

QA/QC Package:
X Standard ☐ Level 4 (Full Validation)
☐ Other
☐ EDD (Type)

Turn-Around Time:
X Standard ☐ Rush

Project Name:
R.O. Reject

Project #: P.O. # 231642

Project Manager:
Scott Denton
Robert Combs

Sampler: Brady Hubbard

On Ice: X Yes ☐ No

Sample Temperature: 1.3+1.5(CF)=2.8°C

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

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1901787	8260B:WQCC List VOCs	8270C: WQCC list SVOCs	6010B: WQCC Metals +Va	335.4: Total Cyanide	7470: Mercury	8015: GRO, DRO	8082: PCBs	Radioactivity (EPA 903.1+904.0)	Cation/Anion Balance	Phenols SW-846 9067	pH	504.1:EDB	Air Bubbles (Y or N)
1-18-19	1:35	liquid	R.O. Reject	2 - 500ml P	1-unpres 1-H2SO4	-001									X		X		Y
1-18-19	1:35	liquid	R.O. Reject	3-40ml VOA	HCL		X												
1-18-19	1:35	liquid	R.O. Reject	1-500ml P	HNO3						X								
1-18-19	1:35	liquid	R.O. Reject	1-125ml P	HNO3				X										
1-18-19	1:35	liquid	R.O. Reject	1-500ml P	NaOH					X									
1-18-19	1:35	liquid	R.O. Reject	2- 1L P	HNO3									X					
1-18-19	1:35	liquid	R.O. Reject	3-40ml VOA	Na2S2O3													X	
1-18-19	1:35	liquid	R.O. Reject	2 - 1L Glass	unpres								X						
1-18-19	1:35	liquid	R.O. Reject	1 - 1L Glass	unpres			X											
1-18-19	1:35	liquid	R.O. Reject	3-40ml VOA	HCl							X							
1-18-19	1:35	liquid	R.O. Reject	1-250mlGlass	unpres							X							
1-18-19	1:35	liquid	R.O. Reject	1 - 1L Glass	H2SO4											X			
1-18-19	XXX	liquid	Trip Blank	2-40ml VOA	HCL	-002													

Date: 1-18-19 Time: 4:00 Relinquished by: Brady Hubbard

Received by: Fedex ejm 1/21/19 Date: 1/21/19 Time: 0820

Date: Time: Relinquished by:

Received by: Date: Time:

Remarks: email to Scott Denton, Robert Combs and Randy Dade pH= 7.02 22.5°C
Metals: As, Al, Ba, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, U, Zn
VOCs: 1,1,1-Trichloroethane; 1,1,2,2-Tetrachloroethane; 1,1,2,2-Tetrachloroethylene; 1,1,2-Trichloroethane; 1,1,2-Trichloroethylene; 1,1-Dichloroethane; 1,1-Dichloroethene; 1,2-Dibromoethane; 1,2-Dichloroethane; Benzene; Carbon Tetrachloride; Chloroform; Dichloromethane; Ethylbenzene; Toluene; Total Xylenes; Vinyl Chloride
SVOCs: benzo(a)pyrene, phenol, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene

Attachment A
2019 Annual Groundwater Monitoring Report, February 2020
(Separate Electronic File)