GW - __28__

ANNUAL DISCHARGE REPORT

2018

HOLLYFRONTIER.

June 13, 2019

Mr. Carl Chavez
New Mexico Energy, Minerals and Natural Resources Department
Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, NM 87505

Re: Submittal of the *2018 Annual Discharge Report* and the *2018 Annual Groundwater Monitoring Report* for the HollyFrontier Navajo Refining LLC, Artesia Refinery Discharge Permit GW-028

Dear Mr. Chavez:

Please find enclosed the original and one electronic copy of the *2018 Annual Discharge Report* and the *2018 Annual Groundwater Monitoring Report*, which fulfill requirements of Section 2.E of Discharge Permit GW-028.

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, A. Sahba, J. Leik, R. Dade
TRC: J. Speer, C. Smith

File Location: \Env\OCD\OCD-Annual Report\2018\Artesia

2018 ANNUAL DISCHARGE PERMIT REPORT
HOLLYFRONTIER NAVAJO REFINING LLC - ARTESIA REFINERY
DISCHARGE PERMIT GW-028

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 (Navajo) 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 on-site.
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. MAJOR REFINERY ACTIVITIES FOR 2018

The refinery conducted normal operations during 2018. Additional capital projects were completed to improve operability. No new tanks or refinery units were built in 2018.

Discharge Permit GW-028 Modifications

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

On September 9, 2016, OCD notified Navajo 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, Navajo 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, Navajo 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. Navajo 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.

RO Reject Water Discharge

In 2018, Navajo continued land application of the RO reject water in accordance with GW-028 which allows for discharge of RO reject water to the refinery's onsite fields. GW-028 requires sampling and analyzing RO reject water for Water Quality Control Commission (WQCC) constituents on at least a semi-annual basis. Navajo collected a grab sample of RO reject water from the point of discharge in February 2018 and January 2019. Due to an oversight, the second semi-annual RO reject water sample was not collected until January 2019, five days prior to cessation of land application of RO reject water (as described below). Laboratory analytical reports are provided in Appendix A.3.

Injection Well WDW-4 (Class I Disposal Well)

Navajo 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.

RO Reject Fields Investigation and Abatement Plan

On August 20, 2015, Navajo 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. Navajo 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.

Navajo 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. Navajo 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 on January 26, 2019. Navajo submitted a *Stage 1 Abatement Plan for the Reverse Osmosis Reject Discharge Fields* on March 21, 2019.

2. SUMMARY OF DISCHARGE ACTIVITIES

Navajo's primary discharges are treated wastewater from the wastewater treatment plant (WWTP) effluent and the RO reject water. The WWTP effluent is discharged to Navajo's injection wells (WDW-1, WDW-2, and WDW-3 during 2018) and to the City of Artesia's Publicly Owned Treatment Works (POTW). The details of each discharge are provided below:

- **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 2018 was 6,117,655 barrels.

- **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 2018 was 1,179,792 gallons or 28,090 barrels.

Navajo continued to discharge the blow-down from cooling towers to the City of Artesia POTW in 2018. The total volume of blow-down discharged to the City of Artesia POTW based on an average rate of 72.5 gallons per minute (gpm) is estimated to be 38,155,680 gallons, or 908,469 barrels.

- **Reverse Osmosis Reject Water**

The RO reject water is land applied under GW-028 to onsite 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 in February 2018 and January 2019 in accordance with GW-028. Laboratory analytical reports are provided in Appendix A.3.

The RO reject fluid flow rate is 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 2018 was 165,641,928 gallons, or 3,943,855 barrels. The average daily discharge rate was 10,803 barrels per day. There were no exceedances of the permitted discharge rate in 2018.

3. SUMMARY OF ALL LEAKS, SPILLS, AND RELEASES

The refinery had three reportable spills under GW-028 in 2018. Each spill was reported to the OCD and addressed in accordance with 19.15.29 NMAC as described below.

September 23, 2018 – Wastewater Treatment Plant Release

Wastewater effluent was released on September 23, 2018, from a wastewater surge tank (T-897). A power outage caused wastewater to overflow from this tank into the refinery process area containment, which then drained into the refinery process sewer. Some of the released water overtopped the secondary containment and flowed through a road culvert to a depression north of the wastewater treatment unit. Free liquids were recovered and placed into the refinery process sewer. The initial C-141 Release Notification for this release was submitted to OCD on September 28, 2018.

Soil assessment activities were conducted in December 2018. Assessment results indicated chloride, iron, total petroleum hydrocarbons (TPH), sulfate, and selenium were present in soil at concentrations above their respective closure criteria, but below their applicable NMED Construction Worker soil screening levels (SSLs). The impacts were located in an area containing sensitive refinery infrastructure, and therefore, Navajo 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 January 23, 2019, and included the request for deferred corrective action and a final C-141 (Site Assessment/Characterization and Closure).

September 24, 2018 – Wastewater Effluent Pipeline Release

Wastewater effluent was released on September 24, 2018, from a pipeline that conveys treated wastewater from the refinery to injection wells for disposal. The source of the release was stopped by turning off the refinery wastewater effluent discharge pumps and closing in-line valves on the pipeline. Approximately 60 barrels of wastewater were recovered. Soil immediately surrounding the pipeline was excavated to allow repairs of the line and was disposed off-site. The initial C-141 Release Notification for this release was submitted to New Mexico OCD on September 28, 2018.

Soil assessment activities were conducted in December 2018 and January 2019. Assessment results indicated chloride was present in soil at concentrations above the closure criteria. However, the distribution and magnitude of chloride concentrations varied across the release area and areas unaffected by the release (i.e., background) indicating the presence of chloride in soil is not attributable to the release. In addition, synthetic precipitation leaching procedure (SPLP) results indicated chloride cannot potentially leach from soil in the release area to groundwater at concentrations that would adversely affect groundwater concentrations. A Site Characterization, Assessment, and Closure Report was submitted to the New Mexico OCD on January 23, 2019, and included a final C-141 (Site Assessment/Characterization and Closure).

December 29, 2018 – Wastewater Effluent Pipeline Release

Wastewater effluent was released on December 29, 2018 from a pipeline that conveys treated wastewater from the refinery to injection wells for disposal. The source of the release was stopped by turning off the refinery wastewater effluent discharge pumps and closing in-line valves on the pipeline. Approximately 270 barrels of wastewater were recovered. Soil immediately surrounding the pipeline was excavated to allow repairs of the line and was disposed off-site. The initial C-141 Release Notification for this release was submitted to New Mexico Oil OCD on January 4, 2019.

Soil assessment activities were conducted in January 2019 and March 2019. Assessment results indicated chloride, TPH, and sulfate were present in soil at concentration above their respective closure criteria. However, the presence of TPH was attributed to other sources not related to the wastewater release. TPH associated with the former Three Mile Ditch (listed as Solid Waste Management Unit [SWMU] in the refinery's Post-Closure Care Permit [PCC Permit]) will be addressed in accordance with the PCC Permit under the direction of NMED. Chloride SPLP results indicated chloride will not leach from soil at concentrations in exceedance of the WQCC groundwater standard. The highly variable distribution and magnitude of sulfate concentrations across the release area and areas unaffected by the release (i.e., background) indicated the presence of sulfate in soil is not attributable to the release. A Site Characterization, Assessment,

and Closure Report was submitted to the New Mexico OCD on April 29, 2019, and included a final C-141 (Site Assessment/ Characterization and Closure).

4. SUMMARY OF NEW GROUNDWATER CONTAMINATION

Groundwater contamination and changes in existing constituents are discussed in Section 7 of the *2018 Annual Groundwater Monitoring Report* that was submitted to the NMED on February 28, 2019 (and attached to this report). Groundwater conditions measured during 2018 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. PSH thicknesses are inversely affected by fluctuations in groundwater elevations, which generally increased from 2011 to 2016 and declined in 2017 and 2018, consistent with drought conditions across New Mexico during this time.

- COC concentrations in groundwater have generally remained stable over time with the exception of occasional fluctuations. Certain wells that previously exhibited increasing concentration trends have exhibited stable concentration trends over the most recent sampling events. During 2018 and previous years, the following COCs were detected in groundwater at concentrations in exceedance of their respective Critical Groundwater Screening Level (CGWSL):

    - 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.

- Many of the concentrations of inorganic COCs (manganese, chloride, fluoride, nitrate/nitrite, sulfate, and TDS) noted as "exceedances" of CGWSLs in 2018 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 2018; more information is provided in Section 14 below.

5. SUMMARY OF ALL WASTEWATER VOLUMES DISPOSED OF, SOLD, OR TREATED ON-SITE.

No waste is disposed, sold, or treated onsite.

As described above, wastewater is treated in the refinery WWTP and discharged to either Navajo's injection wells (WDW-1, WDW-2, and WDW-3) or the City of Artesia POTW, both of

which are located outside of the refinery (i.e., off-site). The onsite WWTP treated approximately 6,145,745 barrels of wastewater in 2018.

As described above, RO reject water is land applied to onsite fields. Approximately 3,943,855 barrels of RO reject water was applied to the RO fields in 2018.

6. DOCUMENTATION REGARDING THE CLOSURE OF ANY UIC CLASS V WELLS.

No UIC Class V wells were closed during 2018.

7. A DESCRIPTION OF GROUNDWATER MONITORING AND REMEDIATION ACTIVITIES CONDUCTED THROUGHOUT THE YEAR.

Groundwater monitoring and remediation activities conducted at the refinery in 2018 are described in the attached *2018 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 *2018 Annual Groundwater Monitoring Report*. Remediation activities, including PSH recovery, are described in Section 6 of the *2018 Annual Groundwater Monitoring Report*.

8. 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 *2018 Annual Groundwater Monitoring Report*, as specified below.

- **Well Gauging Results (Groundwater Elevation and PSH Thickness)**

  Well gauging results for both 2018 semiannual monitoring events are presented in Table 1 of the attached *2018 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 E of the *2018 Annual Groundwater Monitoring Report*.

- **Field-Measured Purging Parameters**

  Groundwater quality parameters measured in the field at each well during 2018 groundwater purging and sampling activities are summarized in Table 2 of the attached *2018 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 *2018 Annual Groundwater Monitoring Report*.

- **Laboratory Analytical Results (Water Quality)**

Laboratory analytical results of all wells sampled in 2018, and during at least the three previous sampling events, are summarized in Tables 4A through 4C of the attached *2018 Annual Groundwater Monitoring Report* as follows:

- Table 4A – Gasoline range organics (GRO), DRO, and select VOCs (VOCs that have had at least one detected value reported above the CGWSL in more than one well in 2018)
- Table 4B – Total Metals
- Table 4C – Water quality parameters (TDS, nitrate/nitrite, major cations, major anions) and Cyanide

Analytical results of all detected COCs are summarized in tables that are included in Appendix B of the attached *2018 Annual Groundwater Monitoring Report*.

9. COPIES OF LABORATORY ANALYTICAL DATA SHEETS WITH QUALITY ASSURANCE/QUALITY CONTROL INFORMATION.

Copies of laboratory analytical reports are provided in Appendix B of the attached *2018 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 D of the attached *2018 Annual Groundwater Monitoring Report*.

10. CONTOUR MAPS FOR EACH AQUIFER DEPICTING THE POTENTIOMETRIC GRADIENT FOR EACH MONITORING EVENT.

Groundwater potentiometric surface maps based on the 2018 semiannual gauging results for the shallow saturated zone and the valley fill zone are presented in Figures 4 through 7 of the attached *2018 Annual Groundwater Monitoring Report*.

11. 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 2018 semiannual sampling results are presented on Figures 10 through 19 of the attached *2018 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 2018 semiannual sampling results are presented on Figures 20 through 29 of the attached *2018 Annual Groundwater Monitoring Report*: chloride, fluoride, sulfate, nitrate/nitrite, and TDS.

12. PSH THICKNESS ISOPLETH MAPS FOR EACH MONITORING EVENT.

The presence of PSH and measured PSH thicknesses based on the 2018 semiannual gauging results are shown on Figures 8 and 9 of the attached *2018 Annual Groundwater Monitoring Report*.

13. 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 C of the attached *2018 Annual Groundwater Monitoring Report*.

14. TABULATION OF THE VOLUMES OF PSH REMOVED.

Volumes of groundwater and PSH recovered by the recovery system during 2018 are summarized in Table 5 of the attached *2018 Annual Groundwater Monitoring Report* and additional recovery details are provided in Appendix E of the *2018 Annual Groundwater Monitoring Report*. An estimated 1,955,630 gallons (46,563 barrels) of groundwater and an estimated 23,201 gallons (552 barrels) of PSH were recovered through operation of the automated recovery system in 2018. Further details of the recovery system operation are discussed in Section 6 of the attached *2018 Annual Groundwater Monitoring Report*.

15. CONCLUSIONS AND RECOMMENDATIONS.

Discharge activities at the refinery during 2018 were conducted in accordance with GW-028. Groundwater conditions at the refinery are generally consistent with previous years. Navajo will further characterize the RO reject fields for one year after cessation of land application of RO reject water to support development of a Stage 2 Abatement Plan as agreed by OCD and Navajo in a meeting on May 16, 2019, and in accordance with the *Amendment of the March 2019 Stage 1 Abatement Plan for the Reverse Osmosis Reject Discharge Fields* that was submitted to OCD on May 24, 2019. Additionally, Navajo will continue to monitor groundwater in the vicinity of the fields in accordance with the *2018 Facility-Wide Groundwater Monitoring Work Plan* and GW-028.

ATTACHMENTS

2018 Annual Groundwater Monitoring Report, February 2018

APPENDICES

Appendix A Refinery Discharges

A.1 Treated Wastewater to Injection Wells

A.2 Treated Wastewater to City of Artesia POTW

A.3 RO Reject Water Discharge

APPENDIX A

Refinery Discharges

APPENDIX A.1

Refinery Discharges – Treated Wastewater to Injection Wells

2018 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 (2018)	API No. and Well Name	Volume (bbl)	Average Pressure (psig)
January	30-015-27592 WDW - 1	174,384	1,361
	30-015-20894 WDW - 2	149,016	1,389
	30-015-26575 WDW - 3	198,282	1,340
February	30-015-27592 WDW - 1	184,320	1,305
	30-015-20894 WDW - 2	108,000	1,312
	30-015-26575 WDW - 3	191,520	1,282
March	30-015-27592 WDW - 1	181,440	1,183
	30-015-20894 WDW - 2	69,120	1,263
	30-015-26575 WDW - 3	177,120	1,251
April	30-015-27592 WDW - 1	273,463	1,215
	30-015-20894 WDW - 2	62,880	1,221
	30-015-26575 WDW - 3	105,085	1,210
May	30-015-27592 WDW - 1	388,800	1,224
	30-015-20894 WDW - 2	110,880	1,260
	30-015-26575 WDW - 3	155,520	1,255
June	30-015-27592 WDW - 1	316,800	1,342
	30-015-20894 WDW - 2	146,880	1,359
	30-015-26575 WDW - 3	180,000	1,302
July	30-015-27592 WDW - 1	263,593	1,378
	30-015-20894 WDW - 2	107,349	1,349
	30-015-26575 WDW - 3	143,486	1,338
August	30-015-27592 WDW - 1	234,887	1,304
	30-015-20894 WDW - 2	138,222	1,305
	30-015-26575 WDW - 3	167,040	1,258
September	30-015-27592 WDW - 1	195,420	1,224
	30-015-20894 WDW - 2	112,308	1,211
	30-015-26575 WDW - 3	148,320	1,195
October	30-015-27592 WDW - 1	308,229	1,291
	30-015-20894 WDW - 2	94,594	1,276
	30-015-26575 WDW - 3	132,857	1,251
November	30-015-27592 WDW - 1	258,171	1,237
	30-015-20894 WDW - 2	78,171	1,240
	30-015-26575 WDW - 3	118,286	1,230
December	30-015-27592 WDW - 1	256,149	1,240
	30-015-20894 WDW - 2	75,463	1,225
	30-015-26575 WDW - 3	111,600	1,217

2018 Cumulative Volume:	bbls
30-015-27592 WDW - 1	3,035,656
30-015-20894 WDW - 2	1,252,883
30-015-26575 WDW - 3	1,829,116
Total Injected fluids	**6,117,655**

Average Pressure	psig
30-015-27592 WDW - 1	1,275
30-015-20894 WDW - 2	1,284
30-015-26575 WDW - 3	1,261

Notes:

psig: pounds per square inch gauge

bbl: barrel

APPENDIX A.2

Refinery Discharges – Treated Wastewater to City of Artesia POTW

2018 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 (2018)	**Rate (gpm)**	**Volume (gal)**
January	0.2	8,928
February	0	0
March	0.5	22,320
April	3	129,600
May	2.8	124,992
June	6.3	272,160
July	5	223,200
August	1.6	71,424
September	4.37	188,784
October	0.5	22,320
November	2	89,280
December	0.6	26,784

Average Rate (gpm)	**2.24**
Cummulative gallons	**1,179,792**
Cummulative barrels	**28,090**

Notes:

POTW: Publicly-Owned Treatment Works

WWTP: Wastewater Treatment Plant

gpm: gallons per minute

gal: gallons

2018 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 (2018)	**Rate (gpm)**	**Volume (gal)**
January	52	2,321,280
February	75	3,024,000
March	76	3,392,640
April	78	3,369,600
May	84	3,749,760
June	90	3,888,000
July	76	3,392,640
August	56	2,499,840
September	80	3,456,000
October	61	2,723,040
November	69	3,080,160
December	73	3,258,720

Average (gpm)	**72.5**
Cummulative gallons	**38,155,680**
Cummulative barrels	**908,469**

Notes:

POTW: Publicly-Owned Treatment Works

gpm: gallons per minute

gal: gallons

APPENDIX A.3

Refinery Discharges – RO Reject Water Discharge

2018 ANNUAL DISCHARGE PERMIT REPORT
HOLLYFRONTIER NAVAJO REFINING LLC - ARTESIA REFINERY
DISCHARGE PERMIT GW-028
APPENDIX A.3
MONTHLY RO DISCHARGE SUMMARY

Monthly RO Discharge Volumes
Artesia Refinery

Month (2018)	Discharge Volume (bbl)
January	346,335.73
February	311,264.77
March	331,786.39
April	338,350.78
May	295,051.69
June	280,308.63
July	320,660.39
August	363,575.01
September	346,206.49
October	348,779.53
November	332,344.38
December	329,191.63
Total (bbl)	3,943,855.43
Total (gal)	165,641,927.86

Notes:

RO: Reverse osmosis

bbl: barrel

gal: gallon

2018 ANNUAL DISCHARGE PERMIT REPORT
HOLLYFRONTIER NAVAJO REFINING LLC - ARTESIA REFINERY
DISCHARGE PERMIT GW-028
APPENDIX A.3
MONTHLY RO DISCHARGE SUMMARY

January 2018 - RO Reject Flow/Discharge Measurements					
Skid Location:	**South**	**North**	**Middle**	**Combined**	**Combined**
Measurement:	**Daily Flow**	**Daily Flow**	**Daily Flow**	**Discharge**	**Discharge**
Units:	**GPM**	**GPM**	**GPM**	**GPM**	**BPD**
1/1/2018	161.60	128.20	43.89	333.69	11,440.80
1/2/2018	162.12	0.05	159.84	322.01	11,040.35
1/3/2018	164.58	31.63	130.89	327.10	11,214.80
1/4/2018	110.21	128.59	76.71	315.50	10,817.28
1/5/2018	137.40	128.15	57.02	322.57	11,059.53
1/6/2018	62.06	128.16	126.26	316.48	10,850.74
1/7/2018	162.91	94.24	66.33	323.47	11,090.44
1/8/2018	120.95	40.34	163.41	324.70	11,132.62
1/9/2018	39.19	153.71	139.78	332.67	11,405.98
1/10/2018	157.13	153.13	32.59	342.86	11,755.14
1/11/2018	158.97	114.04	80.59	353.59	12,123.15
1/12/2018	154.01	15.37	171.11	340.48	11,673.63
1/13/2018	152.93	145.20	57.97	356.10	12,209.15
1/14/2018	154.36	7.10	176.91	338.37	11,601.20
1/15/2018	157.55	109.25	48.08	314.88	10,795.79
1/16/2018	73.13	94.08	159.50	326.71	11,201.46
1/17/2018	-0.02	162.04	160.68	322.70	11,064.12
1/18/2018	-0.02	161.04	161.75	322.78	11,066.64
1/19/2018	-0.02	156.89	152.91	309.78	10,621.09
1/20/2018	83.78	151.26	78.64	313.67	10,754.35
1/21/2018	163.15	153.18	0.02	316.35	10,846.25
1/22/2018	161.77	153.23	0.02	315.02	10,800.73
1/23/2018	137.07	49.80	98.59	285.46	9,787.13
1/24/2018	145.92	16.73	146.62	309.27	10,603.56
1/25/2018	155.63	24.03	146.45	326.11	11,180.84
1/26/2018	161.97	29.79	146.26	338.03	11,589.61
1/27/2018	162.97	33.31	146.35	342.64	11,747.50
1/28/2018	162.40	31.18	143.68	337.25	11,562.92
1/29/2018	161.35	34.79	138.92	335.07	11,487.96
1/30/2018	161.12	29.24	138.26	328.62	11,267.04
1/31/2018	160.75	8.19	138.59	307.53	10,543.93
				Total (BBL/MONTH):	**346,335.73**

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February 2018 - RO Reject Flow/Discharge Measurements					
Skid Location:	**South**	**North**	**Middle**	**Combined**	**Combined**
Measurement:	**Daily Flow**	**Daily Flow**	**Daily Flow**	**Discharge**	**Discharge**
Units:	**GPM**	**GPM**	**GPM**	**GPM**	**BPD**
2/1/2018	160.74	0.07	139.23	300.04	10,286.99
2/2/2018	103.58	55.72	139.65	298.96	10,250.12
2/3/2018	-0.02	146.80	140.63	287.41	9,854.07
2/4/2018	-0.01	135.03	152.92	287.94	9,872.12
2/5/2018	-0.01	132.43	159.14	291.55	9,996.09
2/6/2018	107.72	134.09	49.99	291.81	10,004.81
2/7/2018	156.66	141.58	0.02	298.26	10,225.91
2/8/2018	158.01	141.86	0.03	299.90	10,282.41
2/9/2018	156.47	146.01	0.02	302.50	10,371.28
2/10/2018	150.84	161.72	0.02	312.58	10,717.06
2/11/2018	150.85	156.92	0.02	307.79	10,552.86
2/12/2018	150.51	157.59	0.02	308.13	10,564.34
2/13/2018	150.17	156.32	0.03	306.52	10,509.42
2/14/2018	149.47	156.18	24.90	330.55	11,333.05
2/15/2018	89.75	132.58	115.50	337.83	11,582.65
2/16/2018	43.23	129.51	161.64	334.37	11,464.26
2/17/2018	5.54	168.14	158.11	331.79	11,375.75
2/18/2018	1.43	153.37	176.35	331.15	11,353.76
2/19/2018	6.69	144.82	191.65	343.16	11,765.50
2/20/2018	23.16	142.66	191.74	357.56	12,259.13
2/21/2018	23.57	142.49	191.87	357.94	12,272.09
2/22/2018	19.76	142.26	191.87	353.89	12,133.50
2/23/2018	16.94	141.40	191.42	349.76	11,991.76
2/24/2018	27.59	141.20	191.16	359.95	12,341.11
2/25/2018	23.69	140.21	190.90	354.80	12,164.65
2/26/2018	19.71	139.65	190.57	349.93	11,997.67
2/27/2018	17.10	139.14	190.83	347.08	11,899.85
2/28/2018	16.60	138.46	190.34	345.41	11,842.54
				Total (BBL/MONTH):	**311,264.77**

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March 2018 - RO Reject Flow/Discharge Measurements					
Skid Location:	**South**	**North**	**Middle**	**Combined**	**Combined**
Measurement:	**Daily Flow**	**Daily Flow**	**Daily Flow**	**Discharge**	**Discharge**
Units:	**GPM**	**GPM**	**GPM**	**GPM**	**BPD**
3/1/2018	7.98	138.34	190.72	337.04	11,555.73
3/2/2018	-0.02	136.50	190.14	326.63	11,198.79
3/3/2018	83.20	137.09	93.85	314.14	10,770.56
3/4/2018	166.26	138.76	0.02	305.04	10,458.48
3/5/2018	166.30	138.80	0.02	305.11	10,461.07
3/6/2018	165.80	138.50	0.02	304.33	10,434.10
3/7/2018	163.55	138.20	0.05	301.81	10,347.64
3/8/2018	165.03	140.78	0.02	305.84	10,485.78
3/9/2018	166.74	144.46	0.02	311.22	10,670.47
3/10/2018	168.03	146.37	0.02	314.42	10,780.18
3/11/2018	166.90	144.84	0.08	311.82	10,690.84
3/12/2018	166.60	145.43	0.02	312.05	10,698.85
3/13/2018	165.81	142.67	0.02	308.49	10,576.89
3/14/2018	164.83	142.22	0.02	307.07	10,528.01
3/15/2018	161.49	141.88	0.02	303.40	10,402.15
3/16/2018	160.84	139.40	0.02	300.26	10,294.75
3/17/2018	160.17	138.37	0.06	298.60	10,237.61
3/18/2018	160.76	140.59	0.02	301.38	10,332.93
3/19/2018	160.96	143.23	0.07	304.27	10,432.09
3/20/2018	162.09	143.72	0.02	305.84	10,485.81
3/21/2018	157.51	142.35	0.03	299.88	10,281.62
3/22/2018	168.95	152.66	0.02	321.63	11,027.32
3/23/2018	162.19	146.14	0.02	308.35	10,571.93
3/24/2018	162.08	143.07	0.02	305.17	10,463.00
3/25/2018	160.94	144.17	0.05	305.16	10,462.70
3/26/2018	161.89	153.82	0.02	315.73	10,824.88
3/27/2018	162.34	161.21	0.02	323.57	11,093.92
3/28/2018	160.20	162.22	1.22	323.64	11,096.21
3/29/2018	162.13	167.99	0.02	330.14	11,319.15
3/30/2018	161.19	169.33	0.02	330.54	11,332.94
3/31/2018	161.89	172.63	0.02	334.54	11,469.96
				Total (BBL/MONTH):	**331,786.39**

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April 2018 - 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**
4/1/2018	162.44	174.57	0.02	337.03	11,555.37
4/2/2018	161.56	172.45	0.03	334.03	11,452.51
4/3/2018	161.81	171.34	0.02	333.17	11,422.87
4/4/2018	159.88	168.18	0.02	328.07	11,248.27
4/5/2018	157.43	168.08	0.06	325.57	11,162.39
4/6/2018	159.37	171.03	0.02	330.42	11,328.62
4/7/2018	159.30	170.72	0.02	330.04	11,315.75
4/8/2018	159.19	169.95	0.14	329.28	11,289.75
4/9/2018	159.75	173.11	0.02	332.88	11,412.86
4/10/2018	52.15	173.90	20.95	247.00	8,468.57
4/11/2018	178.17	174.70	0.02	352.89	12,099.21
4/12/2018	168.91	170.75	0.01	339.67	11,645.79
4/13/2018	168.64	170.84	0.01	339.50	11,639.87
4/14/2018	165.44	171.39	0.02	336.84	11,548.96
4/15/2018	160.33	171.49	0.03	331.85	11,377.78
4/16/2018	161.37	173.05	0.02	334.45	11,467.00
4/17/2018	160.68	170.62	0.02	331.32	11,359.39
4/18/2018	166.66	177.54	0.01	344.22	11,801.74
4/19/2018	167.64	173.96	0.02	341.62	11,712.64
4/20/2018	162.92	167.90	0.02	330.83	11,342.89
4/21/2018	159.38	175.46	0.02	334.85	11,480.64
4/22/2018	159.27	175.56	0.02	334.85	11,480.62
4/23/2018	159.48	176.55	0.02	336.04	11,521.50
4/24/2018	162.35	177.18	0.02	339.55	11,641.63
4/25/2018	164.16	178.63	0.01	342.80	11,753.07
4/26/2018	164.78	179.43	0.02	344.23	11,802.30
4/27/2018	151.87	173.08	0.02	324.98	11,142.02
4/28/2018	140.19	169.21	0.02	309.42	10,608.76
4/29/2018	141.63	169.20	0.02	310.85	10,657.80
4/30/2018	145.49	134.80	0.02	280.30	9,610.21
				Total (BBL/MONTH):	**338,350.78**

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May 2018 - 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**
5/1/2018	143.40	134.06	0.02	277.48	9,513.63
5/2/2018	142.04	133.88	0.02	275.94	9,460.64
5/3/2018	141.57	134.06	0.02	275.64	9,450.54
5/4/2018	141.17	135.72	0.02	276.91	9,493.91
5/5/2018	142.09	135.33	0.02	277.44	9,512.17
5/6/2018	153.81	146.52	0.02	300.35	10,297.71
5/7/2018	159.46	154.17	0.01	313.64	10,753.39
5/8/2018	161.67	159.08	0.01	320.76	10,997.62
5/9/2018	146.29	138.60	0.01	284.90	9,767.92
5/10/2018	137.68	129.87	0.01	267.56	9,173.45
5/11/2018	136.62	130.92	0.01	267.54	9,172.83
5/12/2018	136.66	130.54	0.01	267.21	9,161.60
5/13/2018	136.35	131.39	0.01	267.75	9,180.00
5/14/2018	135.43	131.94	0.01	267.38	9,167.17
5/15/2018	137.67	132.54	0.01	270.22	9,264.81
5/16/2018	137.21	132.76	0.01	269.98	9,256.44
5/17/2018	137.30	132.83	0.01	270.14	9,261.93
5/18/2018	137.14	132.83	0.01	269.97	9,256.16
5/19/2018	136.02	131.27	0.01	267.30	9,164.72
5/20/2018	136.85	130.67	0.01	267.53	9,172.56
5/21/2018	136.67	131.79	0.02	268.47	9,204.79
5/22/2018	135.79	133.46	0.02	269.27	9,232.06
5/23/2018	135.59	145.47	0.02	281.07	9,636.69
5/24/2018	134.95	144.28	0.02	279.25	9,574.20
5/25/2018	134.83	144.45	0.01	279.29	9,575.69
5/26/2018	134.17	143.58	0.01	277.76	9,523.30
5/27/2018	134.97	145.25	0.01	280.23	9,607.80
5/28/2018	135.03	145.30	0.01	280.33	9,611.44
5/29/2018	134.78	145.32	0.01	280.11	9,603.72
5/30/2018	133.98	143.72	0.01	277.71	9,521.35
5/31/2018	134.12	142.42	0.01	276.54	9,481.46
				Total (BBL/MONTH):	**295,051.69**

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June 2018 - 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**
6/1/2018	135.13	144.28	0.01	279.42	9,579.99
6/2/2018	134.09	144.50	0.00	278.60	9,551.95
6/3/2018	132.48	144.02	0.01	276.50	9,479.91
6/4/2018	131.14	143.62	0.01	274.77	9,420.78
6/5/2018	132.15	150.71	0.01	282.87	9,698.34
6/6/2018	133.55	153.78	0.01	287.34	9,851.75
6/7/2018	133.19	150.41	0.01	283.60	9,723.51
6/8/2018	133.28	134.98	0.01	268.27	9,197.70
6/9/2018	133.57	137.53	0.01	271.10	9,295.02
6/10/2018	133.34	138.84	0.01	272.18	9,331.92
6/11/2018	133.57	139.80	0.01	273.39	9,373.31
6/12/2018	133.70	140.54	0.01	274.25	9,402.74
6/13/2018	134.42	140.85	0.01	275.28	9,438.01
6/14/2018	135.21	140.80	0.01	276.02	9,463.68
6/15/2018	135.44	140.30	0.01	275.74	9,454.11
6/16/2018	134.73	140.82	0.01	275.56	9,447.69
6/17/2018	134.66	140.39	0.02	275.08	9,431.14
6/18/2018	134.82	139.65	0.02	274.48	9,410.68
6/19/2018	134.85	137.85	0.01	272.71	9,349.96
6/20/2018	134.79	137.48	0.01	272.28	9,335.21
6/21/2018	134.01	135.21	0.01	269.23	9,230.88
6/22/2018	134.02	134.87	0.01	268.90	9,219.48
6/23/2018	132.83	131.63	0.01	264.47	9,067.45
6/24/2018	132.78	130.68	0.01	263.47	9,033.29
6/25/2018	134.46	132.95	0.01	267.41	9,168.39
6/26/2018	133.91	132.08	0.01	266.00	9,119.91
6/27/2018	133.56	128.34	0.01	261.90	8,979.58
6/28/2018	132.35	136.89	0.01	269.25	9,231.33
6/29/2018	130.82	131.09	0.01	261.91	8,979.83
6/30/2018	131.53	132.16	0.01	263.70	9,041.06
				Total (BBL/MONTH):	**280,308.63**

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July 2018 - 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**
7/1/2018	129.80	131.24	0.01	261.05	8,950.32
7/2/2018	130.45	136.83	0.01	267.30	9,164.43
7/3/2018	128.99	138.92	0.01	267.92	9,185.81
7/4/2018	125.22	137.19	0.01	262.42	8,997.27
7/5/2018	124.51	136.18	0.01	260.70	8,938.32
7/6/2018	125.92	133.27	0.01	259.21	8,887.18
7/7/2018	125.84	132.88	0.01	258.74	8,870.96
7/8/2018	126.13	132.14	0.02	258.29	8,855.76
7/9/2018	126.38	130.93	0.01	257.32	8,822.33
7/10/2018	124.03	136.11	0.02	260.15	8,919.51
7/11/2018	124.52	138.75	0.02	263.28	9,026.84
7/12/2018	126.12	140.61	0.01	266.74	9,145.44
7/13/2018	124.95	136.18	0.01	261.15	8,953.65
7/14/2018	122.24	122.65	0.01	244.90	8,396.60
7/15/2018	123.64	122.60	0.01	246.25	8,443.00
7/16/2018	123.53	121.76	0.01	245.30	8,410.27
7/17/2018	123.50	121.74	0.08	245.32	8,411.03
7/18/2018	85.70	118.51	92.21	296.41	10,162.74
7/19/2018	71.07	100.06	170.84	341.97	11,724.64
7/20/2018	110.85	81.67	171.71	364.23	12,488.02
7/21/2018	96.94	85.77	175.14	357.85	12,269.30
7/22/2018	0.02	185.62	176.17	361.81	12,404.90
7/23/2018	0.25	176.54	173.74	350.53	12,018.15
7/24/2018	3.11	158.65	167.64	329.40	11,293.77
7/25/2018	59.23	133.40	165.99	358.63	12,295.75
7/26/2018	92.31	92.87	164.99	350.17	12,005.80
7/27/2018	82.25	90.90	168.54	341.68	11,714.71
7/28/2018	149.87	37.94	168.17	355.98	12,205.01
7/29/2018	61.88	147.33	167.92	377.12	12,929.88
7/30/2018	58.71	147.83	167.70	374.24	12,831.25
7/31/2018	69.92	168.57	168.03	406.52	13,937.75
				Total (BBL/MONTH):	**320,660.39**

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August 2018 - 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**
8/1/2018	77.89	154.37	168.41	400.67	13,737.10
8/2/2018	165.10	40.48	167.49	373.08	12,791.23
8/3/2018	158.37	40.63	164.24	363.24	12,453.83
8/4/2018	158.26	43.56	164.19	366.01	12,548.82
8/5/2018	159.26	46.98	164.57	370.82	12,713.76
8/6/2018	159.87	43.02	164.62	367.51	12,600.50
8/7/2018	162.45	118.54	76.38	357.37	12,252.77
8/8/2018	164.02	152.59	46.15	362.76	12,437.37
8/9/2018	43.24	155.81	137.66	336.71	11,544.28
8/10/2018	0.02	167.77	169.56	337.35	11,566.20
8/11/2018	0.10	197.34	168.52	365.96	12,547.19
8/12/2018	57.71	73.71	166.37	297.78	10,209.75
8/13/2018	160.98	23.64	162.99	347.61	11,918.07
8/14/2018	162.65	9.39	165.64	337.68	11,577.60
8/15/2018	161.41	0.10	165.98	327.49	11,228.33
8/16/2018	72.13	97.31	164.66	334.10	11,454.77
8/17/2018	0.02	197.80	164.04	361.87	12,406.90
8/18/2018	0.03	181.47	164.67	346.17	11,868.54
8/19/2018	0.02	152.97	162.53	315.52	10,817.77
8/20/2018	0.02	164.25	164.18	328.46	11,261.38
8/21/2018	0.02	162.38	164.18	326.58	11,197.16
8/22/2018	0.02	168.79	164.03	332.84	11,411.67
8/23/2018	0.02	168.76	164.00	332.78	11,409.70
8/24/2018	0.02	170.39	163.10	333.51	11,434.57
8/25/2018	0.02	168.97	164.19	333.19	11,423.67
8/26/2018	0.02	166.19	163.94	330.15	11,319.36
8/27/2018	0.02	157.58	165.05	322.65	11,062.25
8/28/2018	0.02	158.64	164.57	323.23	11,082.16
8/29/2018	0.03	161.95	163.98	325.96	11,175.79
8/30/2018	0.02	158.34	162.77	321.13	11,010.09
8/31/2018	0.02	159.52	164.56	324.11	11,112.42
				Total (BBL/MONTH):	**363,575.01**

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September 2018 - 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**
9/1/2018	0.02	160.04	165.40	325.47	11,158.87
9/2/2018	0.02	160.67	166.82	327.51	11,228.81
9/3/2018	0.02	157.77	164.37	322.15	11,045.31
9/4/2018	0.02	158.79	166.28	325.09	11,145.81
9/5/2018	0.02	159.85	166.46	326.33	11,188.48
9/6/2018	0.02	160.09	166.90	327.01	11,211.79
9/7/2018	0.01	159.67	165.67	325.35	11,154.71
9/8/2018	0.02	157.83	166.16	324.00	11,108.64
9/9/2018	0.02	154.77	164.75	319.54	10,955.71
9/10/2018	0.02	155.15	165.05	320.22	10,978.83
9/11/2018	0.02	154.58	165.12	319.72	10,961.74
9/12/2018	0.02	152.60	164.13	316.75	10,859.92
9/13/2018	0.02	158.53	168.75	327.29	11,221.42
9/14/2018	0.02	172.98	173.21	346.22	11,870.32
9/15/2018	0.02	170.63	172.72	343.37	11,772.83
9/16/2018	0.02	170.00	173.42	343.44	11,775.12
9/17/2018	0.02	171.12	173.96	345.10	11,832.00
9/18/2018	0.02	171.36	173.38	344.77	11,820.64
9/19/2018	0.02	176.12	172.29	348.42	11,945.94
9/20/2018	0.02	184.05	173.24	357.32	12,250.86
9/21/2018	0.02	181.24	173.12	354.38	12,150.10
9/22/2018	0.02	180.66	172.56	353.24	12,111.12
9/23/2018	0.02	177.84	171.73	349.59	11,986.00
9/24/2018	0.02	180.19	172.40	352.61	12,089.60
9/25/2018	0.02	150.14	160.68	310.83	10,657.01
9/26/2018	0.02	149.92	161.48	311.42	10,677.21
9/27/2018	0.00	180.50	174.75	355.25	12,180.09
9/28/2018	0.01	182.52	176.31	358.83	12,302.86
9/29/2018	0.02	182.45	175.27	357.73	12,265.17
9/30/2018	0.01	184.09	174.64	358.74	12,299.59
				Total (BBL/MONTH):	**346,206.49**

2018 ANNUAL DISCHARGE PERMIT REPORT
HOLLYFRONTIER NAVAJO REFINING LLC - ARTESIA REFINERY
DISCHARGE PERMIT GW-028
APPENDIX A.3
MONTHLY RO DISCHARGE SUMMARY

October 2018 - RO Reject Flow/Discharge Measurements					
Skid Location:	**South**	**North**	**Middle**	**Combined**	**Combined**
Measurement:	**Daily Flow**	**Daily Flow**	**Daily Flow**	**Discharge**	**Discharge**
Units:	**GPM**	**GPM**	**GPM**	**GPM**	**BPD**
10/1/2018	0.02	183.46	174.73	358.20	12,281.29
10/2/2018	0.02	184.12	175.40	359.53	12,326.81
10/3/2018	0.02	185.42	175.56	361.00	12,377.10
10/4/2018	121.33	53.29	174.87	349.50	11,982.73
10/5/2018	175.25	0.24	174.28	349.77	11,991.95
10/6/2018	175.65	0.37	174.73	350.75	12,025.72
10/7/2018	176.51	0.17	175.27	351.95	12,066.85
10/8/2018	176.48	0.09	174.88	351.45	12,049.58
10/9/2018	174.54	0.10	174.14	348.77	11,957.87
10/10/2018	170.90	0.08	171.86	342.84	11,754.56
10/11/2018	76.81	90.59	173.98	341.37	11,704.15
10/12/2018	0.00	175.87	175.57	351.45	12,049.56
10/13/2018	0.05	155.70	175.33	331.08	11,351.47
10/14/2018	0.01	157.86	174.60	332.48	11,399.24
10/15/2018	0.01	156.65	174.93	331.59	11,368.89
10/16/2018	-0.01	146.94	174.49	321.42	11,019.99
10/17/2018	120.04	148.92	47.84	316.80	10,861.67
10/18/2018	98.70	153.70	62.79	315.19	10,806.48
10/19/2018	-0.01	158.58	156.05	314.61	10,786.79
10/20/2018	0.00	157.13	155.15	312.28	10,706.61
10/21/2018	0.00	154.06	154.62	308.69	10,583.51
10/22/2018	0.00	155.05	155.43	310.48	10,644.99
10/23/2018	0.05	153.02	154.56	307.64	10,547.81
10/24/2018	0.00	153.84	154.77	308.60	10,580.70
10/25/2018	0.00	153.10	154.68	307.78	10,552.30
10/26/2018	0.00	152.82	154.63	307.45	10,541.09
10/27/2018	0.00	153.81	154.72	308.53	10,578.29
10/28/2018	0.00	153.81	154.44	308.25	10,568.59
10/29/2018	0.00	150.71	152.98	303.69	10,412.14
10/30/2018	0.01	152.90	153.42	306.33	10,502.63
10/31/2018	0.01	150.22	153.06	303.28	10,398.18
				Total (BBL/MONTH):	**348,779.53**

2018 ANNUAL DISCHARGE PERMIT REPORT
HOLLYFRONTIER NAVAJO REFINING LLC - ARTESIA REFINERY
DISCHARGE PERMIT GW-028
APPENDIX A.3
MONTHLY RO DISCHARGE SUMMARY

November 2018 - 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**
11/1/2018	-0.01	150.16	152.95	303.11	10,392.35
11/2/2018	-0.01	150.22	152.18	302.39	10,367.62
11/3/2018	-0.01	146.78	152.70	299.48	10,267.80
11/4/2018	0.00	135.05	152.39	287.43	9,854.77
11/5/2018	-0.01	132.97	152.80	285.76	9,797.62
11/6/2018	0.00	141.21	152.53	293.74	10,070.96
11/7/2018	0.00	163.28	153.87	317.15	10,873.72
11/8/2018	-0.01	160.88	153.88	314.76	10,791.63
11/9/2018	-0.01	158.74	153.98	312.72	10,721.73
11/10/2018	-0.01	156.26	153.64	309.89	10,624.91
11/11/2018	0.00	153.59	153.43	307.02	10,526.37
11/12/2018	0.00	152.80	153.59	306.39	10,504.86
11/13/2018	0.00	153.74	154.19	307.93	10,557.76
11/14/2018	71.85	67.66	123.10	262.62	9,004.00
11/15/2018	162.32	0.05	117.42	279.79	9,592.85
11/16/2018	103.85	38.11	48.94	190.91	6,545.52
11/17/2018	147.72	133.43	0.03	281.18	9,640.40
11/18/2018	152.74	139.30	0.04	292.09	10,014.38
11/19/2018	181.10	193.63	0.04	374.76	12,849.00
11/20/2018	179.55	192.48	0.04	372.07	12,756.70
11/21/2018	179.35	192.32	0.04	371.70	12,744.08
11/22/2018	180.71	190.78	0.04	371.53	12,738.15
11/23/2018	185.67	192.67	0.04	378.38	12,972.91
11/24/2018	186.47	192.96	0.03	379.46	13,010.22
11/25/2018	184.96	192.48	0.03	377.46	12,941.64
11/26/2018	185.34	191.21	0.03	376.58	12,911.43
11/27/2018	185.81	194.30	0.04	380.14	13,033.34
11/28/2018	184.53	194.16	0.03	378.72	12,984.67
11/29/2018	185.89	195.16	0.03	381.08	13,065.46
11/30/2018	168.44	128.67	0.02	297.14	10,187.52
				Total (BBL/MONTH):	**332,344.38**

2018 ANNUAL DISCHARGE PERMIT REPORT
HOLLYFRONTIER NAVAJO REFINING LLC - ARTESIA REFINERY
DISCHARGE PERMIT GW-028
APPENDIX A.3
MONTHLY RO DISCHARGE SUMMARY

December 2018 - RO Reject Flow/Discharge Measurements					
Skid Location:	**South**	**North**	**Middle**	**Combined**	**Combined**
Measurement:	**Daily Flow**	**Daily Flow**	**Daily Flow**	**Discharge**	**Discharge**
Units:	**GPM**	**GPM**	**GPM**	**GPM**	**BPD**
12/1/2018	159.43	105.66	0.03	265.12	9,089.95
12/2/2018	159.87	116.68	0.03	276.58	9,482.75
12/3/2018	160.78	139.26	0.03	300.07	10,288.06
12/4/2018	160.99	134.91	0.04	295.94	10,146.68
12/5/2018	151.22	134.62	10.98	296.82	10,176.70
12/6/2018	23.78	111.82	82.28	217.88	7,470.01
12/7/2018	1.34	94.24	120.72	216.30	7,415.92
12/8/2018	-0.02	73.00	133.96	206.93	7,094.76
12/9/2018	-0.03	0.03	142.75	142.75	4,894.13
12/10/2018	37.27	0.03	140.35	177.64	6,090.58
12/11/2018	184.97	0.04	157.58	342.60	11,746.16
12/12/2018	179.57	0.05	185.84	365.46	12,529.98
12/13/2018	168.38	0.06	186.73	355.17	12,177.24
12/14/2018	169.84	0.05	187.54	357.43	12,254.83
12/15/2018	172.13	0.04	170.22	342.39	11,739.08
12/16/2018	164.64	0.05	157.82	322.51	11,057.59
12/17/2018	159.39	0.05	154.18	313.62	10,752.84
12/18/2018	172.16	0.05	152.84	325.05	11,144.42
12/19/2018	172.18	0.05	162.00	334.23	11,459.22
12/20/2018	161.35	0.06	173.78	335.19	11,492.28
12/21/2018	161.82	0.05	174.39	336.27	11,529.31
12/22/2018	174.52	0.06	173.46	348.04	11,932.71
12/23/2018	189.06	0.07	174.57	363.70	12,469.57
12/24/2018	177.68	0.05	178.65	356.38	12,218.57
12/25/2018	175.09	0.05	177.78	352.92	12,100.11
12/26/2018	167.07	0.06	177.83	344.96	11,827.14
12/27/2018	167.74	0.05	177.22	345.02	11,829.18
12/28/2018	172.44	0.06	168.95	341.45	11,706.81
12/29/2018	176.02	0.04	166.41	342.47	11,741.74
12/30/2018	176.43	0.04	173.95	350.42	12,014.46
12/31/2018	167.52	0.05	162.56	330.13	11,318.87
				Total (BBL/MONTH):	**329,191.63**

Notes:

RO: Reverse Osmosis

BBL: barrel

GPM: gallons per minute

BPD: barrels per day

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

March 14, 2018

Robert Combs

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

RE: RO Reject OrderNo.: 1802943

Dear Robert Combs:

Hall Environmental Analysis Laboratory received 2 sample(s) on 2/16/2018 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 #NM0190

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: RO Reject
Project: RO Reject
Collection Date: 2/14/2018 3:04:00 PM
Lab ID: 1802943-001 **Matrix:** AQUEOUS **Received Date:** 2/16/2018 9:30:00 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	2/22/2018 4:22:38 PM
EPA METHOD 8082A: PCB'S						Analyst: **SCC**
Aroclor 1016	ND	1.0		µg/L	1	2/27/2018 12:54:00 PM
Aroclor 1221	ND	1.0		µg/L	1	2/27/2018 12:54:00 PM
Aroclor 1232	ND	1.0		µg/L	1	2/27/2018 12:54:00 PM
Aroclor 1242	ND	1.0		µg/L	1	2/27/2018 12:54:00 PM
Aroclor 1248	ND	1.0		µg/L	1	2/27/2018 12:54:00 PM
Aroclor 1254	ND	1.0		µg/L	1	2/27/2018 12:54:00 PM
Aroclor 1260	ND	1.0		µg/L	1	2/27/2018 12:54:00 PM
Surr: Decachlorobiphenyl	91.6	34.1-101		%Rec	1	2/27/2018 12:54:00 PM
Surr: Tetrachloro-m-xylene	92.8	22.9-104		%Rec	1	2/27/2018 12:54:00 PM
EPA METHOD 8015M/D: DIESEL RANGE						Analyst: **TOM**
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	2/20/2018 8:42:58 PM
Motor Oil Range Organics (MRO)	ND	5.0		mg/L	1	2/20/2018 8:42:58 PM
Surr: DNOP	116	77.5-161		%Rec	1	2/20/2018 8:42:58 PM
EPA METHOD 8310: PAHS						Analyst: **SCC**
Naphthalene	ND	2.0		µg/L	1	3/1/2018 8:30:00 PM
1-Methylnaphthalene	ND	2.0		µg/L	1	3/1/2018 8:30:00 PM
2-Methylnaphthalene	ND	2.0		µg/L	1	3/1/2018 8:30:00 PM
Benzo(a)pyrene	ND	0.070		µg/L	1	3/1/2018 8:30:00 PM
Surr: Benzo(e)pyrene	77.9	52-133		%Rec	1	3/1/2018 8:30:00 PM
EPA METHOD 300.0: ANIONS						Analyst: **MRA**
Fluoride	2.7	0.10		mg/L	1	2/16/2018 2:56:33 PM
Chloride	51	10		mg/L	20	2/16/2018 3:08:58 PM
Nitrogen, Nitrite (As N)	ND	0.10		mg/L	1	2/16/2018 2:56:33 PM
Bromide	0.18	0.10		mg/L	1	3/5/2018 7:27:11 PM
Nitrogen, Nitrate (As N)	1.6	0.10		mg/L	1	2/16/2018 2:56:33 PM
Phosphorus, Orthophosphate (As P)	ND	0.50		mg/L	1	2/16/2018 2:56:33 PM
Sulfate	1400	25		mg/L	50	3/2/2018 3:21:58 PM
EPA METHOD 200.7: DISSOLVED METALS						Analyst: **pmf**
Aluminum	ND	0.020		mg/L	1	2/20/2018 10:33:17 PM
Barium	0.055	0.0020		mg/L	1	2/20/2018 10:33:17 PM
Boron	0.086	0.040		mg/L	1	2/21/2018 7:43:41 PM
Cadmium	ND	0.0020		mg/L	1	2/20/2018 10:33:17 PM
Calcium	640	10		mg/L	10	2/21/2018 7:53:56 PM
Chromium	ND	0.0060		mg/L	1	2/20/2018 10:33:17 PM
Cobalt	ND	0.0060		mg/L	1	2/20/2018 10:33:17 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: RO Reject
Project: RO Reject
Collection Date: 2/14/2018 3:04:00 PM
Lab ID: 1802943-001 **Matrix:** AQUEOUS **Received Date:** 2/16/2018 9:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 200.7: DISSOLVED METALS						Analyst: **pmf**
Copper	ND	0.0060		mg/L	1	2/20/2018 10:33:17 PM
Iron	ND	0.020		mg/L	1	2/20/2018 10:33:17 PM
Magnesium	190	5.0		mg/L	5	2/21/2018 7:51:56 PM
Manganese	0.0086	0.0020		mg/L	1	2/20/2018 10:33:17 PM
Molybdenum	0.011	0.0080		mg/L	1	2/20/2018 10:33:17 PM
Nickel	ND	0.010		mg/L	1	2/20/2018 10:33:17 PM
Potassium	3.9	1.0		mg/L	1	2/20/2018 10:33:17 PM
Silver	0.012	0.0050		mg/L	1	2/20/2018 10:33:17 PM
Sodium	61	1.0		mg/L	1	2/20/2018 10:33:17 PM
Zinc	0.019	0.010		mg/L	1	2/20/2018 10:33:17 PM
EPA 200.8: DISSOLVED METALS						Analyst: **JLF**
Arsenic	ND	0.0050		mg/L	5	2/26/2018 9:25:14 PM
Lead	ND	0.00050		mg/L	1	2/22/2018 12:56:21 AM
Selenium	0.0099	0.0010		mg/L	1	2/22/2018 12:56:21 AM
Uranium	0.0054	0.00050		mg/L	1	2/22/2018 12:56:21 AM
EPA METHOD 245.1: MERCURY						Analyst: **rde**
Mercury	ND	0.00020		mg/L	1	3/1/2018 5:58:11 PM
EPA METHOD 8260B: VOLATILES						Analyst: **RAA**
Benzene	ND	1.0		µg/L	1	2/21/2018 4:19:00 PM
Toluene	ND	1.0		µg/L	1	2/21/2018 4:19:00 PM
Ethylbenzene	ND	1.0		µg/L	1	2/21/2018 4:19:00 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	2/21/2018 4:19:00 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	2/21/2018 4:19:00 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	2/21/2018 4:19:00 PM
Chloroform	ND	1.0		µg/L	1	2/21/2018 4:19:00 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	2/21/2018 4:19:00 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	2/21/2018 4:19:00 PM
Methylene Chloride	ND	3.0		µg/L	1	2/21/2018 4:19:00 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	2/21/2018 4:19:00 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	2/21/2018 4:19:00 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	2/21/2018 4:19:00 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	2/21/2018 4:19:00 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	2/21/2018 4:19:00 PM
Vinyl chloride	ND	1.0		µg/L	1	2/21/2018 4:19:00 PM
Xylenes, Total	ND	1.5		µg/L	1	2/21/2018 4:19:00 PM
Surr: 1,2-Dichloroethane-d4	89.0	70-130		%Rec	1	2/21/2018 4:19:00 PM
Surr: 4-Bromofluorobenzene	76.9	70-130		%Rec	1	2/21/2018 4:19:00 PM
Surr: Dibromofluoromethane	92.2	70-130		%Rec	1	2/21/2018 4:19:00 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: RO Reject
Project: RO Reject
Collection Date: 2/14/2018 3:04:00 PM
Lab ID: 1802943-001 **Matrix:** AQUEOUS **Received Date:** 2/16/2018 9:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: **RAA**
Surr: Toluene-d8	77.2	70-130		%Rec	1	2/21/2018 4:19:00 PM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **AG**
Gasoline Range Organics (GRO)	ND	0.050		mg/L	1	2/21/2018 5:21:46 PM
Surr: BFB	114	70-130		%Rec	1	2/21/2018 5:21:46 PM
TOTAL PHENOLICS BY SW-846 9067						Analyst: **SCC**
Phenolics	ND	2.5		µg/L	1	2/27/2018
EPA 335.4: TOTAL CYANIDE SUBBED						Analyst: **SUB**
Cyanide	ND	0.0100		mg/L	1	2/23/2018
EPA 903.1: RA 226 AND EPA 904.0: RA 228-SUBBED						Analyst: **SUB**
Radium-226	1.07	0.888		pCi/L	1	2/23/2018
Radium-226 ±	0.676	0.888		pCi/L	1	2/23/2018
Radium-228	0.0763	0.833		pCi/L	1	2/23/2018
Radium-228 ±	0.367	0.833		pCi/L	1	2/23/2018
SM2510B: SPECIFIC CONDUCTANCE						Analyst: **JRR**
Conductivity	3100	5.0		µmhos/cm	1	2/19/2018 11:48:18 AM
SM4500-H+B / 9040C: PH						Analyst: **JRR**
pH	7.85		H	pH units	1	2/19/2018 11:48:18 AM
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: **KS**
Total Dissolved Solids	2980	20.0	*	mg/L	1	2/22/2018 3:38:00 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: 1802943-002 **Matrix:** AQUEOUS **Received Date:** 2/16/2018 9:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8011/504.1: EDB						Analyst: **JME**
1,2-Dibromoethane	ND	0.0096		µg/L	1	2/22/2018 4:37:52 PM
EPA METHOD 8260B: VOLATILES						Analyst: **RAA**
Benzene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
Toluene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
Ethylbenzene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
Naphthalene	ND	2.0		µg/L	1	2/21/2018 5:31:00 PM
1-Methylnaphthalene	ND	4.0		µg/L	1	2/21/2018 5:31:00 PM
2-Methylnaphthalene	ND	4.0		µg/L	1	2/21/2018 5:31:00 PM
Acetone	ND	10		µg/L	1	2/21/2018 5:31:00 PM
Bromobenzene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
Bromodichloromethane	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
Bromoform	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
Bromomethane	ND	3.0		µg/L	1	2/21/2018 5:31:00 PM
2-Butanone	ND	10		µg/L	1	2/21/2018 5:31:00 PM
Carbon disulfide	ND	10		µg/L	1	2/21/2018 5:31:00 PM
Carbon Tetrachloride	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
Chlorobenzene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
Chloroethane	ND	2.0		µg/L	1	2/21/2018 5:31:00 PM
Chloroform	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
Chloromethane	ND	3.0		µg/L	1	2/21/2018 5:31:00 PM
2-Chlorotoluene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
4-Chlorotoluene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
cis-1,2-DCE	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	2/21/2018 5:31:00 PM
Dibromochloromethane	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
Dibromomethane	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
1,2-Dichlorobenzene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
1,3-Dichlorobenzene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
1,4-Dichlorobenzene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
Dichlorodifluoromethane	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
1,1-Dichloroethane	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
1,1-Dichloroethene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
1,2-Dichloropropane	ND	1.0		µg/L	1	2/21/2018 5:31:00 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
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Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: Trip Blank
Project: RO Reject
Collection Date:
Lab ID: 1802943-002 **Matrix:** AQUEOUS **Received Date:** 2/16/2018 9:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: **RAA**
1,3-Dichloropropane	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
2,2-Dichloropropane	ND	2.0		µg/L	1	2/21/2018 5:31:00 PM
1,1-Dichloropropene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
Hexachlorobutadiene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
2-Hexanone	ND	10		µg/L	1	2/21/2018 5:31:00 PM
Isopropylbenzene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
4-Isopropyltoluene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
4-Methyl-2-pentanone	ND	10		µg/L	1	2/21/2018 5:31:00 PM
Methylene Chloride	ND	3.0		µg/L	1	2/21/2018 5:31:00 PM
n-Butylbenzene	ND	3.0		µg/L	1	2/21/2018 5:31:00 PM
n-Propylbenzene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
sec-Butylbenzene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
Styrene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
tert-Butylbenzene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	2/21/2018 5:31:00 PM
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
trans-1,2-DCE	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
1,1,1-Trichloroethane	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
1,1,2-Trichloroethane	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
Trichloroethene (TCE)	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
Trichlorofluoromethane	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
1,2,3-Trichloropropane	ND	2.0		µg/L	1	2/21/2018 5:31:00 PM
Vinyl chloride	ND	1.0		µg/L	1	2/21/2018 5:31:00 PM
Xylenes, Total	ND	1.5		µg/L	1	2/21/2018 5:31:00 PM
Surr: 1,2-Dichloroethane-d4	87.2	70-130		%Rec	1	2/21/2018 5:31:00 PM
Surr: 4-Bromofluorobenzene	78.0	70-130		%Rec	1	2/21/2018 5:31:00 PM
Surr: Dibromofluoromethane	89.2	70-130		%Rec	1	2/21/2018 5:31:00 PM
Surr: Toluene-d8	77.4	70-130		%Rec	1	2/21/2018 5:31:00 PM

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QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1802943**

14-Mar-18

Client: Navajo Refining Company

Project: RO Reject

Sample ID **MB-A**	SampType: **MBLK**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **PBW**	Batch ID: **A49271**	RunNo: **49271**
Prep Date:	Analysis Date: **2/20/2018**	SeqNo: **1589731** 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								
Cadmium	ND	0.0020								
Chromium	ND	0.0060								
Cobalt	ND	0.0060								
Copper	ND	0.0060								
Iron	ND	0.020								
Manganese	ND	0.0020								
Molybdenum	ND	0.0080								
Nickel	ND	0.010								
Potassium	ND	1.0								
Silver	ND	0.0050								
Sodium	ND	1.0								
Zinc	ND	0.010								

Sample ID **LLLCS-A**	SampType: **LCSLL**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **BatchQC**	Batch ID: **A49271**	RunNo: **49271**
Prep Date:	Analysis Date: **2/20/2018**	SeqNo: **1589732** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020	0.01000	0	114	50	150			
Barium	0.0023	0.0020	0.002000	0	116	50	150			
Cadmium	ND	0.0020	0.002000	0	89.5	50	150			
Chromium	ND	0.0060	0.006000	0	84.5	50	150			
Cobalt	0.0062	0.0060	0.006000	0	103	50	150			
Copper	0.0065	0.0060	0.006000	0	108	50	150			
Iron	0.024	0.020	0.02000	0	120	50	150			
Manganese	0.0021	0.0020	0.002000	0	105	50	150			
Molybdenum	0.0094	0.0080	0.008000	0	117	50	150			
Nickel	ND	0.010	0.005000	0	68.0	50	150			
Potassium	ND	1.0	0.5000	0	97.9	50	150			
Silver	0.0052	0.0050	0.005000	0	103	50	150			
Sodium	ND	1.0	0.5000	0	92.8	50	150			
Zinc	ND	0.010	0.005000	0	116	50	150			

Sample ID **LCS-A**	SampType: **LCS**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **LCSW**	Batch ID: **A49271**	RunNo: **49271**
Prep Date:	Analysis Date: **2/20/2018**	SeqNo: **1589733** Units: **mg/L**

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

Qualifiers:

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QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1802943**

14-Mar-18

Client: Navajo Refining Company

Project: RO Reject

Sample ID **LCS-A**	SampType: **LCS**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **LCSW**	Batch ID: **A49271**	RunNo: **49271**
Prep Date:	Analysis Date: **2/20/2018**	SeqNo: **1589733** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.57	0.020	0.5000	0	114	85	115			
Barium	0.50	0.0020	0.5000	0	101	85	115			
Cadmium	0.52	0.0020	0.5000	0	104	85	115			
Chromium	0.51	0.0060	0.5000	0	102	85	115			
Cobalt	0.49	0.0060	0.5000	0	98.7	85	115			
Copper	0.52	0.0060	0.5000	0	104	85	115			
Iron	0.51	0.020	0.5000	0	102	85	115			
Manganese	0.51	0.0020	0.5000	0	103	85	115			
Molybdenum	0.50	0.0080	0.5000	0	100	85	115			
Nickel	0.51	0.010	0.5000	0	102	85	115			
Potassium	48	1.0	50.00	0	95.8	85	115			
Silver	0.10	0.0050	0.1000	0	104	85	115			
Sodium	48	1.0	50.00	0	96.2	85	115			
Zinc	0.50	0.010	0.5000	0	101	85	115			

Sample ID **MB-A**	SampType: **MBLK**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **PBW**	Batch ID: **A49287**	RunNo: **49287**
Prep Date:	Analysis Date: **2/21/2018**	SeqNo: **1591279** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	ND	0.040								
Calcium	ND	1.0								
Magnesium	ND	1.0								

Sample ID **LLLCS-A**	SampType: **LCSLL**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **BatchQC**	Batch ID: **A49287**	RunNo: **49287**
Prep Date:	Analysis Date: **2/21/2018**	SeqNo: **1591280** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	ND	0.040	0.04000	0	95.5	50	150			
Calcium	ND	1.0	0.5000	0	101	50	150			
Magnesium	ND	1.0	0.5000	0	97.7	50	150			

Sample ID **LCS-A**	SampType: **LCS**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **LCSW**	Batch ID: **A49287**	RunNo: **49287**
Prep Date:	Analysis Date: **2/21/2018**	SeqNo: **1591281** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Boron	0.50	0.040	0.5000	0	101	85	115			
Calcium	49	1.0	50.00	0	97.6	85	115			

Qualifiers:

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QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1802943**
14-Mar-18

Client: Navajo Refining Company
Project: RO Reject

Sample ID	**LCS-A**	SampType: **LCS**		TestCode: **EPA Method 200.7: Dissolved Metals**					
Client ID:	**LCSW**	Batch ID: **A49287**		RunNo: **49287**					
Prep Date:		Analysis Date: **2/21/2018**		SeqNo: **1591281**	Units: **mg/L**				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Magnesium	49	1.0	50.00	0	97.2	85	115			

Qualifiers:

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Hall Environmental Analysis Laboratory, Inc.

WO#: **1802943**

14-Mar-18

Client: Navajo Refining Company

Project: RO Reject

Sample ID	**MB**	SampType:	**MBLK**	TestCode:	**EPA 200.8: Dissolved Metals**					
Client ID:	**PBW**	Batch ID:	**C49298**	RunNo:	**49298**					
Prep Date:		Analysis Date:	**2/21/2018**	SeqNo:	**1591444**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Lead	ND	0.00050								
Selenium	ND	0.0010								
Uranium	ND	0.00050								

Sample ID	**LLLCS**	SampType:	**LCSLL**	TestCode:	**EPA 200.8: Dissolved Metals**					
Client ID:	**BatchQC**	Batch ID:	**C49298**	RunNo:	**49298**					
Prep Date:		Analysis Date:	**2/21/2018**	SeqNo:	**1591445**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Lead	ND	0.00050	0.0005000	0	97.8	50	150			
Selenium	ND	0.0010	0.001000	0	93.1	50	150			
Uranium	ND	0.00050	0.0005000	0	96.6	50	150			

Sample ID	**LCS**	SampType:	**LCS**	TestCode:	**EPA 200.8: Dissolved Metals**					
Client ID:	**LCSW**	Batch ID:	**C49298**	RunNo:	**49298**					
Prep Date:		Analysis Date:	**2/21/2018**	SeqNo:	**1591446**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Lead	0.012	0.00050	0.01250	0	95.7	85	115			
Selenium	0.023	0.0010	0.02500	0	90.4	85	115			
Uranium	0.012	0.00050	0.01250	0	95.5	85	115			

Sample ID	**MB**	SampType:	**MBLK**	TestCode:	**EPA 200.8: Dissolved Metals**					
Client ID:	**PBW**	Batch ID:	**C49385**	RunNo:	**49385**					
Prep Date:		Analysis Date:	**2/26/2018**	SeqNo:	**1595034**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	0.0010								

Sample ID	**LLLCS**	SampType:	**LCSLL**	TestCode:	**EPA 200.8: Dissolved Metals**					
Client ID:	**BatchQC**	Batch ID:	**C49385**	RunNo:	**49385**					
Prep Date:		Analysis Date:	**2/26/2018**	SeqNo:	**1595035**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	0.0010	0.001000	0	94.1	50	150			

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QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1802943**
14-Mar-18

Client: Navajo Refining Company
Project: RO Reject

Sample ID **LCS**	SampType: **LCS**	TestCode: **EPA 200.8: Dissolved Metals**
Client ID: **LCSW**	Batch ID: **C49385**	RunNo: **49385**
Prep Date:	Analysis Date: **2/26/2018**	SeqNo: **1595036** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.024	0.0010	0.02500	0	94.4	85	115			

Qualifiers:

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H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
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QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1802943**

14-Mar-18

Client: Navajo Refining Company

Project: RO Reject

Sample ID	**MB-36783**	SampType:	**MBLK**	TestCode:	**EPA Method 245.1: Mercury**					
Client ID:	**PBW**	Batch ID:	**36783**	RunNo:	**49489**					
Prep Date:	**3/1/2018**	Analysis Date:	**3/1/2018**	SeqNo:	**1600083**	Units:	**mg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.00020								

Sample ID	**LCS-36783**	SampType:	**LCS**	TestCode:	**EPA Method 245.1: Mercury**					
Client ID:	**LCSW**	Batch ID:	**36783**	RunNo:	**49489**					
Prep Date:	**3/1/2018**	Analysis Date:	**3/1/2018**	SeqNo:	**1600084**	Units:	**mg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0050	0.00020	0.005000	0	101	80	120			

Qualifiers:

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QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1802943**

14-Mar-18

Client: Navajo Refining Company

Project: RO Reject

Sample ID **MB**	SampType: **mblk**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **R49185**	RunNo: **49185**
Prep Date:	Analysis Date: **2/16/2018**	SeqNo: **1587334** 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								
Nitrogen, Nitrite (As N)	ND	0.10								
Nitrogen, Nitrate (As N)	ND	0.10								
Phosphorus, Orthophosphate (As P	ND	0.50								

Sample ID **LCS**	SampType: **lcs**	TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW**	Batch ID: **R49185**	RunNo: **49185**
Prep Date:	Analysis Date: **2/16/2018**	SeqNo: **1587335** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.50	0.10	0.5000	0	100	90	110			
Chloride	4.6	0.50	5.000	0	91.2	90	110			
Nitrogen, Nitrite (As N)	0.94	0.10	1.000	0	94.1	90	110			
Nitrogen, Nitrate (As N)	2.4	0.10	2.500	0	97.9	90	110			
Phosphorus, Orthophosphate (As P	4.8	0.50	5.000	0	96.1	90	110			

Sample ID **MB**	SampType: **mblk**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **R49522**	RunNo: **49522**
Prep Date:	Analysis Date: **3/2/2018**	SeqNo: **1600511** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	ND	0.50								

Sample ID **LCS-b**	SampType: **lcs**	TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW**	Batch ID: **R49522**	RunNo: **49522**
Prep Date:	Analysis Date: **3/2/2018**	SeqNo: **1600513** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	9.2	0.50	10.00	0	91.9	90	110			

Sample ID **MB**	SampType: **mblk**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **R49564**	RunNo: **49564**
Prep Date:	Analysis Date: **3/5/2018**	SeqNo: **1602334** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Bromide	ND	0.10								

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#: **1802943**
14-Mar-18

Client: Navajo Refining Company
Project: RO Reject

Sample ID	**LCS**	SampType:	**lcs**	TestCode:	**EPA Method 300.0: Anions**					
Client ID:	**LCSW**	Batch ID:	**R49564**	RunNo:	**49564**					
Prep Date:		Analysis Date:	**3/5/2018**	SeqNo:	**1602335**	Units:	**mg/L**			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Bromide		2.3	0.10	2.500	0	93.6	90	110			

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#: **1802943**

14-Mar-18

Client: Navajo Refining Company

Project: RO Reject

Sample ID	**MB-36656**	SampType:	**MBLK**	TestCode:	**EPA Method 8011/504.1: EDB**					
Client ID:	**PBW**	Batch ID:	**36656**	RunNo:	**49337**					
Prep Date:	**2/22/2018**	Analysis Date:	**2/22/2018**	SeqNo:	**1592767**	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-36656**	SampType:	**LCS**	TestCode:	**EPA Method 8011/504.1: EDB**					
Client ID:	**LCSW**	Batch ID:	**36656**	RunNo:	**49337**					
Prep Date:	**2/22/2018**	Analysis Date:	**2/22/2018**	SeqNo:	**1592768**	Units:	**µg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,2-Dibromoethane	0.11	0.010	0.1000	0	105	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#: **1802943**

14-Mar-18

Client: Navajo Refining Company

Project: RO Reject

Sample ID **LCS-36596**	SampType: **LCS**	TestCode: **EPA Method 8015M/D: Diesel Range**
Client ID: **LCSW**	Batch ID: **36596**	RunNo: **49234**
Prep Date: **2/19/2018**	Analysis Date: **2/20/2018**	SeqNo: **1588530** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	5.2	1.0	5.000	0	104	92.3	135			
Surr: DNOP	0.52		0.5000		104	77.5	161			

Sample ID **MB-36596**	SampType: **MBLK**	TestCode: **EPA Method 8015M/D: Diesel Range**
Client ID: **PBW**	Batch ID: **36596**	RunNo: **49234**
Prep Date: **2/19/2018**	Analysis Date: **2/20/2018**	SeqNo: **1588531** 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	1.1		1.000		111	77.5	161			

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#: **1802943**

14-Mar-18

Client: Navajo Refining Company

Project: RO Reject

Sample ID	**MB-36635**	SampType:	**MBLK**	TestCode:	**EPA Method 8082A: PCB's**					
Client ID:	**PBW**	Batch ID:	**36635**	RunNo:	**49397**					
Prep Date:	**2/21/2018**	Analysis Date:	**2/27/2018**	SeqNo:	**1595475**	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	2.1		2.500		82.8	34.1	101			
Surr: Tetrachloro-m-xylene	2.3		2.500		90.0	22.9	104			

Sample ID	**LCS-36635**	SampType:	**LCS**	TestCode:	**EPA Method 8082A: PCB's**					
Client ID:	**LCSW**	Batch ID:	**36635**	RunNo:	**49397**					
Prep Date:	**2/21/2018**	Analysis Date:	**2/27/2018**	SeqNo:	**1595479**	Units:	**µg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aroclor 1016	3.6	1.0	5.000	0	72.4	33.4	137			
Aroclor 1260	4.5	1.0	5.000	0	90.4	27.4	141			
Surr: Decachlorobiphenyl	2.1		2.500		84.8	34.1	101			
Surr: Tetrachloro-m-xylene	2.2		2.500		87.6	22.9	104			

Sample ID	**LCSD-36635**	SampType:	**LCSD**	TestCode:	**EPA Method 8082A: PCB's**					
Client ID:	**LCSS02**	Batch ID:	**36635**	RunNo:	**49397**					
Prep Date:	**2/21/2018**	Analysis Date:	**2/27/2018**	SeqNo:	**1595509**	Units:	**µg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aroclor 1016	4.0	1.0	5.000	0	80.6	33.4	137	10.7	17.9	
Aroclor 1260	4.6	1.0	5.000	0	92.6	27.4	141	2.40	16.2	
Surr: Decachlorobiphenyl	2.2		2.500		86.0	34.1	101	0	0	
Surr: Tetrachloro-m-xylene	2.4		2.500		94.0	22.9	104	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#: **1802943**
14-Mar-18

Client: Navajo Refining Company
Project: RO Reject

Sample ID **100ng lcs**	SampType: **LCS**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **LCSW**	Batch ID: **R49300**	RunNo: **49300**
Prep Date:	Analysis Date: **2/21/2018**	SeqNo: **1590831** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	24	1.0	20.00	0	118	70	130			
Toluene	20	1.0	20.00	0	101	70	130			
Chlorobenzene	20	1.0	20.00	0	102	70	130			
1,1-Dichloroethene	26	1.0	20.00	0	128	70	130			
Trichloroethene (TCE)	22	1.0	20.00	0	110	70	130			
Surr: 1,2-Dichloroethane-d4	8.8		10.00		88.4	70	130			
Surr: 4-Bromofluorobenzene	8.0		10.00		79.5	70	130			
Surr: Dibromofluoromethane	9.1		10.00		90.8	70	130			
Surr: Toluene-d8	7.8		10.00		78.2	70	130			

Sample ID **rb**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **R49300**	RunNo: **49300**
Prep Date:	Analysis Date: **2/21/2018**	SeqNo: **1590832** 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								
Methyl tert-butyl ether (MTBE)	ND	1.0								
1,2,4-Trimethylbenzene	ND	1.0								
1,3,5-Trimethylbenzene	ND	1.0								
1,2-Dichloroethane (EDC)	ND	1.0								
1,2-Dibromoethane (EDB)	ND	1.0								
Naphthalene	ND	2.0								
1-Methylnaphthalene	ND	4.0								
2-Methylnaphthalene	ND	4.0								
Acetone	ND	10								
Bromobenzene	ND	1.0								
Bromodichloromethane	ND	1.0								
Bromoform	ND	1.0								
Bromomethane	ND	3.0								
2-Butanone	ND	10								
Carbon disulfide	ND	10								
Carbon Tetrachloride	ND	1.0								
Chlorobenzene	ND	1.0								
Chloroethane	ND	2.0								
Chloroform	ND	1.0								
Chloromethane	ND	3.0								
2-Chlorotoluene	ND	1.0								

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#: **1802943**

14-Mar-18

Client: Navajo Refining Company

Project: RO Reject

Sample ID **rb**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **R49300**	RunNo: **49300**
Prep Date:	Analysis Date: **2/21/2018**	SeqNo: **1590832** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
4-Chlorotoluene	ND	1.0								
cis-1,2-DCE	ND	1.0								
cis-1,3-Dichloropropene	ND	1.0								
1,2-Dibromo-3-chloropropane	ND	2.0								
Dibromochloromethane	ND	1.0								
Dibromomethane	ND	1.0								
1,2-Dichlorobenzene	ND	1.0								
1,3-Dichlorobenzene	ND	1.0								
1,4-Dichlorobenzene	ND	1.0								
Dichlorodifluoromethane	ND	1.0								
1,1-Dichloroethane	ND	1.0								
1,1-Dichloroethene	ND	1.0								
1,2-Dichloropropane	ND	1.0								
1,3-Dichloropropane	ND	1.0								
2,2-Dichloropropane	ND	2.0								
1,1-Dichloropropene	ND	1.0								
Hexachlorobutadiene	ND	1.0								
2-Hexanone	ND	10								
Isopropylbenzene	ND	1.0								
4-Isopropyltoluene	ND	1.0								
4-Methyl-2-pentanone	ND	10								
Methylene Chloride	ND	3.0								
n-Butylbenzene	ND	3.0								
n-Propylbenzene	ND	1.0								
sec-Butylbenzene	ND	1.0								
Styrene	ND	1.0								
tert-Butylbenzene	ND	1.0								
1,1,1,2-Tetrachloroethane	ND	1.0								
1,1,2,2-Tetrachloroethane	ND	2.0								
Tetrachloroethene (PCE)	ND	1.0								
trans-1,2-DCE	ND	1.0								
trans-1,3-Dichloropropene	ND	1.0								
1,2,3-Trichlorobenzene	ND	1.0								
1,2,4-Trichlorobenzene	ND	1.0								
1,1,1-Trichloroethane	ND	1.0								
1,1,2-Trichloroethane	ND	1.0								
Trichloroethene (TCE)	ND	1.0								
Trichlorofluoromethane	ND	1.0								
1,2,3-Trichloropropane	ND	2.0								

Qualifiers:

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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#: **1802943**

14-Mar-18

Client: Navajo Refining Company

Project: RO Reject

Sample ID **rb**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **R49300**	RunNo: **49300**
Prep Date:	Analysis Date: **2/21/2018**	SeqNo: **1590832** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Vinyl chloride	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	8.9		10.00		88.9	70	130			
Surr: 4-Bromofluorobenzene	7.6		10.00		76.1	70	130			
Surr: Dibromofluoromethane	9.2		10.00		91.7	70	130			
Surr: Toluene-d8	7.7		10.00		77.3	70	130			

Sample ID **1802943-001BMS**	SampType: **MS**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **RO Reject**	Batch ID: **R49300**	RunNo: **49300**
Prep Date:	Analysis Date: **2/21/2018**	SeqNo: **1590836** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	24	1.0	20.00	0.08400	122	60.5	137			
Toluene	25	1.0	20.00	0.5680	121	70	130			
Chlorobenzene	21	1.0	20.00	0	105	70	130			
1,1-Dichloroethene	26	1.0	20.00	0	129	70	130			
Trichloroethene (TCE)	23	1.0	20.00	0	115	70	130			
Surr: 1,2-Dichloroethane-d4	9.1		10.00		90.7	70	130			
Surr: 4-Bromofluorobenzene	7.9		10.00		79.1	70	130			
Surr: Dibromofluoromethane	9.2		10.00		92.2	70	130			
Surr: Toluene-d8	7.8		10.00		78.1	70	130			

Sample ID **1802943-001BMSD**	SampType: **MSD**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **RO Reject**	Batch ID: **R49300**	RunNo: **49300**
Prep Date:	Analysis Date: **2/21/2018**	SeqNo: **1590837** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	23	1.0	20.00	0.08400	115	60.5	137	5.90	20	
Toluene	25	1.0	20.00	0.5680	121	70	130	0.130	20	
Chlorobenzene	20	1.0	20.00	0	99.8	70	130	5.32	20	
1,1-Dichloroethene	25	1.0	20.00	0	124	70	130	4.13	20	
Trichloroethene (TCE)	22	1.0	20.00	0	108	70	130	5.78	20	
Surr: 1,2-Dichloroethane-d4	8.8		10.00		88.2	70	130	0	0	
Surr: 4-Bromofluorobenzene	8.0		10.00		79.5	70	130	0	0	
Surr: Dibromofluoromethane	9.1		10.00		90.5	70	130	0	0	
Surr: Toluene-d8	7.8		10.00		78.5	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
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QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1802943**

14-Mar-18

Client: Navajo Refining Company

Project: RO Reject

Sample ID **MB-36634**	SampType: **MBLK**	TestCode: **EPA Method 8310: PAHs**							
Client ID: **PBW**	Batch ID: **36634**	RunNo: **49473**							
Prep Date: **2/21/2018**	Analysis Date: **3/1/2018**	SeqNo: **1599096**	Units: **µg/L**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Naphthalene	ND	2.0								
1-Methylnaphthalene	ND	2.0								
2-Methylnaphthalene	ND	2.0								
Benzo(a)pyrene	ND	0.070								
Surr: Benzo(e)pyrene	12		20.00		61.2	52	133			

Sample ID **LCS-36634**	SampType: **LCS**	TestCode: **EPA Method 8310: PAHs**							
Client ID: **LCSW**	Batch ID: **36634**	RunNo: **49473**							
Prep Date: **2/21/2018**	Analysis Date: **3/1/2018**	SeqNo: **1599124**	Units: **µg/L**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Naphthalene	56	2.0	80.00	0	69.9	35.5	118			
1-Methylnaphthalene	56	2.0	80.20	0	70.4	35.5	119			
2-Methylnaphthalene	56	2.0	80.00	0	69.6	32.4	122			
Benzo(a)pyrene	0.37	0.070	0.5020	0	73.7	49.8	120			
Surr: Benzo(e)pyrene	15		20.00		74.2	52	133			

Sample ID **LCSD-36634**	SampType: **LCSD**	TestCode: **EPA Method 8310: PAHs**							
Client ID: **LCSS02**	Batch ID: **36634**	RunNo: **49473**							
Prep Date: **2/21/2018**	Analysis Date: **3/1/2018**	SeqNo: **1599129**	Units: **µg/L**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Naphthalene	62	2.0	80.00	0	77.4	35.5	118	10.1	19.8	
1-Methylnaphthalene	62	2.0	80.20	0	77.5	35.5	119	9.51	19.9	
2-Methylnaphthalene	62	2.0	80.00	0	77.3	32.4	122	10.5	19.4	
Benzo(a)pyrene	0.41	0.070	0.5020	0	81.7	49.8	120	10.3	24.1	
Surr: Benzo(e)pyrene	16		20.00		81.4	52	133	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#: **1802943**
14-Mar-18

Client: Navajo Refining Company
Project: RO Reject

Sample ID	**MB-36748**	SampType: **MBLK**			TestCode: **Total Phenolics by SW-846 9067**					
Client ID:	**PBW**	Batch ID: **36748**			RunNo: **49467**					
Prep Date:	**2/27/2018**	Analysis Date: **2/27/2018**			SeqNo: **1597701**	Units: **µg/L**				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phenolics	ND	2.5								

Sample ID	**LCS-36748**	SampType: **LCS**			TestCode: **Total Phenolics by SW-846 9067**					
Client ID:	**LCSW**	Batch ID: **36748**			RunNo: **49467**					
Prep Date:	**2/27/2018**	Analysis Date: **2/27/2018**			SeqNo: **1597702**	Units: **µg/L**				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phenolics	25	2.5	20.00	0	126	67.8	139			

Sample ID	**LCSD-36748**	SampType: **LCSD**			TestCode: **Total Phenolics by SW-846 9067**					
Client ID:	**LCSS02**	Batch ID: **36748**			RunNo: **49467**					
Prep Date:	**2/27/2018**	Analysis Date: **2/27/2018**			SeqNo: **1597703**	Units: **µg/L**				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phenolics	21	2.5	20.00	0	107	67.8	139	16.0	21	

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#: **1802943**

14-Mar-18

Client: Navajo Refining Company

Project: RO Reject

Sample ID	**MB-R49764**	SampType:	**MBLK**	TestCode:	**EPA 335.4: Total Cyanide Subbed**					
Client ID:	**PBW**	Batch ID:	**R49764**	RunNo:	**49764**					
Prep Date:		Analysis Date:	**2/23/2018**	SeqNo:	**1610100**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cyanide	ND	0.0100								

Sample ID	**LCS-R49764**	SampType:	**LCS**	TestCode:	**EPA 335.4: Total Cyanide Subbed**					
Client ID:	**LCSW**	Batch ID:	**R49764**	RunNo:	**49764**					
Prep Date:		Analysis Date:	**2/23/2018**	SeqNo:	**1610101**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cyanide	0.517		0.5000	0	103	90	110			

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#: **1802943**
14-Mar-18

Client: Navajo Refining Company
Project: RO Reject

Sample ID	**lcs-1 ~20uS eC**	SampType: **LCS**		TestCode: **SM2510B: Specific Conductance**					
Client ID:	**LCSW**	Batch ID: **R49228**		RunNo: **49228**					
Prep Date:		Analysis Date: **2/19/2018**		SeqNo: **1588186**		Units: **µmhos/cm**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Conductivity	22	5.0	19.96	0	111	80	120			

Sample ID	**1802943-001f dup**	SampType: **DUP**		TestCode: **SM2510B: Specific Conductance**					
Client ID:	**RO Reject**	Batch ID: **R49228**		RunNo: **49228**					
Prep Date:		Analysis Date: **2/19/2018**		SeqNo: **1588194**		Units: **µmhos/cm**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Conductivity	3100	5.0						0.592	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#: **1802943**

14-Mar-18

Client: Navajo Refining Company

Project: RO Reject

Sample ID	**1802943-001bms**	SampType:	**MS**		TestCode:	**EPA Method 8015D: Gasoline Range**					
Client ID:	**RO Reject**	Batch ID:	**W49276**		RunNo:	**49276**					
Prep Date:		Analysis Date:	**2/21/2018**		SeqNo:	**1590910**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Gasoline Range Organics (GRO)	0.57	0.050	0.5000	0	113	70	130				
Surr: BFB	11		10.00		106	70	130				

Sample ID	**1802943-001bmsd**	SampType:	**MSD**		TestCode:	**EPA Method 8015D: Gasoline Range**					
Client ID:	**RO Reject**	Batch ID:	**W49276**		RunNo:	**49276**					
Prep Date:		Analysis Date:	**2/21/2018**		SeqNo:	**1590911**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Gasoline Range Organics (GRO)	0.56	0.050	0.5000	0	111	70	130	1.57	20		
Surr: BFB	10		10.00		105	70	130	0	0		

Sample ID	**2.5ug gro lcs**	SampType:	**LCS**		TestCode:	**EPA Method 8015D: Gasoline Range**					
Client ID:	**LCSW**	Batch ID:	**W49276**		RunNo:	**49276**					
Prep Date:		Analysis Date:	**2/21/2018**		SeqNo:	**1590915**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Gasoline Range Organics (GRO)	0.59	0.050	0.5000	0	117	70	130				
Surr: BFB	10		10.00		104	70	130				

Sample ID	**rb**	SampType:	**MBLK**		TestCode:	**EPA Method 8015D: Gasoline Range**					
Client ID:	**PBW**	Batch ID:	**W49276**		RunNo:	**49276**					
Prep Date:		Analysis Date:	**2/21/2018**		SeqNo:	**1590916**	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	12		10.00		117	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#: **1802943**
14-Mar-18

Client: Navajo Refining Company
Project: RO Reject

Sample ID	**1802943-001f dup**	SampType: **DUP**		TestCode: **SM4500-H+B / 9040C: pH**					
Client ID:	**RO Reject**	Batch ID: **R49228**		RunNo: **49228**					
Prep Date:		Analysis Date: **2/19/2018**		SeqNo: **1588175**	Units: **pH units**				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
pH	7.86									H

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#: **1802943**
14-Mar-18

Client: Navajo Refining Company
Project: RO Reject

Sample ID	**MB-R49764**	SampType: **MBLK**		TestCode: **EPA 903.1: Ra 226 and EPA 904.0: Ra 228-Subbed**					
Client ID:	**PBW**	Batch ID: **R49764**		RunNo: **49764**					
Prep Date:		Analysis Date: **2/23/2018**		SeqNo: **1610103**	Units: **pCi/L**				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Radium-226	0.506	0.587								
Radium-226 ±	0.433	0.587								
Radium-228	0.311	0.821								
Radium-228 ±	0.388	0.821								

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#: **1802943**

14-Mar-18

Client: Navajo Refining Company

Project: RO Reject

Sample ID	**MB-36645**	SampType:	**MBLK**		TestCode:	**SM2540C MOD: Total Dissolved Solids**				
Client ID:	**PBW**	Batch ID:	**36645**		RunNo:	**49330**				
Prep Date:	**2/21/2018**	Analysis Date:	**2/22/2018**		SeqNo:	**1592366**	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-36645**	SampType:	**LCS**		TestCode:	**SM2540C MOD: Total Dissolved Solids**				
Client ID:	**LCSW**	Batch ID:	**36645**		RunNo:	**49330**				
Prep Date:	**2/21/2018**	Analysis Date:	**2/22/2018**		SeqNo:	**1592367**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	999	20.0	1000	0	99.9	80	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

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: 1802943 RcptNo: 1

Received By: Sophia Campuzano 2/16/2018 9:30:00 AM

Completed By: Anne Thorne 2/16/2018 11:53:18 AM Anne Thorne

Reviewed By: ENM 2/16/18

Labeled: SRE 02/16/18 MW 2/16/18 @1345

Chain of Custody

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

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 ☐	# of preserved bottles checked for pH: 6, 1 (<2 or >12 unless noted)
12. Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	Adjusted? 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 ☐	Checked by:

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: custody seals present & intact. 02/16/18 SRE

17. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.3	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. # 251841

Project Manager:
Scott Denton
Robert Combs

Sampler:

On Ice: X Yes ☐ No

Sample Temperature: 1.3

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1802943	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)		
2/14/2018	3:04	liquid	R.O. Reject	22	H2SO4/HNO3/HCl/ Na2S2O3	-001	X	X	X	X	X	X	X	X	X	X	X	X	Y		

Date	Time	Relinquished by	Received by	Date	Time
2-15-18	10:00	Brady Hubbard	Courier	02/16/18	0930
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks: email to Scott Denton, Robert Combs and Randy Dade
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-methylnaphchalene, naphthalene

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1808536**

06-Sep-18

Client: Navajo Refining Company

Project: POTW Sampling Week 6

Sample ID	**MB-39746**	SampType:	**MBLK**		TestCode:	**SM2540C MOD: Total Dissolved Solids**				
Client ID:	**PBW**	Batch ID:	**39746**		RunNo:	**53431**				
Prep Date:	**8/13/2018**	Analysis Date:	**8/14/2018**		SeqNo:	**1759749**	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-39746**	SampType:	**LCS**		TestCode:	**SM2540C MOD: Total Dissolved Solids**				
Client ID:	**LCSW**	Batch ID:	**39746**		RunNo:	**53431**				
Prep Date:	**8/13/2018**	Analysis Date:	**8/14/2018**		SeqNo:	**1759750**	Units:	**mg/L**		

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	1000	20.0	1000	0	100	80	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

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: 1808536 RcptNo: 1

Received By: Isaiah Ortiz 8/8/2018 8:56:00 AM IG

Completed By: Ashley Gallegos 8/9/2018 9:35:42 AM AG

Reviewed By: ENM 8/10/18 labeled by: LB

Chain of Custody

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

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: LB

Special Handling (if applicable)

15. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified:	Brady Hubbard	Date	8/8/2018
By Whom:	Ashley Gallegos	Via:	☑ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:	analysis request		
Client Instructions:	same as 1808006		

16. Additional remarks:

17. **Cooler Information**

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.6	Good	Yes			

Chain-of-Custody Record

Client: Navajo Refining Co

Mailing Address: 501 E Main
Artesia, NM 88210

Phone #: 575-308-2718

email or Fax#: Robert.Combs@hollyfrontier.com

QA/QC Package:
☐ Standard ☐ Level 4 (Full Validation)

Accreditation
☐ NELAP ☐ Other _____

☐ EDD (Type) _____

Turn-Around Time:
☒ Standard ☐ Rush _____

Project Name:
POTW Sampling Week 6

Project #:

Project Manager:
Robert Combs

Sampler: Brady Hubbard
On Ice: ☒ Yes ☐ No
Sample Temperature: 2.3-1.0(CF) 1.3

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

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Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1808536	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH 8015B (GRO / DRO / MRO)	TPH (Method 418.1)	EDB (Method 504.1)	PAH's (8310 or 8270 SIMS)	RCRA 8 Metals	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)	Same as 1808004 per B.H. 08/08		Air Bubbles (Y or N)
8/7/18	10:00	Liquid	POTW Effluent			-001														
			TripBlank			-002														
			08/09/18																	

Date:	Time:	Relinquished by:	Received by:	Date	Time
8/7/18	11:00	Brady Hubbard	Courier	08/08/18	0856
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks:

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

Hall Environmental Analysis Laboratory
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

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Qualifiers:

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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 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

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Qualifiers:

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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 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

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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 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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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 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

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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:

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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-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:

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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
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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	**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:

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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
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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
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-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
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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
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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-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
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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	**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:

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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 **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
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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-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:

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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-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
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-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:

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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
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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:

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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-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:

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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
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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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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:

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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	**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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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:

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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
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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-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:

*	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

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

Analysis Request

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:	Time:	Relinquished by:	Received by:	Date	Time
1-18-19	4:00	Brady Hubbard	Fedex ejm 1/21/19	1/21/19	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