

GW - _____28_____

PIPELINE

2018 - Present

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Thursday, August 22, 2019 2:40 PM
To: Denton, Scott (Scott.Denton@HollyFrontier.com)
Cc: Griswold, Jim, EMNRD; Brancard, Bill, EMNRD; Ames, Eric, EMNRD
Subject: Effluent Pipeline

Scott, hi.

FYI: Click [here](#).

Just wanted to follow-up with you about the fiberglass pipeline upgradient from the WDWs and historical releases.

The pipeline has been in place now for more than 10 years. HFNR indicated there are no current plans to replace the pipeline. This pipeline may someday handle a WDW-4 hazardous waste stream.

HFNR held a communication meeting with OCD yesterday, and OCD brought up the pipeline so you know OCD is concerned about the releases upgradient from the WDWs. It may be prudent for HFNR to think about the pipeline and it can even be used to transport hazardous wastewater to WDW-4 someday.

Please click [here](#) to review OCD HST Guidance. Because the refinery is under a WQCC DP, it would need to meet the technical requirements of the guidance; however, the HST fluids could be returned back into the refinery WWTS and/or refining process...

Thank you.

Mr. Carl J. Chavez, CHMM (#13099)
New Mexico Oil Conservation Division
Energy Minerals and Natural Resources Department
1220 South St Francis Drive
Santa Fe, New Mexico 87505
Ph. (505) 476-3490
E-mail: CarlJ.Chavez@state.nm.us

“Why not prevent pollution, minimize waste to reduce operating costs, reuse or recycle, and move forward with the rest of the Nation?” (To see how, go to: <http://www.emnrd.state.nm.us/OCD> and see “Publications”)

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Thursday, October 4, 2018 11:15 AM
To: Denton, Scott (Scott.Denton@HollyFrontier.com); Combs, Robert (Robert.Combs@hollyfrontier.com)
Cc: Griswold, Jim, EMNRD
Subject: Artesia Refinery (GW-28) Pipeline

Scott and Robert:

Good morning.

FYI: EMNRD Legal Counsel has determined that the pipeline shall remain under the above subject WQCC Discharge Permit.

Also, OCD is looking into the releases along the pipeline again as part of its C-141 review. OCD will likely require routine annual HSTs be performed on the entire pipeline (especially under the Pecos River) and/or proposal as part of the operator's final C-141 to install a device(s) to prevent back pressure and blow out of FG collars along the pipeline during power failures, upset, etc., etc. It appears that backpressure on the fiberglass line is causing blowouts along the pipeline collars and this should be prevented by the operator.

Thank you.

Mr. Carl J. Chavez, CHMM (#13099)
New Mexico Oil Conservation Division
Energy Minerals and Natural Resources Department
1220 South St Francis Drive
Santa Fe, New Mexico 87505
Ph. (505) 476-3490
E-mail: CarlJ.Chavez@state.nm.us

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GW - 028

**GENERAL
CORRESPONDENCE**

YEAR(S):

2006 - Present

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Thursday, August 10, 2017 3:05 PM
To: Denton, Scott (Scott.Denton@HollyFrontier.com); Combs, Robert (Robert.Combs@hollyfrontier.com)
Cc: Griswold, Jim, EMNRD; Tsinnajinnie, Leona, NMENV
Subject: HollyFrontier Navajo Refining, LLC Artesia Refinery (GW-028) Notification of Change of Discharge Location (7/21/17) and Closure Plan (7/21/17) Documents Communication Meeting

Gentlemen:

Please find below OCD's notes in red text based on the HollyFrontier Navajo Refining, LLC 7/21/17 submittals, and 8/9 telephone communication call. Carl agreed to submit notes to the parties to ensure we are proceeding according to the intent of the discharge permit. Action items are highlighted in yellow.

Meeting attendants, please feel free to add any of your comments for communication purposes.

Thank you.

Introduction

A Notification of Change to Discharge Location (HF 7/21/17 Document) *(approved by OCD)*

- 1) Phytoremediation Pilot Project (call it "feasibility project" instead) within South RO Reject Field (OCD location approval of 7/28) *(Ok)*
 - a. Phytoremediation Work Plan needed *(Scott Denton will address)*
 - b. Abatement Plan (AP) submittal (Pre-closure) *(AP in this instance is for stopping discharge in RO Reject Farm Fields. No DP modification required for phytoremediation project- JG.)*
 - c. Navajo's reference to past reports, i.e., RO Reject Field Reports, Background GW Report, etc. *(Permittee only mentioning for AP required within 60 days from cessation of discharge into RO farm fields per A2a.)*
 - i. To be included in AP submittal? *(May or likely be considered in A1c and A2c)*
 - ii. OCD will consider, but may require other COAs as needed to complete AP *(Same as A1c above)*

2) Abatement Plan Schedule

- a. OCD Modif. Approval of Submittal 60 days after cessation of discharge to RO Reject Fields *(No Modif. Required, but an AP is required at that time)*
- b. OCD Discharge Permit Modification of 6-29-17 *(Ok. OCD issued Admin. Modif.)*
- c. Confusion w/ Phyto-remediation Pilot Project and No. A1b above. *(Phyto-remediation project may factor into AP under A2a above depending on work plan end goals or criteria indicating it is a viable stand-alone abatement or complimentary abatement?)*

B Closure Plan (HF 7/21/2017 Document)

- 1) Phytoremediation Pilot (Abatement under DP)- AP Confusion *(See 2A1 above. This is a feasibility project that may become part of the AP 60 days after cessation of discharge to RO Reject farm fields)*

- a. AP Considerations in cost projection(s) needed now *(Address stoppage of discharge to RO Reject farm fields for now. The AP required 60 days after cessation of discharge will need to be addressed with that submittal)*
 - b. Closure Plan is different and costs may be projected now w/ modification as needed later *(Submit with AP due 60 days after cessation of discharge to RO Reject farm fields.)*
- 2) Navajo's reference to past reports, i.e., RO Reject Field Reports, Background GW Report, etc. assoc. w/ abatement *(Yes, this is to be expected)*
- a. Use in AP submittal A2a above. *(Yes)*
- 3) Abatement Plan Schedule
- a. OCD Modif. Approval of Submittal 60 days after cessation of discharge to RO Reject Fields *(OCD agrees per A2a)*
 - i. Use in cost estimates now *(Cost estimates may need to be adjusted later as more information becomes available and as per B3a)*
- 4) Detailed or itemized list of closure actions with cost estimates *(To be addressed)*
- 5) Financial Assurance (FA) Amount is too Low \$3K (Function of No. B4 above)
- a. What is basis for \$3K *(Estimated cost for ending discharge to RO Farm Fields per DP. More cost details are needed as basis for cost estimate.)*
 - b. FA needed now with modifications as needed *(FA submittal for final AP required separate from 5a above. On a separate note: Financial Assurance- FA for each UIC Class I (NH) Disposal well must be revisited and adjusted based on the effluent pipeline leading to each well for disposal, i.e., WDW-I pipeline extends back to the refinery ~ 12 miles. Scott Denton will address.)*

Path Forward *(As described herein)*

Miscel.

- VOC plume capture system hypothetical: Injection stds. must meet the greater of WQCC water quality standards or background GW quality.
- How will OCD permit Class V remediation injection wells? Since facility is under WQCC DP, Permittee will be required to meet the technical requirements of OCD's UIC Program, i.e., C-108, Fed. Class V Well Form,...
- Gross hydrocarbon removal with GACs. Permittee currently not concerned with general chemistry constituents of concern. i.e., Cl, SO₄,... If water discharged to GW is of better quality then there should be no issues, but monitoring will be required to verify that discharge is better quality than existing GW at the discharge location.
- OSE Water Rights: Permittee discussed a year ago with OSE. If Permittee injects/removes gal/gal, no permit needed. No water rights issue(s) as Permittee has procured shallow GW leased rights (~ 80% plume reinjection/plume capture). About 20% may be reinjected outside of capture zone, but must meet diff. WQ stds. OCD is in discussions with NMED on this plume capture matter. OCD is thinking HF will soon be submitting final hydrogeologic pump test report with perhaps a work plan for extraction/injection wells to address dissolved phase plume migration, PSH, etc. OCD is in communication with NMED on the above. OCD and NMED both agree they need to seek further clarification from Permittee based on this topic and future plans of the Permittee.
- Lovington Refinery GW sampling event start date is Wed. instead of Thurs.
- WDW-4 Disposal Well: OCD UIC Class I Haz. Well Regulations still under review by EPA. EPA Attorneys left, and OCD/EPA Primacy issues still linger. EPA Reg. 6 now aware of situation and will be working with OCD Attys.

Energy Minerals and Natural Resources Department
1220 South St Francis Drive
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Ph. (505) 476-3490
E-mail: CarlJ.Chavez@state.nm.us

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Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Friday, April 21, 2017 8:45 AM
To: Combs, Robert (Robert.Combs@hollyfrontier.com)
Cc: Griswold, Jim, EMNRD
Subject: FW: Artesia Refinery (GW-28) 2015 Effluent Pipeline Release Follow-up

Robert:

Re: Pipeline Releases 2015 and 2016

Good morning. OCD is following up on C-141 Final submittals for the pipeline releases South of the evaporation ponds west of the Pecos River.

The communique below was the last OCD msg. sent to Navajo regarding the 2015 release. Later in 2016 there was another release.

OCD is requesting an update on releases within the next two weeks or on or before May 5, 2017.

Thank you.

From: Chavez, Carl J, EMNRD
Sent: Tuesday, November 15, 2016 3:19 PM
To: Combs, Robert (Robert.Combs@hollyfrontier.com) <Robert.Combs@hollyfrontier.com>
Cc: Holder, Mike (Michael.Holder@hollyfrontier.com) <Michael.Holder@hollyfrontier.com>; Denton, Scott (Scott.Denton@HollyFrontier.com) <Scott.Denton@HollyFrontier.com>; Griswold, Jim, EMNRD <Jim.Griswold@state.nm.us>
Subject: Artesia Refinery (GW-28) 2015 Effluent Pipeline Release

Robert, et al.:

Good afternoon. The New Mexico Oil Conservation Division (OCD) has re-evaluated the release information from the July 27, 2016 Investigation Report, subsequent to the telephone communication call on Nov. 9th. OCD comments and requirements are provided below based on a review of information to date.

OCD comments:

- 1) The water table is less than 10 ft. bgl and the release location is within the Pecos River Flood Plain Watershed area.
- 2) The soil removed to repair the line is estimated to be 50-60 cubic yards, and were not sampled for waste determination because HF was not convinced that the removed soils were actually waste. The excavated soils are stockpiled on land surface, and clean fill was used to backfill the excavation area.
- 3) Two soil borings were advanced (TMW-WWL1 and TMW-WWL2) in areas believed to have been unimpacted by the pipeline release with soil samples taken at depths of 1, 6 and 12 feet bgs in each boring. The 12 foot samples would have been in the capillary fringe or saturated zone. Those soil samples were analyzed for the constituents provided in Table 2. These “background” soils appear

elevated in iron and sulfate, at a minimum. No sampling was done upon the 50 to 60 yards of excavated soils and no sampling was done on the sides or at the base of the excavation.

- 4) The approach used on this 2015 effluent line release appears to be what is also needed on 2016 effluent pipeline release; however, OCD requires sampling along the sidewalls and base of excavations in order to verify soil remediation is acceptable, and the waste must also be sampled for a waste determination. Consequently, HF must not re-embed excavated soils back into the excavation until the analytical data is reviewed and a determination is made by OCD.
- 5) OCD generally relies on soil screening limits DAF1 and DAF20 for evaluation of soil contamination and protection of groundwater when and where feasible. Establishment of background soil quality does simplify the final cleanup criteria for parameters lacking a DAF1 or DAF20.
- 6) For soil reuse proposals related to the effluent pipeline, submittals to OCD is in order. OCD will likely use a similar approach as the NMED for final determination.

OCD requirements:

- 1) OCD requires that the excavated soils be sampled and similarly analyzed for the constituents in Table 2. OCD requires at least 3 discrete grab samples (no composites), one sample for every ~20 yards of material. Environmental analyses shall consist of Organics by Method 8260 full list; Method 8015 extended range; Iron and Manganese by Method 6010; along with Chloride, Fluoride, and Sulfate by Method 300. If the excavation is still open, a sample from the base of excavation should also be collected and analyzed.
- 2) HF shall submit the environmental analytical data with QA/QC to OCD to compare with the background information to decide on the next step (if any) on or before **December 31, 2016**.
- 3) HF shall follow EPA QA/QC and DQOs for all field and laboratory work.

Please contact me if you have questions. Thank you.

GW - 028

C-141s

Chavez, Carl J, EMNRD

From: Combs, Robert [Robert.Combs@hollyfrontier.com]
Sent: Wednesday, September 21, 2011 4:28 PM
To: Chavez, Carl J, EMNRD; Cobrain, Dave, NMENV; Hill, Larry, EMNRD; Dade, Randy, EMNRD
Cc: Moore, Darrell; Lackey, Johnny; Strange, Aaron
Subject: C-141 Spill--NRC effluent pipeline leak near Chukka Federal injection well
Attachments: 2011-09-16 Spill-Effluent pipeline leak at Chukka junction box--initial report.pdf; Chukka Leak

Carl, Dave, Randy, and Larry,

Please see the attached C-141 for the treated waste water spill located near the Chukka injection well that occurred 9/16/11. A final C-141 will follow and will include sample analyses (bottom hole, background, and excavated soil) and photos.

If there are any questions, please contact me at 575-746-5382.

Thanks,
Robert

Robert Combs

Environmental Specialist

The HollyFrontier Companies

P.O. Box 159

Artesia, NM 88211-0159

office: 575-746-5382

cell: 575-308-2718

fax: 575-746-5451

Robert.Combs@HollyFrontier.com

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Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Friday, September 24, 2010 9:54 AM
To: Hill, Larry, EMNRD; Dade, Randy, EMNRD; Perrin, Charlie, EMNRD
Cc: VonGonten, Glenn, EMNRD
Subject: Refinery Meetings in Santa Fe October 6, 2010

Hey guys.

Just wanted to let you know OCD- SF is meeting with Navajo Refining Company (NRC) and Western Refining SW, Inc. (Western) on the above subject date in case you would like to participate by telephone conference. OCD- SF will go over the discharge permit with operators to make sure we are moving forward to address the permit. OCD- SF is under travel restriction; thus, meetings to discuss facility issues makes sense at this time.

The meetings are as follows:

- 1) NRC from 10 to Noon: Lovington or Lea Refinery- GW-014 (particularly interested in the environmental site investigation and GW quality information from the recently installed series of MWs) at the facility within Lovington's Well Head Protection Area.

An agenda item for the NRC- Artesia Refinery (GW-028) is included in this meeting, but another meeting to discuss the permit in more detail will likely be scheduled at a later date. Some current issues are: free-product recovery system is down and a work plan will be submitted by 11/2010 to construct a functional system for product recovery. Issues with the effluent line east of the facility, across Pecos River and to their 3 UIC Class I (NH) disposal wells. Randy Dade will be inspecting the line, recent releases with repair, hydrostatic testing requirements, and requesting a work plan for complete replacement of the effluent line by March of 2011. The Artesia refinery was assessed a fine by NM OSHA for over \$700K for the March 2010 tank explosion that resulted in loss of life of 2 workers from TX.

- 2) Western from 1 to 3 p.m.: Gallup Refinery- GW-028 (particularly interested in the tank construction, waste water pond construction and any permit deadlines). Facility-Wide GW Monitoring Plan will replace the GW sampling portion of the permit in the upcoming renewal of the discharge permit. The refinery is installing a new waste water treatment system for the refinery under an EPA CAFO.

A request for a meeting on Western's Bloomfield Refinery- GW-001 was made today. There is a UIC Class I (NH) Well within the facility (UICI-009) where a hearing request was received on the discharge permit renewal and the Director is currently assessing the hearing request. Bloomfield was allowed to idle or shut-in operations under a recently issued discharge permit renewal. The bulk storage and transportation units are in operation and the UIC Class I well is used for disposal of recovered product behind the remediation barrier wall and the river. The voluntary biovent remediation project at the river terrace is still in progress with ground water and surface quality monitoring.

Let me know if you want to listen in and participate or if you have any issues that OCD-SF needs to discuss during the meetings that would work too. Please contact me if you have questions or wish to discuss any issues you may have before the meeting.

Thank you.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3490
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: <http://www.emnrd.state.nm.us/ocd/index.htm>
(Pollution Prevention Guidance is under "Publications")

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Thursday, August 07, 2008 5:03 PM
To: 'Moore, Darrell'
Cc: 'Lackey, Johnny'; Resinger, Jim; Price, Wayne, EMNRD; Gum, Tim, EMNRD
Subject: Navajo Refining Company Thursday, August 7, 2008 Praxair Technologies & Other Refinery Issues Meeting Summary

Darrell, et. al:

Thanks for setting up the Praxair presentation today and for the opportunity to communicate in a meeting about the Navajo Refineries.

Summary of requested items from the OCD based on the meeting:

- 1) WDWs: Congrats you passed the MITs (dynamic) conducted on Tuesday morning. Submit monthly monitoring reports for pressure limit devices (PLDs) for each WDW. Update OCD on cause for fluid loss in the PLD at WDW# 3. Continue to track the levels closely until we can determine the cause.
- 2) Test Plan for annual Fall-Off Test for WDWs # 1, 2 & 3 is requested by November 15, 2008. Navajo will check with Subsurface to see if this date is ok. The OCD informed Navajo that the provisions for the Test Plan may be viewed online at <http://www.emnrd.state.nm.us/ocd/documents/UICGuidance.pdf>. Navajo will need to follow suggested moving the date of the next Fall-Off test to May 2009.
- 3) Not discussed during the meeting, but of equal importance: when is Navajo going to conduct the hydrostatic test on the effluent line to the WDWs? Were you going to propose the Ultra-sonic Long Wave Technology combined w/ CScan?

Summary of requested items from OCD on Navajo Refining Company agenda items:

- 1) Praxair leak detection technology as alternative to liners for tanks and bermed areas within the refinery? Navajo will want to perform its due diligence of the technology to ensure that it will meet the OCD requirement(s). A listing of tanks w/ denotations of the tank test methods w/ dates will need to be submitted within 3 months of discharge permit issuance. Based on the meeting, the OCD may approve. Navajo will need to propose a frequency of testing to the OCD, i.e., all tanks tested before the expiration date of the permit; or 20% of tanks each year for 5 years, etc. I will search the OCD file for the May 20, 2008 letter mentioned by Johnny Lackey apparently requesting approval to use the Praxair method(s). It is important to note that while the OCD may approve the procedure, if the technology proves to be ineffective on a trial basis, Navajo will need to keep its options open for new or other technologies that may prove more effective than standard hydrostatic testing.
- 2) Discuss Praxair's leak detection technology for underground piping. Is this approved by OCD as an alternative to hydrotesting? Yes, on a case-by-case approval process only. Navajo will need to propose the frequency of testing, i.e., Navajo may be able to test all lines at one time before the end of the expiration date on the permit; or every 5 years; or 20% of the piping annually each year.
- 3) Clarify 24 month approval process for the sanitary effluent to the waste water treatment plant. Submit proposed language for discharge permit that may address concerns of Navajo and OCD by Tuesday, 8/12/2008. I want to finalize the discharge permit for the Navajo Artesia Refinery next week.
- 4) Discuss API Separator use issue. OCD language in discharge permit related to this subject appears to be ok, but propose suggested language if Navajo would still like to request a change and OCD will consider. The OCD is considering the API Separator currently being used as a decanting tank for the FCC scrubber reject water as a below grade tank that requires secondary containment. The OCD may require an "Other Requirement" item in the final discharge permit, but will consider Navajo's opinion on this. Submit opinion or suggested language for discharge permit by Tuesday, August 12, 2008.

8/11/2008

Let OCD know if this does not accurately reflect items discussed and please note that there was a new topic item on the effluent line above. Please contact me if you have questions. Thank you.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
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E-mail: CarlJ.Chavez@state.nm.us
Website: <http://www.emnrd.state.nm.us/oed/index.htm>
(Pollution Prevention Guidance is under "Publications")

8/11/2008

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources
Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised August 8, 2011

Submit 1 Copy to appropriate District Office in
accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company	Navajo Refining Company, L.L.C.	Contact	Robert Combs
Address	501 E. Main St, Artesia, NM 88210	Telephone No.	575-746-5382
Facility Name	Artesia Refinery	Facility Type	Petroleum Refinery
Surface Owner	Mineral Owner	API No.	

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
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Latitude 32° 45' 50.46" N Longitude 104° 14' 17.57" W

NATURE OF RELEASE

Type of Release	Treated Waste Water	Volume of Release	>25 bbl	Volume Recovered	>25 bbl
Source of Release	Effluent pipeline junction	Date and Hour of Occurrence	9/17/11 ~19:30	Date and Hour of Discovery	9/17/11 ~23:50
Was Immediate Notice Given?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required	If YES, To Whom? NMED (505-476-6000); left voicemail message OCD—Artesia (575-748-1283); left voicemail message OCD—Santa Fe (505-476-3490); left voicemail message			
By Whom?	Estefani Hammond	Date and Hour 9/17/11 ~23:50			
Was a Watercourse Reached?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse.			

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.*

At ~19:30 on 09/16/2011 the FCC Division Control Room Boardman noticed that the pipeline discharge pressure (80PI011) dropped from ~1021 psig to ~415 psig and the flow (80FIC011) increased from ~500 gpm to ~647 gpm. At ~19:33, the operator contacted the shift foreman and was instructed to shut down the pipeline pumps (P-849/854). A contract employee was dispatched to inspect the pipeline and determined that there was a breach in the treated waste water pipeline line inside a junction box located near the Chukka Federal injection well (see attachment for exact location). Once the location was known, the spill was reported to the agencies listed above.

Describe Area Affected and Cleanup Action Taken.*


The spill was contained within the junction box, but when the contractors began to excavate outside the box, the water ran along side the pipeline and into the excavated area. A vacuum truck was used to remove the liquid volume from both inside and outside the junction box. The recovered liquid volume was >25 bbl, which includes material from inside the pipeline that emptied into the junction box when the flange was opened. The total volume recovered will be included in the final report once the investigation is complete.

Several soil samples were submitted for analysis; please see the attachment for locations. The excavated dirt was transferred to roll-off bins awaiting analytical results.

It was found that a threaded fiberglass pipe fitting failed and caused the leak. The root cause of the fitting failure is still under investigation. The excavation will be partially filled with sand temporarily to prevent filling with rainwater and eliminate the safety hazard of an open hole (cattle in area).

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

OIL CONSERVATION DIVISION

Signature: 	Approved by Environmental Specialist:	
Printed Name: Robert Combs	Approval Date:	
Title: Environmental Specialist	Approval Date:	Expiration Date:

E-mail Address: robert.combs@hollyfrontier.com	Conditions of Approval:	Attached <input type="checkbox"/>
Date: 9/20/11 Phone: 575-308-2718		

* Attach Additional Sheets If Necessary

Chavez, Carl J, EMNRD

From: Strange, Aaron [Aaron.Strange@hollyfrontier.com]
Sent: Monday, September 19, 2011 3:27 PM
To: Combs, Robert
Cc: Price, Doug; Lackey, Johnny; Moore, Darrell; Rhodes, Glen
Subject: Chukka Leak
Attachments: Chukka Leak (Google Earth).mdi

Robert,

Please see the attachment. Also, below are the coordinates for the leak and samples that are shown on the attachment.

Junction Box (Leak/Spill): 32°45'50.46"N 104°14'17.57"W.

Bottom Hole Sample: 32°45'50.53"N 104°14'17.58"W.

Background Sample: 32°45'50.68"N 104°14'16.67"W.

Excavated Soil Sample: No Coordinates.

Aaron Strange
Environmental Technician, Senior

Environmental Department
Navajo Refining Co, LLC
Artesia NM
Off: (575) 746-5468
Cell: (575) 703-5057

C-141 Notification (3/17/2011)

Navajo Refining Company- Artesia Refinery (GW-028):

Gabriela Combs of Navajo Refining Company called on 3/17/2011 17:45 to report treated waste water release from effluent line (line) to Gaines Disposal Well. The release was greater than 5 bbls. The line leaked along reducer where pipeline size decreased. The spill was contained and a vacuum truck had been contacted to remove fluids. A C-141 Form with more details will be submitted soon.

Chavez, Carl J, EMNRD

From: Strange, Aaron [aaron.strange@hollycorp.com]
Sent: Friday, February 18, 2011 4:51 PM
To: Chavez, Carl J, EMNRD; Monzeglio, Hope, NMENV; Dade, Randy, EMNRD; Hill, Larry, EMNRD
Cc: Moore, Darrell; Lackey, Johnny
Subject: C-141
Attachments: 2011-02-13 Spill Waste Water Effluent.pdf

Hope, Carl, Randy, and Buddy,

Please see the attached C-141

Thank you,
Aaron

Aaron Strange
Environmental Technician, Senior

Environmental Department
Navajo Refining Co, LLC
Artesia NM
Off: (575) 746-5468
Cell: (575) 703-5057

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District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised October 10, 2003

Submit 2 Copies to appropriate
District Office in accordance
with Rule 116 on back
side of form

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company: Navajo Refining Co. LLC	Contact: Aaron Strange
Address: 501 E. Main Street Artesia, N.M. 88210	Telephone No. 575-748-3311
Facility Name: Artesia Plant	Facility Type: Petroleum Refinery

Surface Owner	Mineral Owner	Lease No.
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LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
-------------	---------	----------	-------	---------------	------------------	---------------	----------------	--------

Latitude ~N32°45'54.5" Longitude ~W104°14'17.4"

NATURE OF RELEASE

Type of Release: Spill of Treated Waster Water (by Aggressive Bio. Treatment)	Volume of Release: Unknown	Volume Recovered: ~0 barrels
Source of Release: Effluent line leak between the Chukka and Gaines Injection Wells (~50 yards south of the leak from 01/28/2011).	Date and Hour of Occurrence: 02/13/2011 Unknown	Date and Hour of Discovery: 02/13/2011 ~ 09:00
Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required	If YES, To Whom? Left a voicemail with Carl Chavez from OCD in Santa Fe (505-476-3490), left a voicemail with OCD Artesia Office (575-748-1283 ext. 104), and left a voicemail with the NMED Haz Waste Bureau (505-476-6000).	
By Whom? Aaron Strange	Date and Hour: 02/13/2011 at ~09:32 to the OCD Santa Fe office, 02/13/2011 at ~09:33 to OCD Artesia office, and 02/13/2011 at ~09:36 to NMED Haz Waste Bureau.	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse. NA	

If a Watercourse was Impacted, Describe Fully.* NA

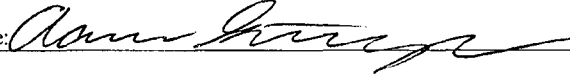
Describe Cause of Problem and Remedial Action Taken.*

On 02/13/2011 at ~ 09:00 a leak was found between the Chukka and Gaines Injection Wells (approximately 50 yards south of the leak from 01/28/2011). The Effluent line was blocked in at the Waste Water Treater (inside the refinery) to stop the leak and repair the line. The leak was excavated and the line was clamped and is holding.

Describe Area Affected and Cleanup Action Taken.*

The area affected was the effluent line between the Chukka and Gaines Injection Wells (approximately 50 yards south of the leak from 01/28/2011). The leak was excavated and the contaminated soil will be disposed of. Bottom Hole samples will be collected and tested for BTEX, Metals, and Anions.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: 	OIL CONSERVATION DIVISION		
Printed Name: Aaron Strange	Approved by District Supervisor:		
Title: Sr. Environmental Technician	Approval Date:	Expiration Date:	
E-mail Address: aaron.strange@hollycorp.com	Conditions of Approval:		Attached <input type="checkbox"/>
Date: 02/18/2011	Phone: 575-703-5057		

Chavez, Carl J, EMNRD

From: Moore, Darrell [Darrell.Moore@hollycorp.com]
Sent: Monday, January 31, 2011 2:23 PM
To: Chavez, Carl J, EMNRD; Monzeglio, Hope, NMENV; Dade, Randy, EMNRD
Cc: Strange, Aaron; Lackey, Johnny
Subject: Effluent Line Leak 1/28/11
Attachments: 2010-12-03 Effluent Line Leak.doc; CIMG0077.jpg; CIMG0078.jpg; CIMG0079.jpg

Attached, please find the C-141 and associated photos for the effluent line leak we reported on 1/28/11.

Darrell Moore
Environmental Manager for Water and Waste
Navajo Refining Company, LLC
Phone Number 575-746-5281
Cell Number 575-703-5058
Fax Number 575-746-5451

CONFIDENTIAL

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Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company: Navajo Refining Co. LLC	Contact: Aaron Strange
Address: 501 E. Main Street Artesia, N.M. 88210	Telephone No. 575-748-3311
Facility Name: Artesia Plant	Facility Type: Petroleum Refinery

Surface Owner	Mineral Owner	Lease No.
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LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
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Latitude ~N32°46'05.3" Longitude ~W104°13'42.9"

NATURE OF RELEASE

Type of Release: Spill of Treated Waster Water (by Aggressive Bio. Treatment)	Volume of Release: Unknown	Volume Recovered: ~0 barrels
Source of Release: Effluent line leak between the Chukka and Mewbourne Injection Wells (just east of the leak from 05/03/2010).	Date and Hour of Occurrence: 12/03/2010 Unknown	Date and Hour of Discovery: 12/03/2010 ~ 14:10
Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required	If YES, To Whom? Sent email to Carl Chavez from OCD in Santa Fe, and sent and email to Hope Monzeglio from the NMED Haz Waste Bureau.	
By Whom? Darrell Moore	Date and Hour: 12/03/2010 at ~14:26 to Carl Chavez (OCD Santa Fe), and 12/03/2010 at ~14:26 to NMED Haz Waste Bureau.	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse. NA	

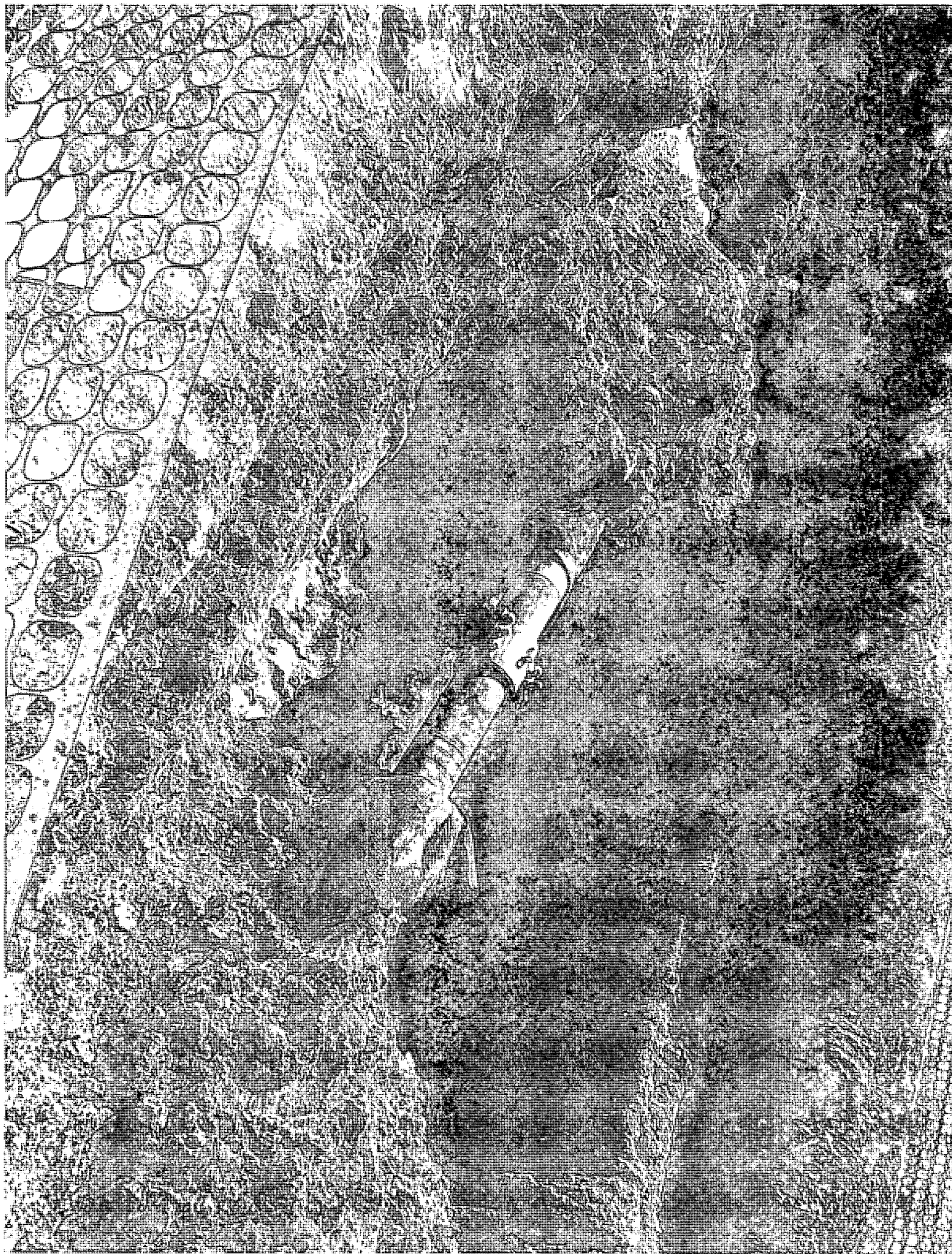
If a Watercourse was Impacted, Describe Fully.* NA

Describe Cause of Problem and Remedial Action Taken.*
On 12/03/2010 at ~ 14:26 a leak was found between the Chukka and Mewbourne Injection Wells (just east of the leak from 05/03/2010). The Effluent line was blocked in at the Waste Water Treater (inside the refinery) to stop the leak and repair the line. The leak was excavated and the line was clamped and is holding.

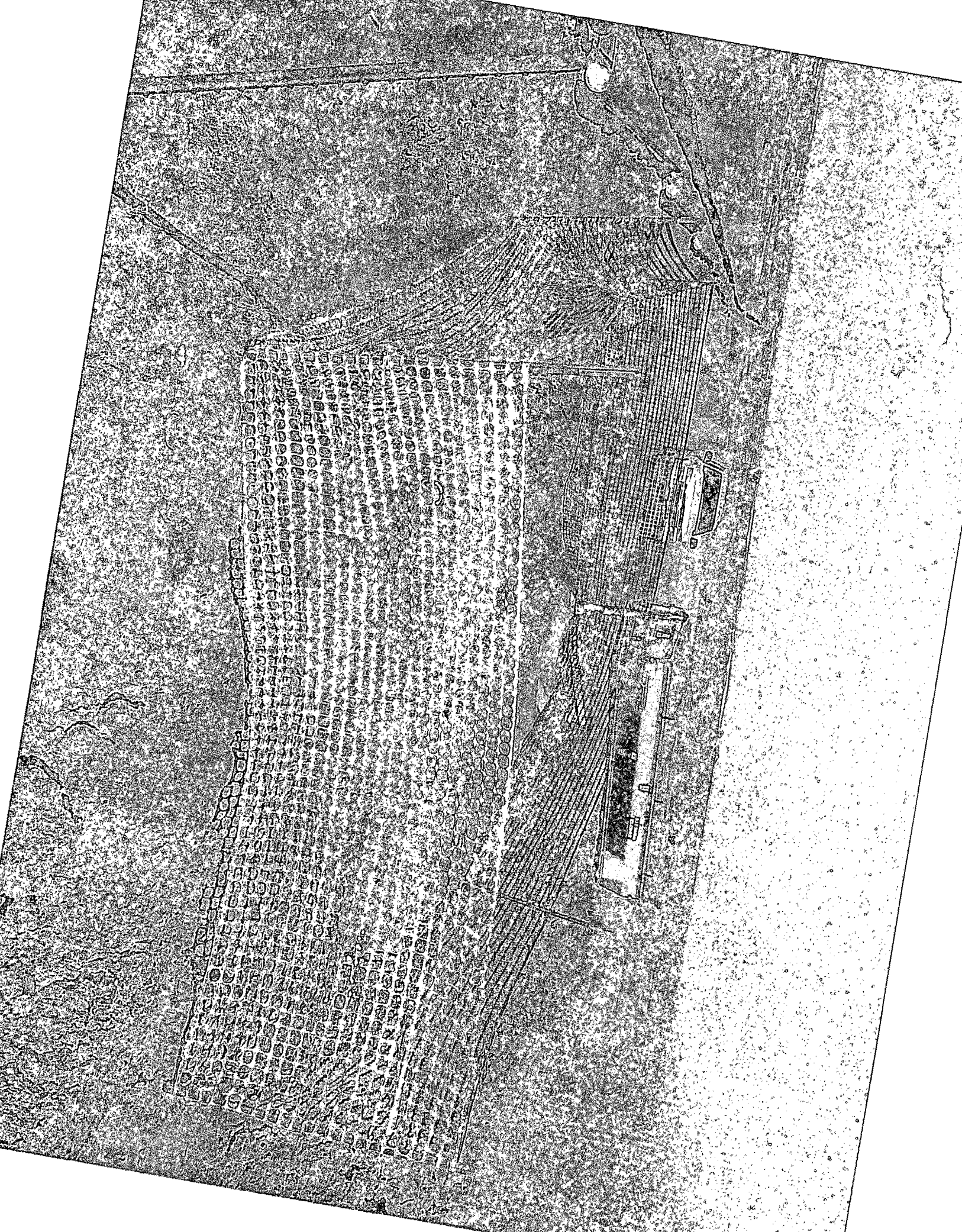
Describe Area Affected and Cleanup Action Taken.*
The area affected was the effluent line between the Chukka and Mewbourne Injection Wells (just east of the leak from 05/03/2010) at ~ N32°46'05.3", W104°13'42.9". The leak was excavated to make repairs. The leak did not stain the soil; however Navajo will dispose of the excavated soil as non-hazardous waste. Bottom Hole samples will be collected and tested for BTEX, Metals, and Anions.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature:	OIL CONSERVATION DIVISION		
Printed Name: Aaron Strange	Approved by District Supervisor:		
Title: Sr. Environmental Technician	Approval Date:	Expiration Date:	
E-mail Address: aaron.strange@hollycorp.com	Conditions of Approval:		Attached <input type="checkbox"/>
Date: 12/07/2010	Phone: 575-703-5057		







Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Wednesday, December 08, 2010 8:04 AM
To: 'Strange, Aaron'; Monzeglio, Hope, NMENV; Dade, Randy, EMNRD; Hill, Larry, EMNRD
Cc: Moore, Darrell; Lackey, Johnny; VonGonten, Glenn, EMNRD
Subject: RE: C-141 Initial Report

Aaron:

Good morning.

OCD is in receipt of the e-mail with documentation of clamp emplacement and work associated with the effluent line releases.

OCD has requested the engineering design plan submittal date from NRC for the complete replacement of the effluent lines to the 3 UIC Class I (NH) Disposal Wells, which OCD has been informed NRC would like to replace by 3/2011. As we discussed early on in the initial effluent line leaks where we reviewed the quarterly monitoring reports (OCD Online GW-028) for effluent flowing through the line to identify the environmental magnitude of the releases to the environment and where they occur along the line transect, the effluent water is freshwater with the most immediate concern being elevated sulfate and of course monitoring shows that it is not characteristically hazardous. Navajo should continue to drive the lines 2x per day until the line is replaced and continue documentation of cleanup and waste manifests until OCD can approve the engineering design work plan and the line is replaced. Any leakage near the Pecos, OCD and NMED shall be notified immediately!

Thank you.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3490
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: <http://www.emnrd.state.nm.us/ocd/index.htm>
(Pollution Prevention Guidance is under "Publications")

From: Strange, Aaron [<mailto:aaron.strange@hollycorp.com>]
Sent: Tuesday, December 07, 2010 4:40 PM
To: Chavez, Carl J, EMNRD; Monzeglio, Hope, NMENV; Dade, Randy, EMNRD; Hill, Larry, EMNRD
Cc: Moore, Darrell; Lackey, Johnny
Subject: C-141 Initial Report

Hope, Carl, Randy, and Buddy,

Please see the attached C-141 and photos for spill on 12/03/2010.

Thank you,
Aaron

Aaron Strange
Environmental Technician, Senior
Environmental Department
Navajo Refining Co, LLC
Artesia NM
Off: (575) 746-5468
Cell: (575) 703-5057

Chavez, Carl J, EMNRD

From: Strange, Aaron [aaron.strange@hollycorp.com]
Sent: Tuesday, December 07, 2010 5:03 PM
To: Strange, Aaron; Chavez, Carl J, EMNRD; Monzeglio, Hope, NMENV; Dade, Randy, EMNRD; Hill, Larry, EMNRD
Cc: Moore, Darrell; Lackey, Johnny
Subject: RE: C-141 initial report
Attachments: effluent leaks 035.jpg; effluent leaks 037.jpg; effluent leaks 038.jpg; effluent leaks 039.jpg

Attached is the other half of the photos for the event below.

Aaron Strange
Environmental Technician, Senior
Off: (575) 746-5468
Cell: (575) 703-5057

From: Strange, Aaron
Sent: Tuesday, December 07, 2010 4:59 PM
To: Strange, Aaron; Chavez, Carl J, EMNRD; Monzeglio, Hope, NMENV; randy.dade@state.nm.us; larry.hill@state.nm.us
Cc: Moore, Darrell; Lackey, Johnny
Subject: C-141 initial report

Hope, Carl, Randy, and Buddy,

Please see the attached C-141 and photos for spill on 12/02/2010. I will send a reply to this email with the other half of the photos.

Thank you,
Aaron

Aaron Strange
Environmental Technician, Senior
Environmental Department
Navajo Refining Co, LLC
Artesia NM
Off: (575) 746-5468
Cell: (575) 703-5057

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LEGEND

GARMIN

12/12/22

LEGEND

12/10/20

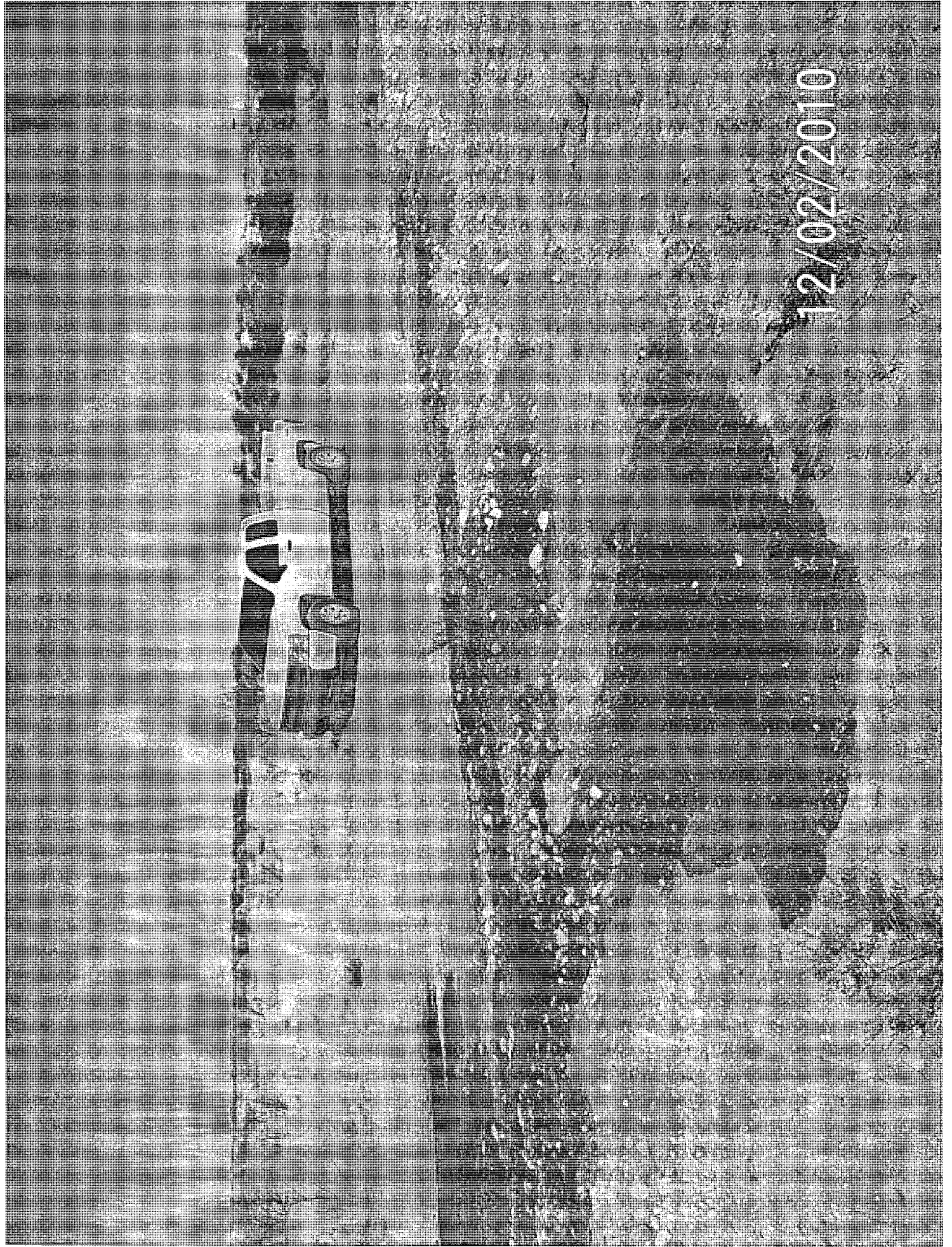
GARMIN

LEGEND

12/10/20

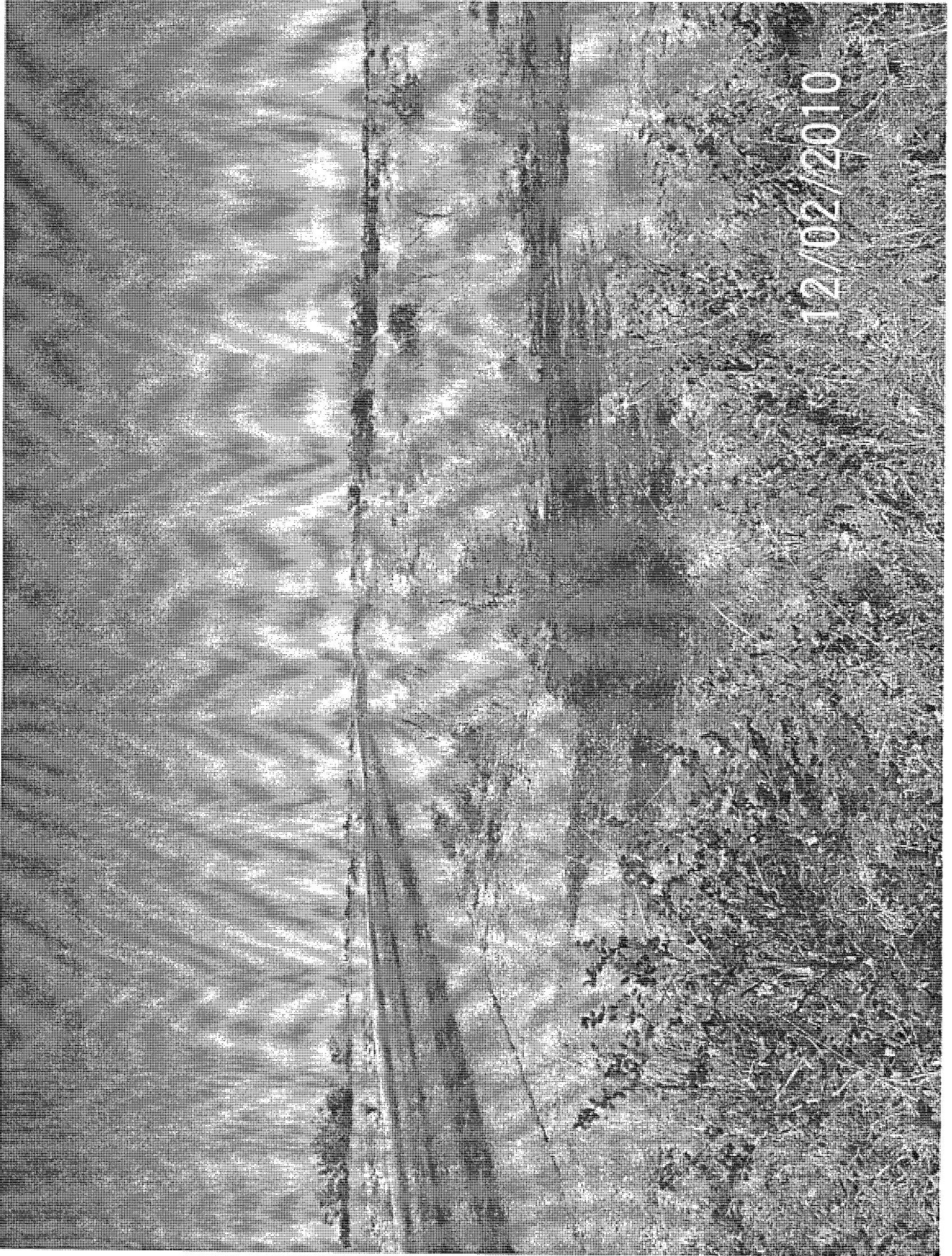
GARMIN





12/02/2010

12/02/2010



Chavez, Carl J, EMNRD

From: Strange, Aaron [aaron.strange@hollycorp.com]
Sent: Tuesday, December 07, 2010 4:59 PM
To: Strange, Aaron; Chavez, Carl J, EMNRD; Monzeglio, Hope, NMENV; Dade, Randy, EMNRD; Hill, Larry, EMNRD
Cc: Moore, Darrell; Lackey, Johnny
Subject: C-141 initial report
Attachments: 2010-12-02 Effluent Line Lead.pdf; effluent leaks 040.jpg; effluent leaks 041.jpg; effluent leaks 042.jpg; effluent leaks 036.jpg

Hope, Carl, Randy, and Buddy,

Please see the attached C-141 and photos for spill on 12/02/2010. I will send a reply to this email with the other half of the photos.

Thank you,
Aaron

Aaron Strange
Environmental Technician, Senior

Environmental Department
Navajo Refining Co, LLC
Artesia NM
Off: (575) 746-5468
Cell: (575) 703-5057

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Name of Company: Navajo Refining Co. LLC	Contact: Aaron Strange
Address: 501 E. Main Street Artesia, N.M. 88210	Telephone No. 575-748-3311
Facility Name: Artesia Plant	Facility Type: Petroleum Refinery


Surface Owner	Mineral Owner	Lease No.
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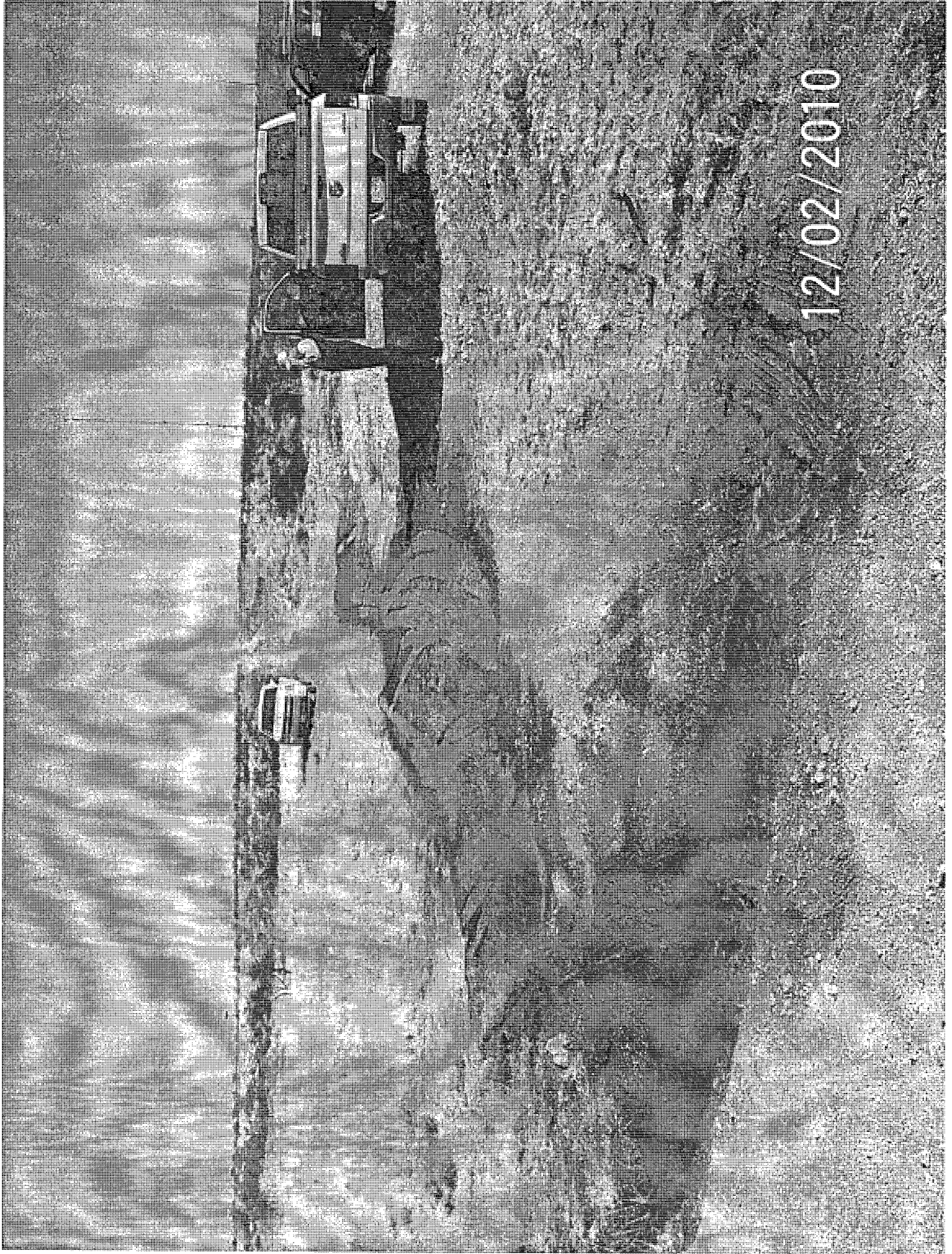
LOCATION OF RELEASE

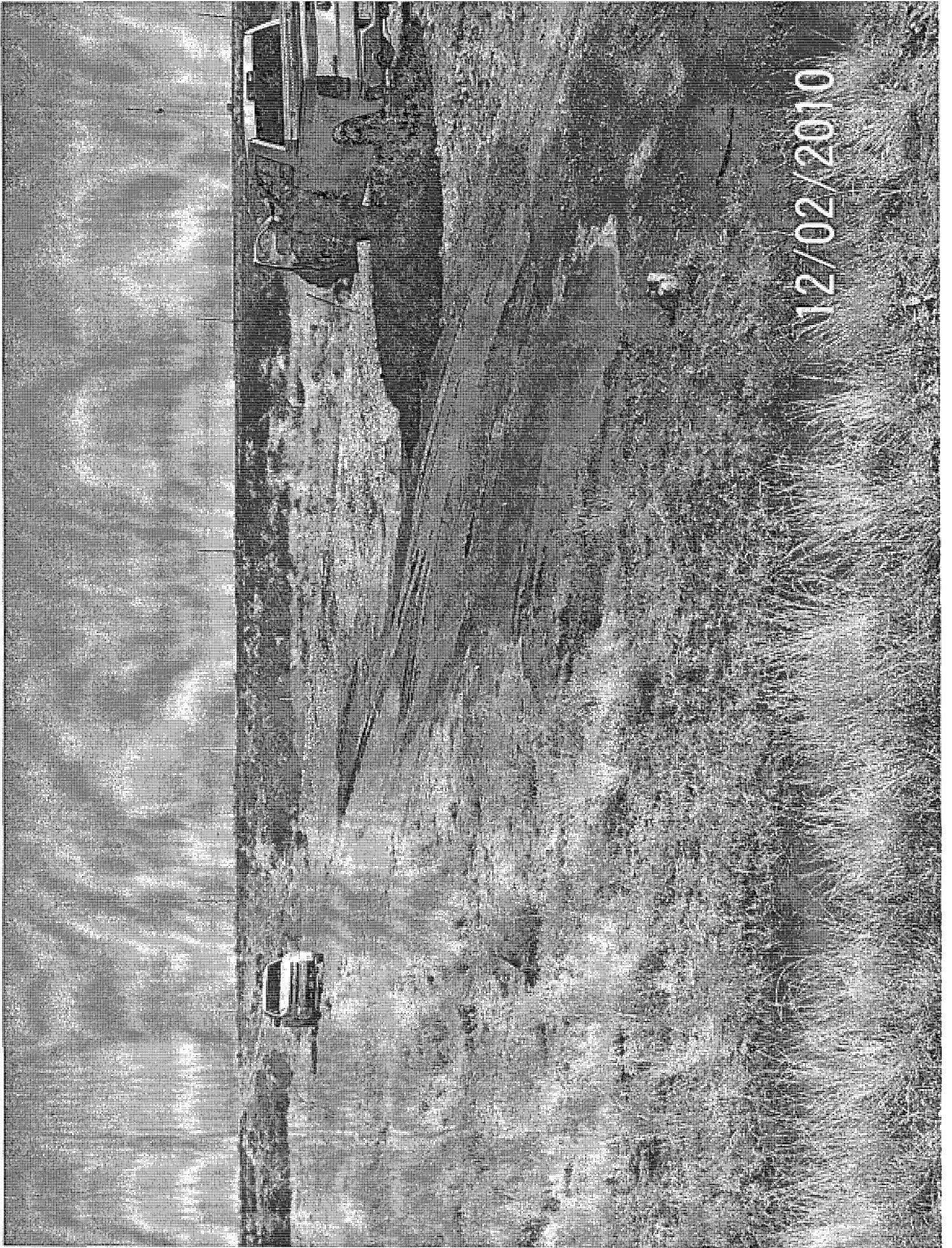
Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
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Latitude ~N32°46'48.8" Longitude ~W104°13'02.6"

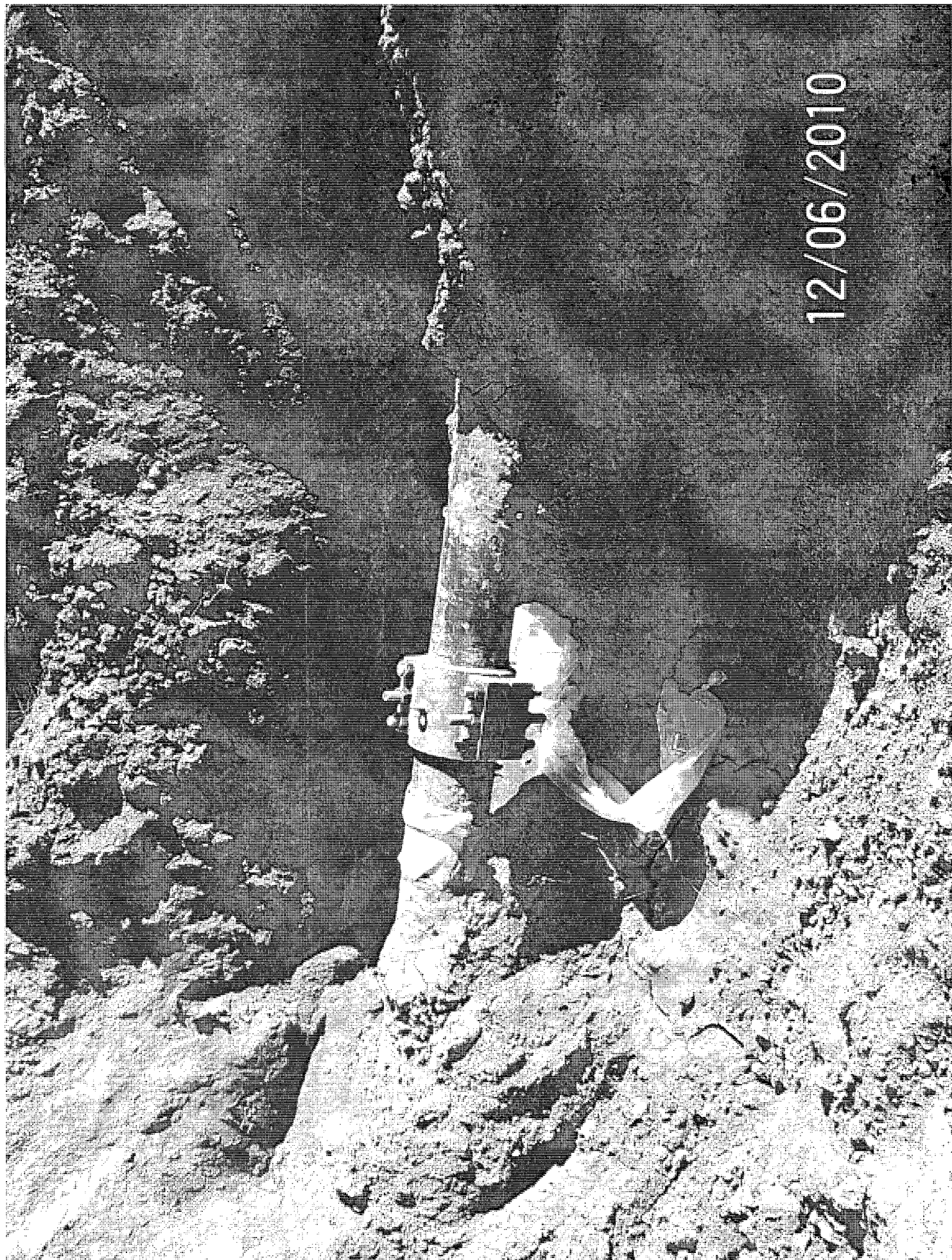
NATURE OF RELEASE

Type of Release: Spill of Treated Waster Water (by Aggressive Bio. Treatment)	Volume of Release: Unknown	Volume Recovered: ~0 barrels
Source of Release: Effluent line leak near the Mewbourne injection well (~ 40 yards East of CR204).	Date and Hour of Occurrence: 12/02/2010 Unknown	Date and Hour of Discovery: 12/02/2010 ~ 09:00
Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required	If YES, To Whom? Sent email to Carl Chavez from OCD in Santa Fe, and sent and email to Hope Monzeglio from the NMED Haz Waste Bureau.	
By Whom? Darrell Moore	Date and Hour: 12/02/2010 at ~09:14 to Carl Chavez (OCD Santa Fe), and 12/02/2010 at ~09:14 to NMED Haz Waste Bureau.	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse. NA	
If a Watercourse was Impacted, Describe Fully.* NA		
Describe Cause of Problem and Remedial Action Taken.* On 12/02/2010 at ~ 09:00 a leak was found near the Mewbourne injection well (~ 40 yards East of CR204). The Effluent line was blocked in at the Waste Water Treater (inside the refinery) to stop the leak and repair the line. The leak was excavated and the line was clamped and is holding.		
Describe Area Affected and Cleanup Action Taken.* The area affected was the effluent line near the Mewbourne injection well (~ 40 yards East of CR204) at ~ N32°46'48.8", W104°13'02.6". The leak was excavated to make repairs. The leak did not stain the soil; however Navajo will dispose of the excavated soil as non-hazardous waste. Bottom Hole samples will be collected and tested for BTEX, Metals, and Anions.		
I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.		
Signature: 	OIL CONSERVATION DIVISION	
Printed Name: Aaron Strange	Approved by District Supervisor:	
Title: Sr. Environmental Technician	Approval Date:	Expiration Date:
E-mail Address: aaron.strange@hollycorp.com	Conditions of Approval:	Attached <input type="checkbox"/>
Date: 12/07/2010	Phone: 575-703-5057	





12/02/2010



12/06/2010



Chavez, Carl J, EMNRD

From: Strange, Aaron [aaron.strange@hollycorp.com]
Sent: Tuesday, December 07, 2010 4:52 PM
To: Strange, Aaron; Chavez, Carl J, EMNRD; Monzeglio, Hope, NMENV; Dade, Randy, EMNRD; Hill, Larry, EMNRD
Cc: Moore, Darrell; Lackey, Johnny
Subject: RE: C-141 Initial Report
Attachments: effluent leaks 048.jpg; effluent leaks 045.jpg; effluent leaks 046.jpg

Here is the other half of the photos for the event below.

Aaron Strange
Environmental Technician, Senior
Off: (575) 746-5468
Cell: (575) 703-5057

From: Strange, Aaron
Sent: Tuesday, December 07, 2010 4:48 PM
To: Strange, Aaron; Chavez, Carl J, EMNRD; Monzeglio, Hope, NMENV; randy.dade@state.nm.us; larry.hill@state.nm.us
Cc: Moore, Darrell; Lackey, Johnny
Subject: C-141 Initial Report

Hope, Carl, Randy, and Buddy,

Please see the attached C-141 and photos for spill on 12/03/2010. I will send a reply to this email with the other half of the photos.

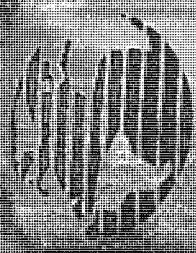
Thank you,
Aaron

Aaron Strange
Environmental Technician, Senior
Environmental Department
Navajo Refining Co, LLC
Artesia NM
Off: (575) 746-5468
Cell: (575) 703-5057

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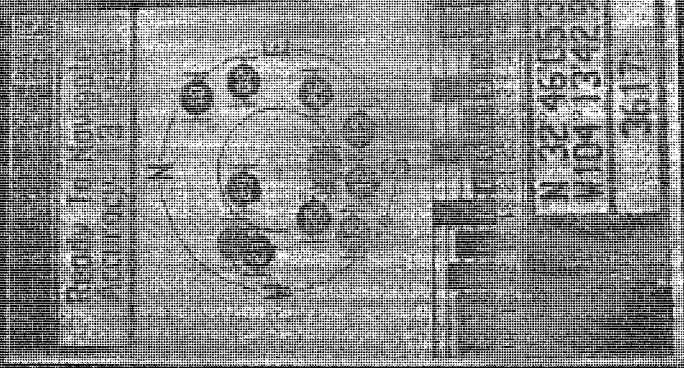


12/06/2010

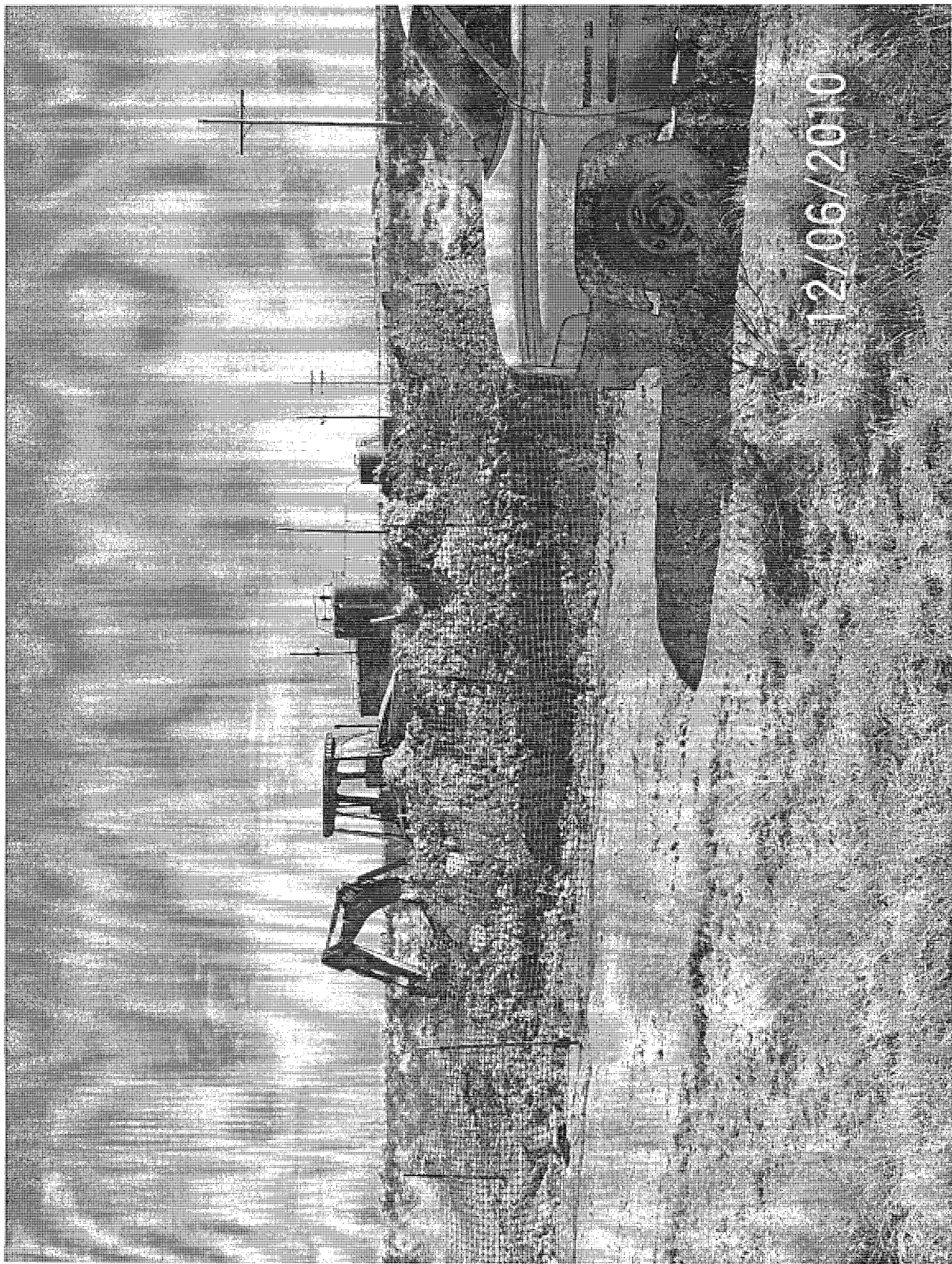


Legend

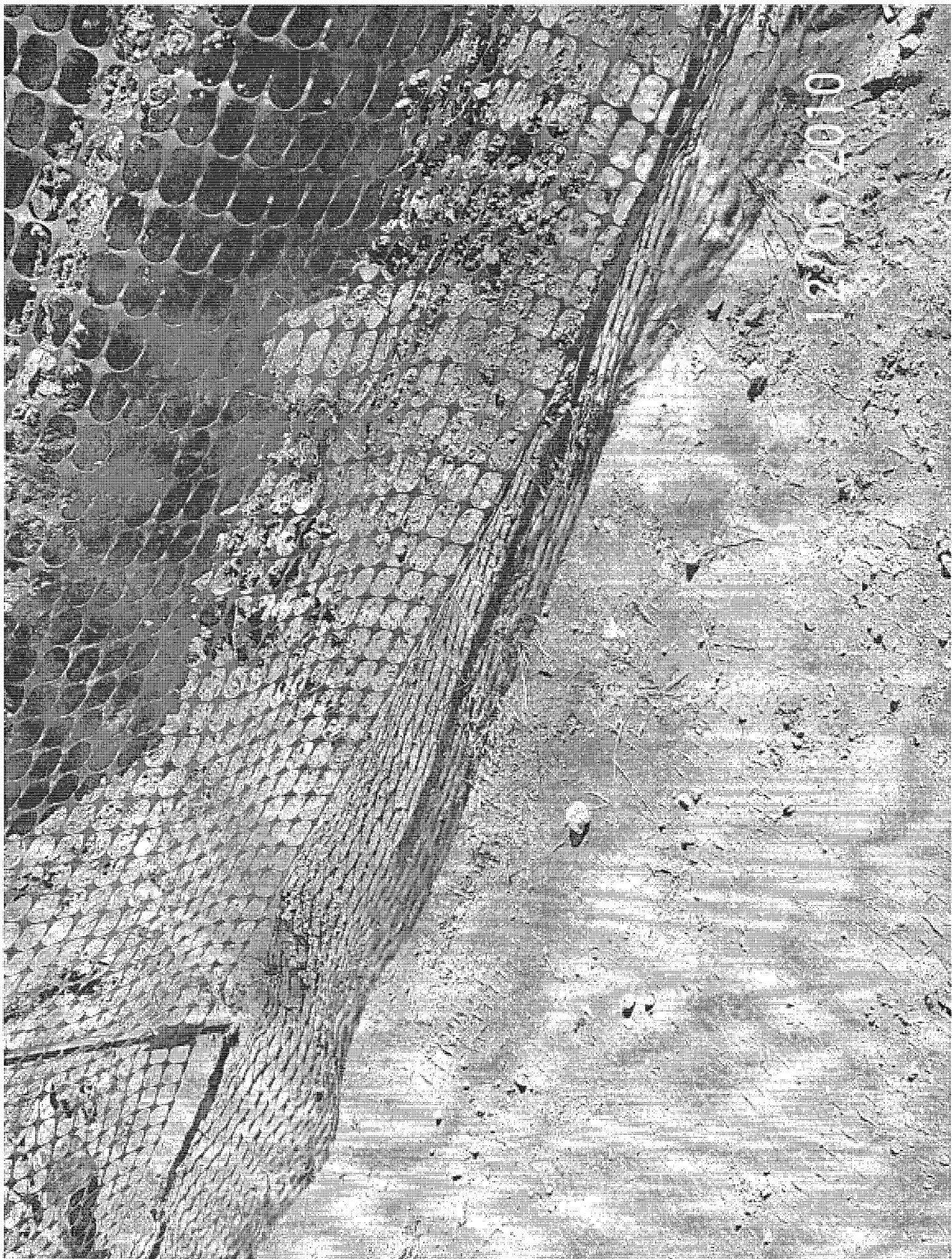
LEGEND



GARMIN



12/06/2010



12/06/2010

Chavez, Carl J, EMNRD

From: Strange, Aaron [aaron.strange@hollycorp.com]
Sent: Tuesday, December 07, 2010 4:48 PM
To: Strange, Aaron; Chavez, Carl J, EMNRD; Monzeglio, Hope, NMENV; Dade, Randy, EMNRD; Hill, Larry, EMNRD
Cc: Moore, Darrell; Lackey, Johnny
Subject: C-141 Initial Report
Attachments: 2010-12-03 Effluent Line Leak.pdf; effluent leaks 047.jpg; effluent leaks 043.jpg; effluent leaks 044.jpg

Hope, Carl, Randy, and Buddy,

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Thank you,
Aaron

Aaron Strange
Environmental Technician, Senior
Environmental Department
Navajo Refining Co, LLC
Artesia NM
Off: (575) 746-5468
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Address: 501 E. Main Street Artesia, N.M. 88210	Telephone No. 575-748-3311
Facility Name: Artesia Plant	Facility Type: Petroleum Refinery

Surface Owner	Mineral Owner	Lease No.
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Latitude ~N32°46'05.3" Longitude ~W104°13'42.9"

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Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required	If YES, To Whom? Sent email to Carl Chavez from OCD in Santa Fe, and sent and email to Hope Monzeglio from the NMED Haz Waste Bureau.	
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Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse. NA	

If a Watercourse was Impacted, Describe Fully.* NA

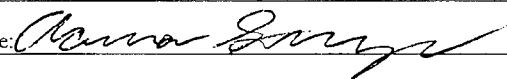
Describe Cause of Problem and Remedial Action Taken.*

On 12/03/2010 at ~ 14:26 a leak was found between the Chukka and Mewbourne Injection Wells (just east of the leak from 05/03/2010). The Effluent line was blocked in at the Waste Water Treater (inside the refinery) to stop the leak and repair the line. The leak was excavated and the line was clamped and is holding.

Describe Area Affected and Cleanup Action Taken.*

The area affected was the effluent line between the Chukka and Mewbourne Injection Wells (just east of the leak from 05/03/2010) at ~ N32°46'05.3", W104°13'42.9". The leak was excavated to make repairs. The leak did not stain the soil; however Navajo will dispose of the excavated soil as non-hazardous waste. Bottom Hole samples will be collected and tested for BTEX, Metals, and Anions.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: 	OIL CONSERVATION DIVISION		
Printed Name: Aaron Strange	Approved by District Supervisor:		
Title: Sr. Environmental Technician	Approval Date:	Expiration Date:	
E-mail Address: aaron.strange@hollycorp.com	Conditions of Approval:		Attached <input type="checkbox"/>
Date: 12/07/2010	Phone: 575-703-5057		





0102/90/21
12/06/2010



12/06/2010

Chavez, Carl J, EMNRD

From: Strange, Aaron [aaron.strange@hollycorp.com]
Sent: Tuesday, December 07, 2010 4:40 PM
To: Chavez, Carl J, EMNRD; Monzeglio, Hope, NMENV; Dade, Randy, EMNRD; Hill, Larry, EMNRD
Cc: Moore, Darrell; Lackey, Johnny
Subject: C-141 Initial Report
Attachments: 2010-12-03 Effluent Line Leak.pdf; effluent leaks 047.jpg; effluent leaks 048.jpg; effluent leaks 043.jpg; effluent leaks 044.jpg; effluent leaks 045.jpg; effluent leaks 046.jpg

Hope, Carl, Randy, and Buddy,

Please see the attached C-141 and photos for spill on 12/03/2010.

Thank you,
Aaron

Aaron Strange
Environmental Technician, Senior
Environmental Department
Navajo Refining Co, LLC
Artesia NM
Off: (575) 746-5468
Cell: (575) 703-5057

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1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources
Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised October 10, 2003

Submit 2 Copies to appropriate
District Office in accordance
with Rule 116 on back
side of form

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company: Navajo Refining Co. LLC	Contact: Aaron Strange
Address: 501 E. Main Street Artesia, N.M. 88210	Telephone No. 575-748-3311
Facility Name: Artesia Plant	Facility Type: Petroleum Refinery

Surface Owner	Mineral Owner	Lease No.
---------------	---------------	-----------

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
-------------	---------	----------	-------	---------------	------------------	---------------	----------------	--------

Latitude ~N32°46'05.3" Longitude ~W104°13'42.9"

NATURE OF RELEASE

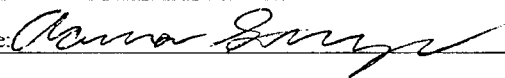
Type of Release: Spill of Treated Waster Water (by Aggressive Bio. Treatment)	Volume of Release: Unknown	Volume Recovered: ~0 barrels
Source of Release: Effluent line leak between the Chukka and Mewbourne Injection Wells (just east of the leak from 05/03/2010).	Date and Hour of Occurrence: 12/03/2010 Unknown	Date and Hour of Discovery: 12/03/2010 ~ 14:10
Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required	If YES, To Whom? Sent email to Carl Chavez from OCD in Santa Fe, and sent and email to Hope Monzeglio from the NMED Haz Waste Bureau.	
By Whom? Darrell Moore	Date and Hour: 12/03/2010 at ~14:26 to Carl Chavez (OCD Santa Fe), and 12/03/2010 at ~14:26 to NMED Haz Waste Bureau.	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse. NA	

If a Watercourse was Impacted, Describe Fully. * NA

Describe Cause of Problem and Remedial Action Taken.*
On 12/03/2010 at ~ 14:26 a leak was found between the Chukka and Mewbourne Injection Wells (just east of the leak from 05/03/2010). The Effluent line was blocked in at the Waste Water Treater (inside the refinery) to stop the leak and repair the line. The leak was excavated and the line was clamped and is holding.

Describe Area Affected and Cleanup Action Taken.*
The area affected was the effluent line between the Chukka and Mewbourne Injection Wells (just east of the leak from 05/03/2010) at ~ N32°46'05.3", W104°13'42.9". The leak was excavated to make repairs. The leak did not stain the soil; however Navajo will dispose of the excavated soil as non-hazardous waste. Bottom Hole samples will be collected and tested for BTEX, Metals, and Anions.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: 	OIL CONSERVATION DIVISION		
Printed Name: Aaron Strange	Approved by District Supervisor:		
Title: Sr. Environmental Technician	Approval Date:	Expiration Date:	
E-mail Address: aaron.strange@hollycorp.com	Conditions of Approval:		Attached <input type="checkbox"/>
Date: 12/07/2010	Phone: 575-703-5057		





0107/2007/2010

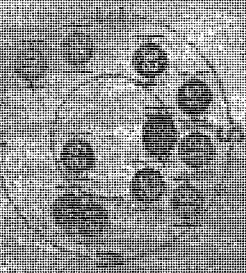


eTrex

LEGEND

GARMIN

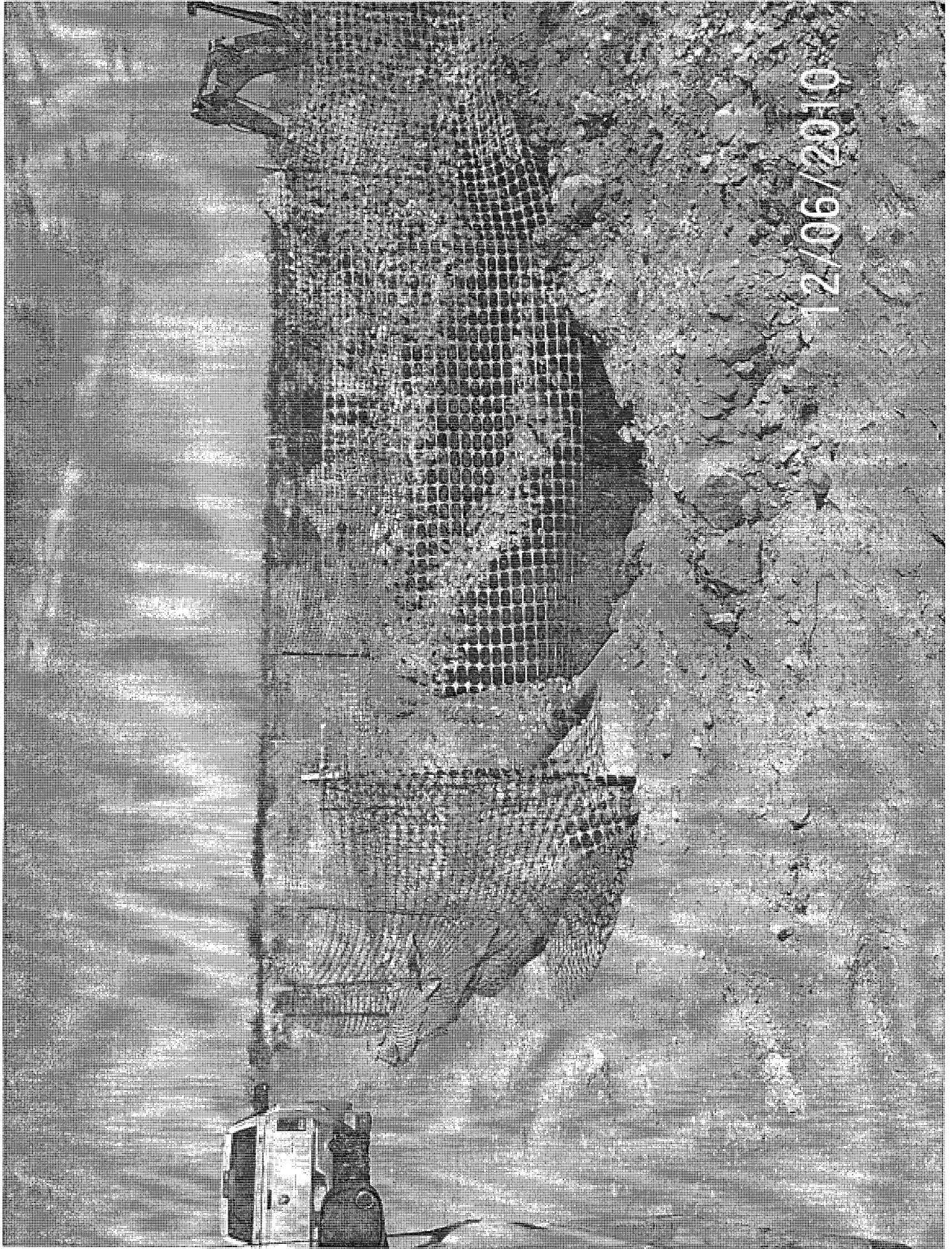
Ready To Navigate
Accuracy: 11 Feet



4610.5
46° 13' 42.9" N
13° 42.9" E

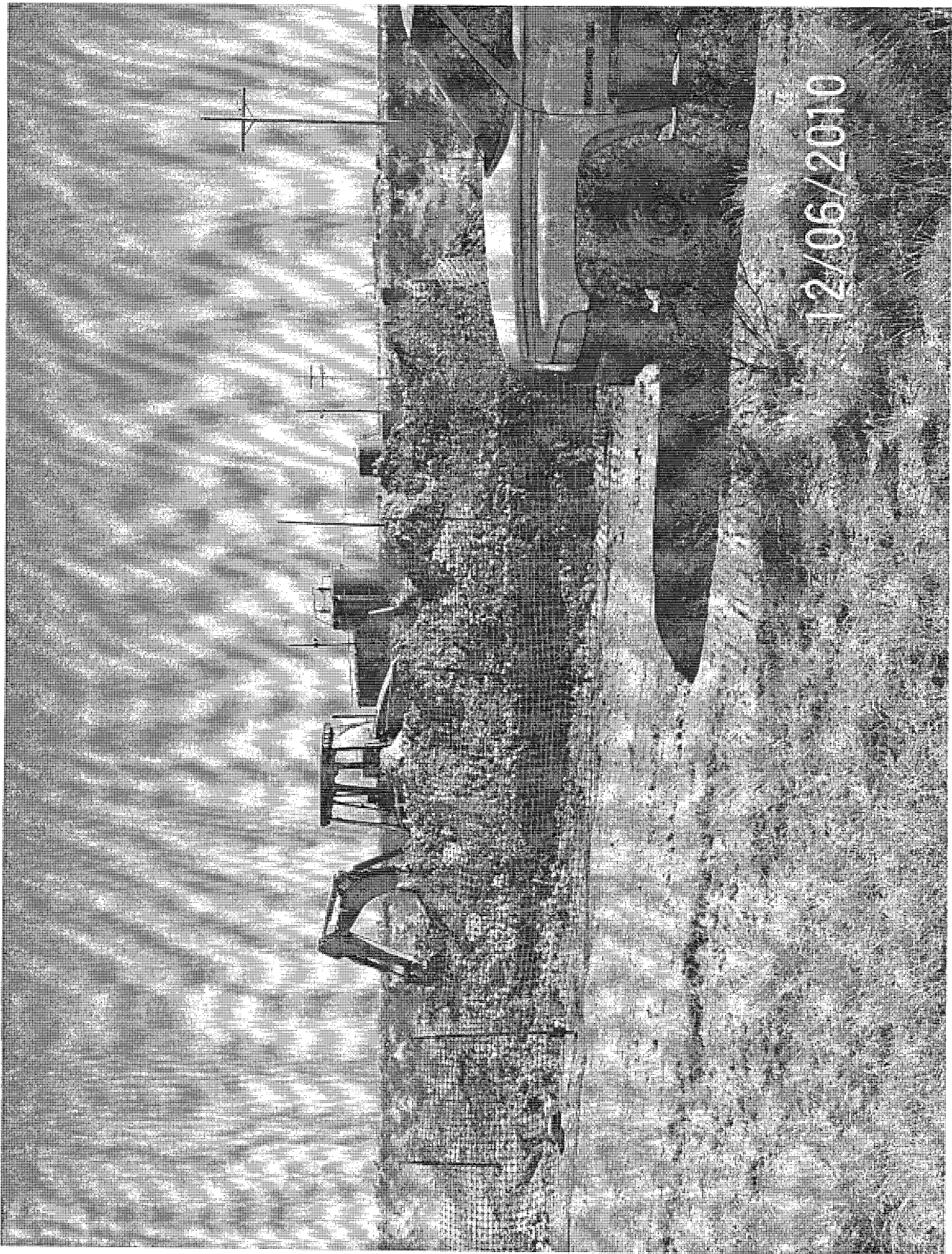
4610.5
46° 13' 42.9" N
13° 42.9" E

4610.5
46° 13' 42.9" N
13° 42.9" E

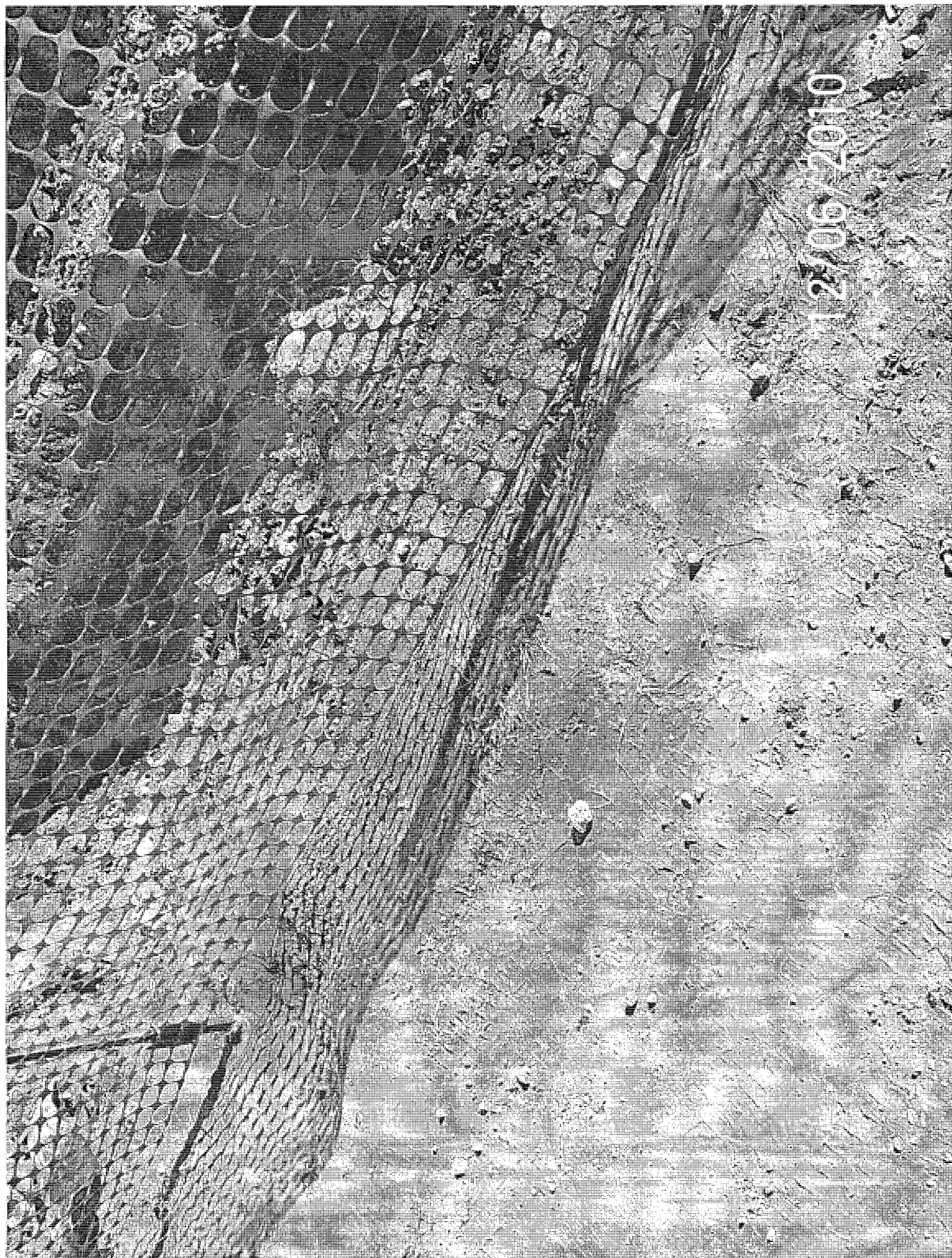


12/06/2010





12/06/2010



12/06/2010

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Tuesday, December 07, 2010 6:27 AM
To: Moore, Darrell; 'Lackey, Johnny'
Cc: Dade, Randy, EMNRD; VonGonten, Glenn, EMNRD; 'Strange, Aaron'
Subject: Effluent Line Design Work Plan Submittal Date Request

Darrell and Johnny:

Good morning. The OCD continues to notice problems with leakage at various locations along the effluent line to the UIC Class I (NH) Wells. Navajo Refining Company (NRC) should provide GPS coordinates for all releases on the C-141 form.

OCD hereby requests the official submittal date to the OCD for the effluent line design work plan that NRC has indicated it wants to replace my March of 2011.

Thank you.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3490
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: <http://www.emnrd.state.nm.us/oed/index.htm>
(Pollution Prevention Guidance is under "Publications")

Chavez, Carl J, EMNRD

From: Moore, Darrell [Darrell.Moore@hollycorp.com]
Sent: Friday, December 03, 2010 2:26 PM
To: Chavez, Carl J, EMNRD; Monzeglio, Hope, NMENV; Envir
Subject: Second effluent line leak

Carl and Hope

Today at 2:10 pm, a second leak in our effluentline was discovered. The line has been shut in and crews are mobilizing to repair the leak.

Aaron Strange will send the C-141 with details as soon as possible.

Sent from my Palm Pre on the Now Network from Sprint

On Dec 2, 2010 9:18 AM, Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us> wrote:

Hope:

Good morning. Before I forget, did NMED receive the Arcadis Work Plan for the free-product recovery system design from Navajo Refining Company? I think we were supposed to receive it in mid-November of 2010. Thanks.

Carl J. Chavez, CHMM

New Mexico Energy, Minerals & Natural Resources Dept.

Oil Conservation Division, Environmental Bureau

1220 South St. Francis Dr., Santa Fe, New Mexico 87505

Office: (505) 476-3490

Fax: (505) 476-3462

E-mail: CarlJ.Chavez@state.nm.us

Website: <http://www.emnrd.state.nm.us/ocd/index.htm>

(Pollution Prevention Guidance is under "Publications")

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Chavez, Carl J, EMNRD

From: Moore, Darrell [Darrell.Moore@hollycorp.com]
Sent: Thursday, December 02, 2010 9:14 AM
To: Monzeglio, Hope, NMENV; Chavez, Carl J, EMNRD
Cc: Strange, Aaron; Lackey, Johnny
Subject: Leak on Effluent Line

Carl and Hope

At 9 am this morning, during our daily inspection of our Effluent Line, a leak was discovered on the far east end of the line near our Mewbourne (WDW-1) Injection well. The line has been shut in and crews are mobilizing to repair the line. We will get more details as to exact location (GPS), extent of spill and photos and Aaron Strange will be sending the initial C-141 in a timely manner.

Darrell Moore
Environmental Manager for Water and Waste
Navajo Refining Company, LLC
Phone Number 575-746-5281
Cell Number 575-703-5058
Fax Number 575-746-5451

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Chavez, Carl J, EMNRD

From: Strange, Aaron [aaron.strange@hollycorp.com]
Sent: Thursday, November 11, 2010 10:53 AM
To: Chavez, Carl J, EMNRD; Monzeglio, Hope, NMENV; Dade, Randy, EMNRD; Hill, Larry, EMNRD
Cc: Moore, Darrell; Lackey, Johnny
Subject: C-141 final report
Attachments: 2010-05-03 Effluent Line Leak Final.pdf; effluent leaks 015.jpg; effluent leaks 016.jpg; effluent leaks 017.jpg; 1010346 WW Effluent Final 5-3-2010.pdf; effluent leaks 014.jpg

Hope, Carl, Randy, and Buddy,

Please see the attached final C-141 for the effluent leak from 5/3/2010. Also attached are the associated photos and analytical results.

Thank you,

Aaron Strange
Environmental Technician, Senior
Environmental Department
Navajo Refining Co, LLC
Artesia NM
Off: (575) 746-5468
Cell: (575) 703-5057

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State of New Mexico
Energy Minerals and Natural Resources
Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised October 10, 2003

Submit 2 Copies to appropriate
District Office in accordance
with Rule 116 on back
side of form

Release Notification and Corrective Action

OPERATOR

☐ Initial Report ☒ Final Report

Name of Company: Navajo Refining Co. LLC	Contact: Aaron Strange	
Address: 501 E. Main Street Artesia, N.M. 88210	Telephone No. 575-748-3311	
Facility Name: Artesia Plant	Facility Type: Petroleum Refinery	
Surface Owner	Mineral Owner	Lease No.

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
-------------	---------	----------	-------	---------------	------------------	---------------	----------------	--------

Latitude ~N32°46'03.8" Longitude ~W104°13'44.4"

NATURE OF RELEASE

Type of Release: Spill of Treated Waste Water (by Aggressive Bio. Treatment)	Volume of Release: Unknown	Volume Recovered: ~0 barrels
Source of Release: Effluent line leak between the Chukka and Mewborne Injection Wells.	Date and Hour of Occurrence: 05/03/2010 Unknown	Date and Hour of Discovery: 05/03/2010 ~ 15:00
Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required	If YES, To Whom? Notified Carl Chavez from OCD in Santa Fe (505-476-3490), OCD Artesia office (575-748-1283), and Hope Monzeglio with the NMED Haz Waste Bureau (505-476-6045).	
By Whom? Darrell Moore	Date and Hour: 05/03/2010 at ~18:06 to Carl Chavez (OCD Santa Fe), 05/03/2010 at ~18:10 to the OCD Artesia office, and 05/03/2010 at ~18:08 to NMED Haz Waste Bureau.	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse. NA	

If a Watercourse was Impacted, Describe Fully.* NA

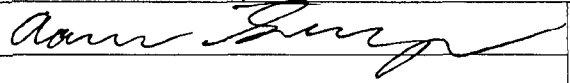
Describe Cause of Problem and Remedial Action Taken.*

On 04/15/2010 at ~ 09:40 a leak was found between the Chukka and Mewborne Injection Wells. The Effluent line was blocked in at the Waste Water Treater (inside the refinery) to stop the leak and repair the line. The leak was excavated and the line was clamped and is holding.

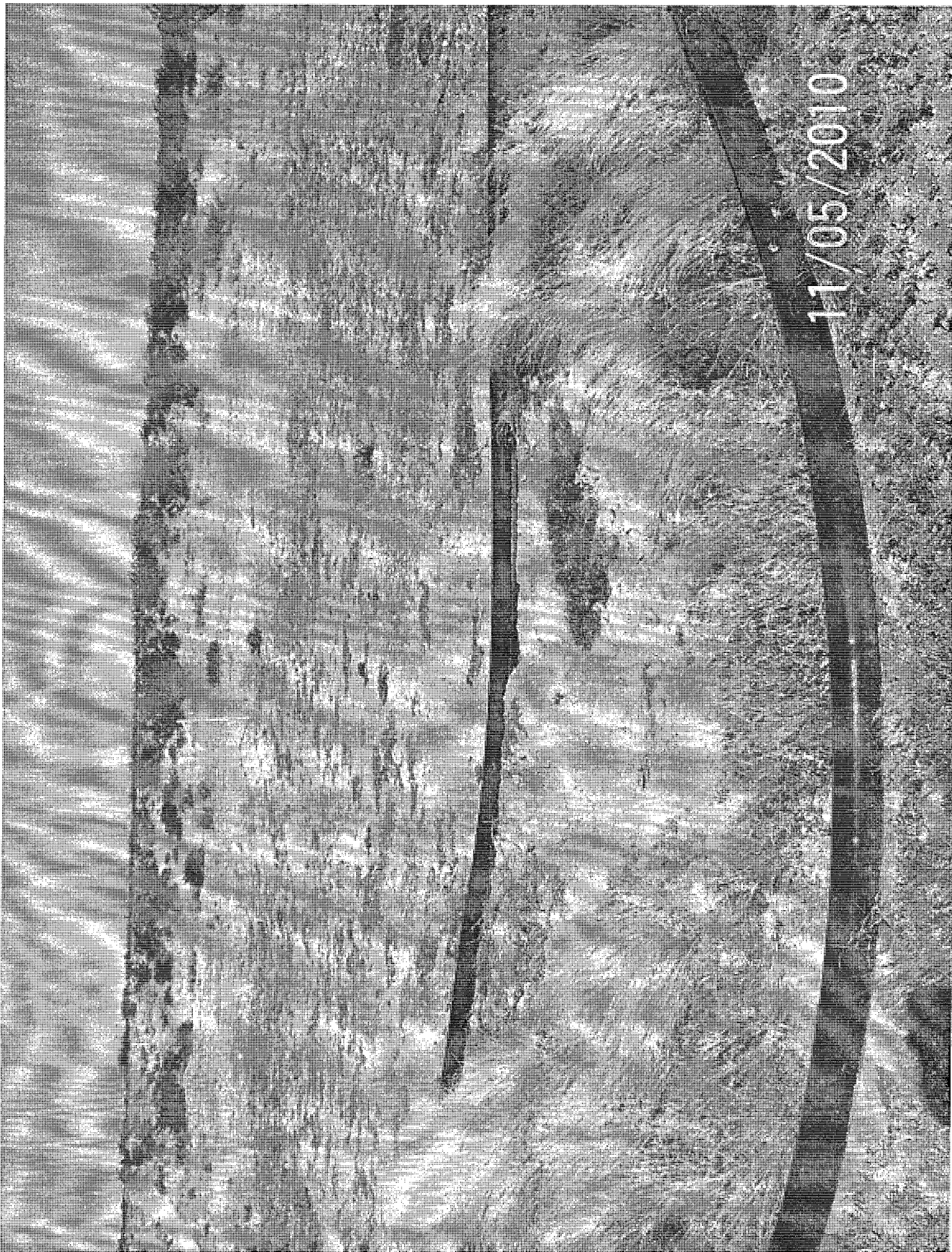
Describe Area Affected and Cleanup Action Taken.*

The area affected was the effluent line between the Chukka and Mewborne Injection Wells at ~ N32°46'03.8", W104°13'44.4". The leak was excavated and the line was clamped and is holding. The leak did not stain the soil. Bottom Hole samples have been collected and tested for BTEX, Metals, and Anions.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

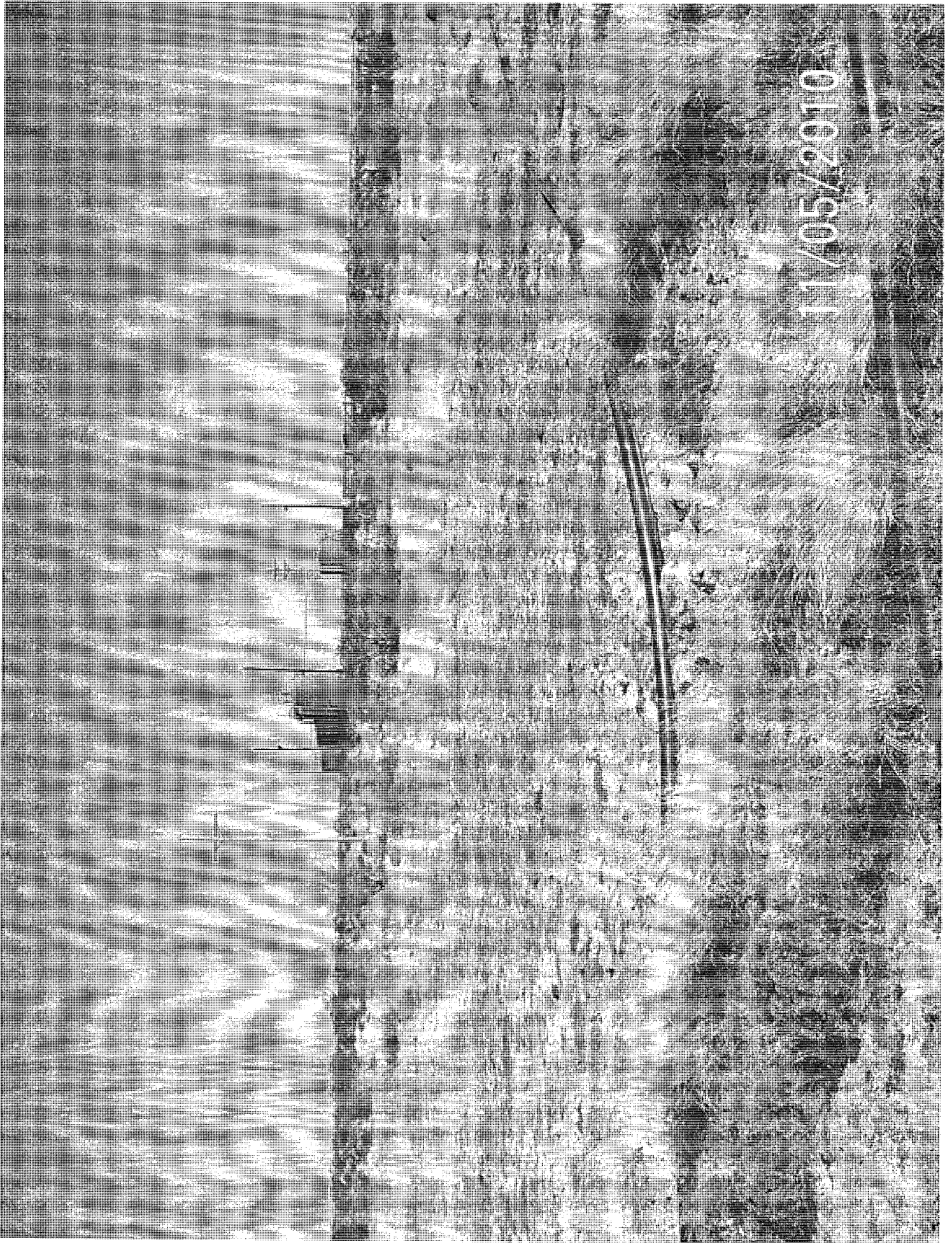
Signature: 	OIL CONSERVATION DIVISION		
Printed Name: Aaron Strange	Approved by District Supervisor:		
Title: Sr. Environmental Technician	Approval Date:	Expiration Date:	
E-mail Address: aaron.strange@hollycorp.com	Conditions of Approval:		Attached <input type="checkbox"/>
Date: 11/10/2010	Phone: 575-703-5057		

11/05/2010





11/05/2010



11/05/2010



11/05/2010

ALS Environmental

Date: 18-Oct-10

Client: Navajo Refining Company

Project: WW Effluent

Work Order: 1010346

Sample ID: Leak from 5-3-10

Lab ID: 1010346-06

Collection Date: 10/7/2010 01:34 PM

Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
BTEX						
			SW8021B			Analyst: IGF
Benzene	ND		0.0010	mg/Kg	1	10/12/2010 03:05 PM
Toluene	ND		0.0010	mg/Kg	1	10/12/2010 03:05 PM
Ethylbenzene	ND		0.0010	mg/Kg	1	10/12/2010 03:05 PM
Xylenes, Total	ND		0.0030	mg/Kg	1	10/12/2010 03:05 PM
Surr: 4-Bromofluorobenzene	94.9		75-131	%REC	1	10/12/2010 03:05 PM
Surr: Trifluorotoluene	92.1		73-130	%REC	1	10/12/2010 03:05 PM
MERCURY						
			SW7471A			Prep Date: 10/14/2010 Analyst: JCJ
Mercury	9.44		3.46	µg/Kg	1	10/14/2010 03:52 PM
METALS						
			SW6020			Prep Date: 10/13/2010 Analyst: SKS
Aluminum	10,600		99.0	mg/Kg	100	10/14/2010 10:04 PM
Antimony	ND		0.495	mg/Kg	1	10/14/2010 07:12 AM
Arsenic	3.41		0.495	mg/Kg	1	10/14/2010 07:12 AM
Barium	210		2.48	mg/Kg	5	10/14/2010 07:48 PM
Beryllium	0.521		0.495	mg/Kg	1	10/14/2010 07:12 AM
Cadmium	ND		0.495	mg/Kg	1	10/14/2010 07:12 AM
Calcium	76,700		4,950	mg/Kg	100	10/14/2010 10:04 PM
Chromium	7.65		0.495	mg/Kg	1	10/14/2010 07:12 AM
Cobalt	3.57		0.495	mg/Kg	1	10/14/2010 07:12 AM
Copper	7.92		0.495	mg/Kg	1	10/14/2010 07:12 AM
Iron	6,720		49.5	mg/Kg	1	10/14/2010 07:12 AM
Lead	6.74		2.48	mg/Kg	5	10/14/2010 07:48 PM
Magnesium	4,130		49.5	mg/Kg	1	10/14/2010 07:12 AM
Manganese	178		0.495	mg/Kg	1	10/14/2010 07:12 AM
Nickel	7.72		0.495	mg/Kg	1	10/14/2010 07:12 AM
Potassium	2,730		49.5	mg/Kg	1	10/14/2010 07:12 AM
Selenium	1.73		0.495	mg/Kg	1	10/14/2010 07:12 AM
Silver	ND		0.495	mg/Kg	1	10/14/2010 07:12 AM
Sodium	93.6		49.5	mg/Kg	1	10/14/2010 07:12 AM
Strontium	79.6		0.495	mg/Kg	1	10/14/2010 07:12 AM
Thallium	ND		2.48	mg/Kg	5	10/14/2010 07:48 PM
Vanadium	12.5		0.495	mg/Kg	1	10/14/2010 07:12 AM
Zinc	35.1		0.495	mg/Kg	1	10/14/2010 07:12 AM
ANIONS						
			E300			Prep Date: 10/13/2010 Analyst: DM
Chloride	6.93		4.99	mg/Kg	1	10/14/2010 03:06 PM
Sulfate	30.6		4.99	mg/Kg	1	10/14/2010 03:06 PM
Surr: Selenate (surr)	109		85-115	%REC	1	10/14/2010 03:06 PM

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Environmental

Date: 18-Oct-10

Client: Navajo Refining Company

Project: WW Effluent

Work Order: 1010346

Sample ID: Background N32 45' 54.3"-W104 14' 13.0"

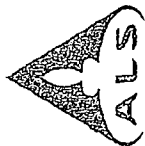
Lab ID: 1010346-07

Collection Date: 10/7/2010 01:40 PM

Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
BTEX						
			SW8021B			Analyst: IGF
Benzene	ND		0.0010	mg/Kg	1	10/12/2010 04:00 PM
Toluene	ND		0.0010	mg/Kg	1	10/12/2010 04:00 PM
Ethylbenzene	ND		0.0010	mg/Kg	1	10/12/2010 04:00 PM
Xylenes, Total	ND		0.0030	mg/Kg	1	10/12/2010 04:00 PM
Surr: 4-Bromofluorobenzene	96.3		75-131	%REC	1	10/12/2010 04:00 PM
Surr: Trifluorotoluene	93.4		73-130	%REC	1	10/12/2010 04:00 PM
MERCURY						
			SW7471A			Prep Date: 10/14/2010 Analyst: JCJ
Mercury	11.7		3.55	µg/Kg	1	10/14/2010 03:54 PM
METALS						
			SW6020			Prep Date: 10/13/2010 Analyst: SKS
Aluminum	7,760		94.3	mg/Kg	100	10/14/2010 10:22 PM
Antimony	ND		0.472	mg/Kg	1	10/14/2010 07:18 AM
Arsenic	2.40		0.472	mg/Kg	1	10/14/2010 07:18 AM
Barium	70.3		0.472	mg/Kg	1	10/14/2010 07:18 AM
Beryllium	ND		0.472	mg/Kg	1	10/14/2010 07:18 AM
Cadmium	ND		0.472	mg/Kg	1	10/14/2010 07:18 AM
Calcium	39,100		4,720	mg/Kg	100	10/14/2010 10:22 PM
Chromium	6.82		0.472	mg/Kg	1	10/14/2010 07:18 AM
Cobalt	2.61		0.472	mg/Kg	1	10/14/2010 07:18 AM
Copper	6.24		0.472	mg/Kg	1	10/14/2010 07:18 AM
Iron	5,520		47.2	mg/Kg	1	10/14/2010 07:18 AM
Lead	6.07		0.472	mg/Kg	1	10/14/2010 07:18 AM
Magnesium	7,550		47.2	mg/Kg	1	10/14/2010 07:18 AM
Manganese	149		0.472	mg/Kg	1	10/14/2010 07:18 AM
Nickel	5.84		0.472	mg/Kg	1	10/14/2010 07:18 AM
Potassium	1,340		47.2	mg/Kg	1	10/14/2010 07:18 AM
Selenium	ND		0.472	mg/Kg	1	10/14/2010 07:18 AM
Silver	ND		0.472	mg/Kg	1	10/14/2010 07:18 AM
Sodium	ND		47.2	mg/Kg	1	10/14/2010 07:18 AM
Strontium	107		0.472	mg/Kg	1	10/14/2010 07:18 AM
Thallium	ND		0.472	mg/Kg	1	10/14/2010 07:18 AM
Vanadium	10.7		0.472	mg/Kg	1	10/14/2010 07:18 AM
Zinc	18.4		0.472	mg/Kg	1	10/14/2010 07:18 AM
ANIONS						
			E300			Prep Date: 10/13/2010 Analyst: DM
Chloride	ND		4.96	mg/Kg	1	10/14/2010 03:27 PM
Sulfate	7,510		49.6	mg/Kg	10	10/14/2010 05:37 PM
Surr: Selenate (surr)	108		85-115	%REC	10	10/14/2010 05:37 PM
Surr: Selenate (surr)	109		85-115	%REC	1	10/14/2010 03:27 PM

Note: See Qualifiers Page for a list of qualifiers and their explanation.



ALS Laboratory Group
10450 Standliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

Chain of Custody Form

ALS Laboratory Group
3352 128th Ave.
Holland, MI 49424-8263
Tel: +1 616 399 6070
Fax: +1 616 399 6185

Page 1 of 1

Customer Information				Project Information				ALS Project Manager: <u>WWEffluent</u> ALS Work Order #: <u>0636</u>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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<u>X</u>				NC: <u>X</u>				ND: <u>X</u>				NE: <u>X</u>				NF: <u>X</u>				NG: <u>X</u>				NH: <u>X</u>				NI: <u>X</u>				NJ: <u>X</u>				NK: <u>X</u>				NL: <u>X</u>				NM: <u>X</u>				NN: <u>X</u>				NO: <u>X</u>				NP: <u>X</u>				NQ: <u>X</u>				NR: <u>X</u>				NS: <u>X</u>				NT: <u>X</u>				NU: <u>X</u>				NV: <u>X</u>				NW: <u>X</u>				NX: <u>X</u>				NY: <u>X</u>				NZ: <u>X</u>				OA: <u>X</u>				OB: <u>X</u>				OC: <u>X</u>				OD: <u>X</u>				OE: <u>X</u>				OF: <u>X</u>				OG: <u>X</u>				OH: <u>X</u>				OI: <u>X</u>				OJ: <u>X</u>				OK: <u>X</u>				OL: <u>X</u>				OM: <u>X</u>				ON: <u>X</u>				OO: <u>X</u>				OP: <u>X</u>				OQ: <u>X</u>				OR: <u>X</u>				OS: <u>X</u>				OT: <u>X</u>				OU: <u>X</u>				OV: <u>X</u>				OW: <u>X</u>				OX: <u>X</u>				OY: <u>X</u>				OZ: <u>X</u>				PA: <u>X</u>				PB: <u>X</u>				PC: <u>X</u>				PD: <u>X</u>				PE: <u>X</u>				PF: <u>X</u>				PG: <u>X</u>				PH: <u>X</u>				PI: <u>X</u>				PJ: <u>X</u>				PK: <u>X</u>				PL: <u>X</u>				PM: <u>X</u>				PN: <u>X</u>				PO: <u>X</u>				PP: <u>X</u>				PQ: <u>X</u>				PR: <u>X</u>				PS: <u>X</u>				PT: <u>X</u>				PU: <u>X</u>				PV: <u>X</u>				PW: <u>X</u>				PX: <u>X</u>				PY: <u>X</u>				PZ: <u>X</u>				QA: <u>X</u>				QB: <u>X</u>				QC: <u>X</u>				QD: <u>X</u>				QE: <u>X</u>				QF: <u>X</u>				QG: <u>X</u>				QH: <u>X</u>				QI: <u>X</u>				QJ: <u>X</u>				QK: <u>X</u>				QL: <u>X</u>				QM: <u>X</u>				QN: <u>X</u>				QO: <u>X</u>				QP: <u>X</u>				QQ: <u>X</u>				QR: <u>X</u>				QS: <u>X</u>				QT: <u>X</u>				QU: <u>X</u>				QV: <u>X</u>				QW: <u>X</u>				QX: <u>X</u>				QY: <u>X</u>				QZ: <u>X</u>				RA: <u>X</u>				RB: <u>X</u>				RC: <u>X</u>				RD: <u>X</u>				RE: <u>X</u>				RF: <u>X</u>				RG: <u>X</u>				RH: <u>X</u>				RI: <u>X</u>				RJ: <u>X</u>				RK: <u>X</u>				RL: <u>X</u>				RM: <u>X</u>				RN: <u>X</u>				RO: <u>X</u>				RP: <u>X</u>				RQ: <u>X</u>				RR: <u>X</u>				RS: <u>X</u>				RT: <u>X</u>				RU: <u>X</u>				RV: <u>X</u>				RW: <u>X</u>				RX: <u>X</u>				RY: <u>X</u>				RZ: <u>X</u>				SA: <u>X</u>				SB: <u>X</u>				SC: <u>X</u>				SD: <u>X</u>				SE: <u>X</u>				SF: <u>X</u>				SG: <u>X</u>				SH: <u>X</u>				SI: <u>X</u>				SJ: <u>X</u>				SK: <u>X</u>				SL: <u>X</u>				SM: <u>X</u>				SN: <u>X</u>				SO: <u>X</u>				SP: <u>X</u>				SQ: <u>X</u>				SR: <u>X</u>				SS: <u>X</u>				ST: <u>X</u>				SU: <u>X</u>				SV: <u>X</u>				SW: <u>X</u>				SX: <u>X</u>				SY: <u>X</u>				SZ: <u>X</u>				TA: <u>X</u>				TB: <u>X</u>				TC: <u>X</u>				TD: <u>X</u>				TE: <u>X</u>				TF: <u>X</u>				TG: <u>X</u>				TH: <u>X</u>				TI: <u>X</u>				TJ: <u>X</u>				TK: <u>X</u>				TL: <u>X</u>				TM: <u>X</u>				TN: <u>X</u>				TO: <u>X</u>				TP: <u>X</u>				TQ: <u>X</u>				TR: <u>X</u>				TS: <u>X</u>				TT: <u>X</u>				TU: <u>X</u>				TV: <u>X</u>				TW: <u>X</u>				TX: <u>X</u>				TY: <u>X</u>				TZ: <u>X</u>				UA: <u>X</u>				UB: <u>X</u>				UC: <u>X</u>				UD: <u>X</u>				UE: <u>X</u>				UF: <u>X</u>				UG: <u>X</u>				UH: <u>X</u>				UI: <u>X</u>				UJ: <u>X</u>				UK: <u>X</u>				UL: <u>X</u>				UM: <u>X</u>				UN: <u>X</u>				UO: <u>X</u>				UP: <u>X</u>				UQ: <u>X</u>				UR: <u>X</u>				US: <u>X</u>				UT: <u>X</u>				UU: <u>X</u>				UV: <u>X</u>				UW: <u>X</u>				UX: <u>X</u>				UY: <u>X</u>				UZ: <u>X</u>				VA: <u>X</u>				VB: <u>X</u>				VC: <u>X</u>				VD: <u>X</u>				VE: <u>X</u>				VF: <u>X</u>				VG: <u>X</u>				VH: <u>X</u>				VI: <u>X</u>				VJ: <u>X</u>				VK: <u>X</u>				VL: <u>X</u>				VM: <u>X</u>				VN: <u>X</u>				VO: <u>X</u>				VP: <u>X</u>				VQ: <u>X</u>				VR: <u>X</u>				VS: <u>X</u>				VT: <u>X</u>				VU: <u>X</u>				VV: <u>X</u>				VW: <u>X</u>				VX: <u>X</u>				VY: <u>X</u>				VZ: <u>X</u>				WA: <u>X</u>				WB: <u>X</u>				WC: <u>X</u>				WD: <u>X</u>				WE: <u>X</u>				WF: <u>X</u>				WG: <u>X</u>				WH: <u>X</u>				WI: <u>X</u>				WJ: <u>X</u>				WK: <u>X</u>				WL: <u>X</u>				WM: <u>X</u>				WN: <u>X</u>				WO: <u>X</u>				WP: <u>X</u>				WQ: <u>X</u>				WR: <u>X</u>				WS: <u>X</u>				WT: <u>X</u>				WU: <u>X</u>				WV: <u>X</u>				WW: <u>X</u>				WX: <u>X</u>				WY: <u>X</u>				WZ: <u>X</u>				XA: <u>X</u>				XB: <u>X</u>				XC: <u>X</u>				XD: <u>X</u>				XE: <u>X</u>				XF: <u>X</u>				XG: <u>X</u>				XH: <u>X</u>				XI: <u>X</u>				XJ: <u>X</u>				XK: <u>X</u>				XL: <u>X</u>				XM: <u>X</u>				XN: <u>X</u>				XO: <u>X</u>				XP: <u>X</u>				XQ: <u>X</u>				XR: <u>X</u>				XS: <u>X</u>				XT: <u>X</u>				XU: <u>X</u>				XV: <u>X</u>				XW: <u>X</u>				XX: <u>X</u>				XY: <u>X</u>				XZ: <u>X</u>				YA: <u>X</u>				YB: <u>X</u>				YC: <u>X</u>				YD: <u>X</u>				YE: <u>X</u>				YF: <u>X</u>				YG: <u>X</u>				YH: <u>X</u>				YI: <u>X</u>				YJ: <u>X</u>				YK: <u>X</u>				YL: <u>X</u>				YM: <u>X</u>				YN: <u>X</u>				YO: <u>X</u>				YP: <u>X</u>				YQ: <u>X</u>				YR: <u>X</u>				YS: <u>X</u>				YT: <u>X</u>				YU: <u>X</u>				YV: <u>X</u>				YW: <u>X</u>				YX: <u>X</u>				YY: <u>X</u>				YZ: <u>X</u>				ZA: <u>X</u>				ZB: <u>X</u>				ZC: <u>X</u>				ZD: <u>X</u>				ZE: <u>X</u>				ZF: <u>X</u>				ZG: <u>X</u>				ZH: <u>X</u>				ZI: <u>X</u>				ZJ: <u>X</u>				ZK: <u>X</u>				ZL: <u>X</u>				ZM: <u>X</u>				ZN: <u>X</u>				ZO: <u>X</u>				ZP: <u>X</u>				ZQ: <u>X</u>				ZR: <u>X</u>				ZS: <u>X</u>				ZT: <u>X</u>				ZU: <u>X</u>				ZV: <u>X</u>				ZW: <u>X</u>				ZX: <u>X</u>				ZY: <u>X</u>				ZZ: <u>X</u>			

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Laboratory Group.
2. Unless otherwise agreed in a formal contract, services provided by ALS Laboratory Group are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

WARNING
EFFLUENT
PIPELINE
NAVALO REEFING COMPANY LLC
Be Very Excavating or in Case of Emergency
Call 1-800-555-7814
ARTESIA, NM

11/05/2010

Chavez, Carl J, EMNRD

From: Strange, Aaron [aaron.strange@hollycorp.com]
Sent: Friday, November 12, 2010 7:27 AM
To: Strange, Aaron; Chavez, Carl J, EMNRD; Monzeglio, Hope, NMENV; Dade, Randy, EMNRD; Hill, Larry, EMNRD
Cc: Moore, Darrell; Lackey, Johnny
Subject: RE: C-141 final report
Attachments: 0057.jpg; New Image.jpg; oo58.jpg; CIMG0060.jpg; CIMG0061.jpg; CIMG0065.jpg

Hope, Carl, Randy, and Buddy,

Please see the attached photos per the email below. I have attached about 1/3rd of the photos and will send the rest in two other emails following this email.

Thank you,

Aaron Strange
Environmental Technician, Senior
Off: (575) 746-5468
Cell: (575) 703-5057

From: Strange, Aaron
Sent: Thursday, November 11, 2010 11:36 AM
To: 'Chavez, Carl J, EMNRD'; 'Monzeglio, Hope, NMENV'; 'randy.dade@state.nm.us'; 'larry.hill@state.nm.us'
Cc: Moore, Darrell; Lackey, Johnny
Subject: C-141 final report

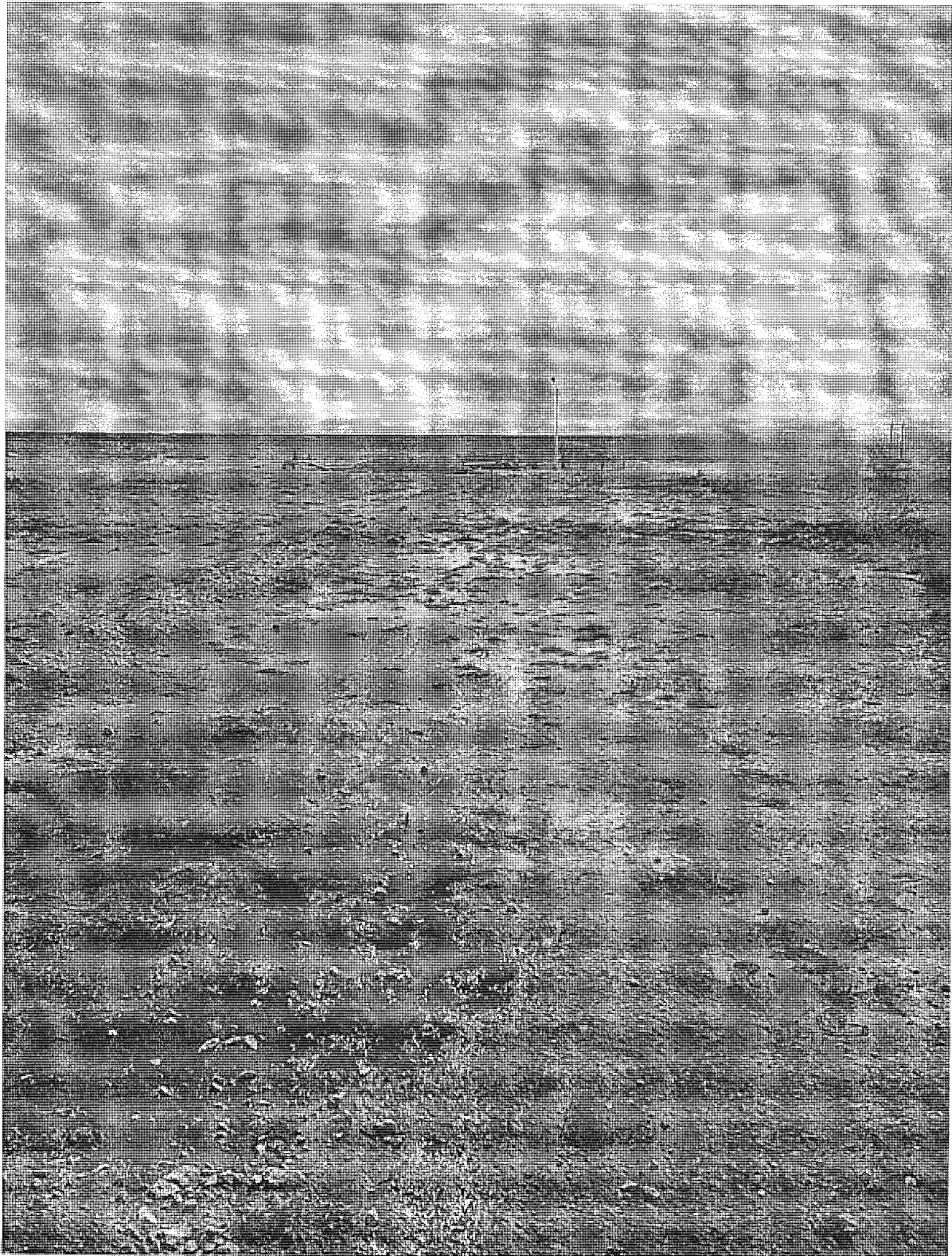
Hope, Carl, Randy, and Buddy,

Please see the attached final C-141s from the effluent leaks on 2/20/2010, 4/14/2010, and 9/27/2010. These are the three leaks that were very close together. Also attached are the associated analytical results. I am also sending the associated photos on another email following this.

Thank you,

Aaron Strange
Environmental Technician, Senior
Environmental Department
Navajo Refining Co, LLC
Artesia NM
Off: (575) 746-5468
Cell: (575) 703-5057

CONFIDENTIALITY NOTICE: This e-mail, and any attachments, may contain information that is privileged, proprietary and/or confidential. If you received this message in error, please advise the sender immediately by reply e-mail and do not retain any paper or electronic copies of this message or any attachments. Unless expressly stated, nothing contained in this message should be construed as a digital or electronic signature or a commitment to a binding agreement.













Chavez, Carl J, EMNRD

From: Strange, Aaron [aaron.strange@hollycorp.com]
Sent: Thursday, November 11, 2010 11:36 AM
To: Chavez, Carl J, EMNRD; Monzeglio, Hope, NMENV; Dade, Randy, EMNRD; Hill, Larry, EMNRD
Cc: Moore, Darrell; Lackey, Johnny
Subject: C-141 final report
Attachments: 2010-02-20 Effluent Line Leak Final.pdf; 1003452 Bottom Hole Final.pdf; 1003356 Disposal Final.pdf; 1007504 Bottom Hole Final.pdf; 2010-04-15 Effluent Line Leak Final.pdf; 2010-09-27 Effluent Line Leak Final.pdf; 1010346 WW Effluent Final 9-27-2010.pdf; 10091037 Disposal Final.pdf

Hope, Carl, Randy, and Buddy,

Please see the attached final C-141s from the effluent leaks on 2/20/2010, 4/14/2010, and 9/27/2010. These are the three leaks that were very close together. Also attached are the associated analytical results. I am also sending the associated photos on another email following this.

Thank you,

Aaron Strange
Environmental Technician, Senior
Environmental Department
Navajo Refining Co, LLC
Artesia NM
Off: (575) 746-5468
Cell: (575) 703-5057

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District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources
Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised October 10, 2003

Submit 2 Copies to appropriate
District Office in accordance
with Rule 116 on back
side of form

Release Notification and Corrective Action

OPERATOR

☐ Initial Report ☒ Final Report

Name of Company: Navajo Refining Co. LLC	Contact: Aaron Strange
Address: 501 E. Main Street Artesia, N.M. 88210	Telephone No. 575-748-3311
Facility Name: Artesia Plant	Facility Type: Petroleum Refinery

Surface Owner	Mineral Owner	Lease No.
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LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
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Latitude ~N32°45'54.3" Longitude ~W104°14'17.4"

NATURE OF RELEASE


Type of Release: Spill of Treated Waste Water (by Aggressive Bio. Treatment)	Volume of Release: Unknown	Volume Recovered: ~0 barrels
Source of Release: Effluent line leak between the Chukka and Gaines Injection Wells.	Date and Hour of Occurrence: 02/20/2010 ~ 12:10	Date and Hour of Discovery: 02/20/2010 ~ 12:30
Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required	If YES, To Whom? Left a voicemail with Carl Chavez with OCD in Santa Fe (505-476-3490), left a voicemail with Hope Monzeglio from the NMED Haz Waste Bureau (505-476-6045), and left a voicemail with the OCD Artesia Office (575-748-1283 extension 104). OCD (Artesia) called back.	
By Whom? Darrell Moore	Date and Hour: 02/20/2010 at ~13:50 to Carl Chavez (OCD Santa Fe), 02/20/2010 at ~14:15 to Hope Monzeglio (NMED Haz Waste Bureau), and 02/31/2010 at ~14:17 to the OCD Artesia office.	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse. NA	

If a Watercourse was Impacted, Describe Fully.* NA

Describe Cause of Problem and Remedial Action Taken.*
On 02/20/2010 at ~ 12:30 the waste water effluent line began to leak between the Chukka and Gaines Injection Wells. The effluent line was blocked in at the Waste Water Treater (inside the refinery) at ~ 13:04 on 02/20/2010 to stop the leak and repair the line. The leak was excavated and the line was clamped and is holding.

Describe Area Affected and Cleanup Action Taken.*
The area affected was the effluent line between the Chukka and Gaines Injection wells at ~ N32°45'54.3", W104°14'17.4". The leak was excavated to make repairs and the soil was placed into six roll off bins. The leak did not stain the soil; however Navajo has dispose of the excavated soil as Non-Hazardous Waste per analytical results. Bottom Hole samples were collected and tested for TPH. This same location was tested for BTEX, Metals, and Anions after the leak that occurred on 09/27/2010. This leak was just a few feet from the leaks that occurred on 04/15/2010 and 09/27/2010.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: 	OIL CONSERVATION DIVISION		
Printed Name: Aaron Strange	Approved by District Supervisor:		
Title: Sr. Environmental Technician	Approval Date:	Expiration Date:	
E-mail Address: aaron.strange@hollycorp.com	Conditions of Approval:		Attached <input type="checkbox"/>
Date: 11/10/2010	Phone: 575-703-5057		

ALS Laboratory Group

Date: 25-Mar-10

Client: Navajo Refining Company

Project: Bottom Hole

Work Order: 1003452

Sample ID: WW Effluent #1

Lab ID: 1003452-01

Collection Date: 3/16/2010 02:13 PM

Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TEXAS TPH			TX1005		Prep Date: 3/19/2010	Analyst: KMB
nC6 to nC12	ND		50	mg/Kg	1	3/20/2010 09:53 PM
>nC12 to nC28	ND		50	mg/Kg	1	3/20/2010 09:53 PM
>nC28 to nC35	ND		50	mg/Kg	1	3/20/2010 09:53 PM
Total Petroleum Hydrocarbon	ND		50	mg/Kg	1	3/20/2010 09:53 PM
Surr: 2-Fluorobiphenyl	89.9		70-130	%REC	1	3/20/2010 09:53 PM
Surr: Trifluoromethyl benzene	90.1		70-130	%REC	1	3/20/2010 09:53 PM

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Laboratory Group

Date: 25-Mar-10

Client: Navajo Refining Company

Project: Bottom Hole

Work Order: 1003452

Sample ID: WW Effluent #2

Lab ID: 1003452-02

Collection Date: 3/16/2010 02:18 PM

Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TEXAS TPH			TX1005		Prep Date: 3/19/2010	Analyst: KMB
nC6 to nC12	ND		50	mg/Kg	1	3/21/2010 12:49 AM
>nC12 to nC28	ND		50	mg/Kg	1	3/21/2010 12:49 AM
>nC28 to nC35	ND		50	mg/Kg	1	3/21/2010 12:49 AM
Total Petroleum Hydrocarbon	ND		50	mg/Kg	1	3/21/2010 12:49 AM
Surr: 2-Fluorobiphenyl	99.4		70-130	%REC	1	3/21/2010 12:49 AM
Surr: Trifluoromethyl benzene	97.5		70-130	%REC	1	3/21/2010 12:49 AM

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Laboratory Group

Date: 25-Mar-10

Client: Navajo Refining Company

Project: Bottom Hole

Work Order: 1003452

Sample ID: WW Effluent #3

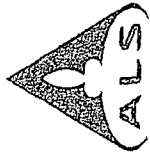
Lab ID: 1003452-03

Collection Date: 3/16/2010 02:22 PM

Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TEXAS TPH			TX1005		Prep Date: 3/19/2010	Analyst: KMB
nC6 to nC12	ND		50	mg/Kg	1	3/21/2010 01:18 AM
>nC12 to nC28	ND		50	mg/Kg	1	3/21/2010 01:18 AM
>nC28 to nC35	ND		50	mg/Kg	1	3/21/2010 01:18 AM
Total Petroleum Hydrocarbon	ND		50	mg/Kg	1	3/21/2010 01:18 AM
Surr: 2-Fluorobiphenyl	77.1		70-130	%REC	1	3/21/2010 01:18 AM
Surr: Trifluoromethyl benzene	77.1		70-130	%REC	1	3/21/2010 01:18 AM

Note: See Qualifiers Page for a list of qualifiers and their explanation.



☒ **ALS Laboratory Group**
10450 Standliff Rd., Suite 210
Houston, Texas 77099
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Fax. +1 281 530 5887

Chain of Custody Form

☐ **ALS Laboratory Group**
3352 128th Ave.
Holland, MI 49424-9263
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Fax: +1 616 399 6185

Page 1 of 1

Customer Information				Project Information				ALS Work Order #									
Purchase Order				Project Name				Parameter/Method Request for Analysis									
Work Order				Project Number				TPH									
Company Name				Bill To Company				Navajo Refining Company									
Send Report To				Invoice Attn				Aaron Strange									
Address				Address				501									
City/State/Zip				City/State/Zip				Artesia, NM 88211									
Phone				Phone				575 746-3311									
Fax				Fax				575 746-5421									
E-Mail Address				E-Mail Address													
No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	WW Effluent #1	3-16-10	1413	S	None	1	X										
2	WW Effluent #2	3-16-10	1418	S	1	1	X										
3	WW Effluent #3	3-16-10	1422	S	1	1	X										
4	Temp Blank																
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign	Shipment Method	Required Turnaround Time (Check Box)	Results Due Date
Aaron Strange	FedEx	1-24 Hours	

Relinquished by	Date	Time	Relinquished by	Date	Time
Aaron Strange	3-17-10	1615			

Received by	Date	Time	Received by	Date	Time

Logged by (Laboratory)	Date	Time	Checked by (Laboratory)	Date	Time

Preservative Key	1-HCl	2-HNO ₃	3-H ₂ SO ₄	4-NaOH	5-Na ₂ SO ₃	6-NaHSO ₃	7-Other	8-4°C	9-5035

QC Packages (Check One Box Below)	Level III Std	Level III Std	Level III Std	Level III Std	Level III Std	Level III Std	Level III Std	Level III Std	Level III Std

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ALS Laboratory Group

Date: 29-Mar-10

Client: Navajo Refining Company

Project: Disposal

Work Order: 1003356

Sample ID: Waste Water Effluent Soil

Lab ID: 1003356-02

Collection Date: 3/12/2010 11:42 AM

Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TCLP MERCURY			SW7470		Prep Date: 3/19/2010	Analyst: JCJ
Mercury	ND		0.000200	mg/L	1	3/19/2010 04:13 PM
TCLP METALS			SW1311/6020		Prep Date: 3/19/2010	Analyst: SKS
Arsenic	ND		0.0500	mg/L	10	3/19/2010 07:06 PM
Barium	0.131		0.0500	mg/L	10	3/19/2010 07:06 PM
Cadmium	ND		0.0500	mg/L	10	3/19/2010 07:06 PM
Chromium	ND		0.0500	mg/L	10	3/19/2010 07:06 PM
Lead	ND		0.0500	mg/L	10	3/19/2010 07:06 PM
Selenium	ND		0.0500	mg/L	10	3/19/2010 07:06 PM
Silver	ND		0.0500	mg/L	10	3/19/2010 07:06 PM
TCLP SEMIVOLATILES			SW1311/8270		Prep Date: 3/19/2010	Analyst: ACN
2,4,5-Trichlorophenol	ND		5.0	µg/L	1	3/22/2010 05:10 PM
2,4,6-Trichlorophenol	ND		5.0	µg/L	1	3/22/2010 05:10 PM
2,4-Dinitrotoluene	ND		5.0	µg/L	1	3/22/2010 05:10 PM
Cresols, Total	ND		15	µg/L	1	3/22/2010 05:10 PM
Hexachlorobenzene	ND		5.0	µg/L	1	3/22/2010 05:10 PM
Hexachlorobutadiene	ND		5.0	µg/L	1	3/22/2010 05:10 PM
Hexachloroethane	ND		5.0	µg/L	1	3/22/2010 05:10 PM
Nitrobenzene	ND		5.0	µg/L	1	3/22/2010 05:10 PM
Pentachlorophenol	ND		5.0	µg/L	1	3/22/2010 05:10 PM
Pyridine	ND		5.0	µg/L	1	3/22/2010 05:10 PM
Surr: 2,4,6-Tribromophenol	93.8		42-124	%REC	1	3/22/2010 05:10 PM
Surr: 2-Fluorobiphenyl	70.7		48-120	%REC	1	3/22/2010 05:10 PM
Surr: 2-Fluorophenol	63.6		20-120	%REC	1	3/22/2010 05:10 PM
Surr: 4-Terphenyl-d14	76.4		51-135	%REC	1	3/22/2010 05:10 PM
Surr: Nitrobenzene-d5	69.3		41-120	%REC	1	3/22/2010 05:10 PM
Surr: Phenol-d6	65.2		20-120	%REC	1	3/22/2010 05:10 PM
TCLP VOLATILES			SW1311/8260B		Prep Date: 3/19/2010	Analyst: PC
1,1-Dichloroethene	ND		100	µg/L	20	3/22/2010 03:51 PM
1,2-Dichloroethane	ND		100	µg/L	20	3/22/2010 03:51 PM
1,4-Dichlorobenzene	ND		100	µg/L	20	3/22/2010 03:51 PM
2-Butanone	ND		200	µg/L	20	3/22/2010 03:51 PM
Benzene	ND		100	µg/L	20	3/22/2010 03:51 PM
Carbon tetrachloride	ND		100	µg/L	20	3/22/2010 03:51 PM
Chlorobenzene	ND		100	µg/L	20	3/22/2010 03:51 PM
Chloroform	ND		100	µg/L	20	3/22/2010 03:51 PM
Tetrachloroethene	ND		100	µg/L	20	3/22/2010 03:51 PM
Trichloroethene	ND		100	µg/L	20	3/22/2010 03:51 PM

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Laboratory Group

Date: 29-Mar-10

Client: Navajo Refining Company

Project: Disposal

Work Order: 1003356

Sample ID: Waste Water Effluent Soil

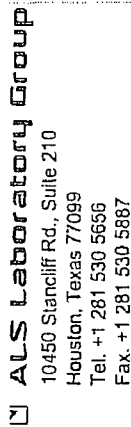
Lab ID: 1003356-02

Collection Date: 3/12/2010 11:42 AM

Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Vinyl chloride	ND		100	µg/L	20	3/22/2010 03:51 PM
Surr: 1,2-Dichloroethane-d4	89.5		70-125	%REC	20	3/22/2010 03:51 PM
Surr: 4-Bromofluorobenzene	101		72-125	%REC	20	3/22/2010 03:51 PM
Surr: Dibromofluoromethane	92.4		71-125	%REC	20	3/22/2010 03:51 PM
Surr: Toluene-d8	98.0		75-125	%REC	20	3/22/2010 03:51 PM
REACTIVE CYANIDE			SW-846			Analyst: HN
Reactive Cyanide	ND		40.0	mg/Kg	1	3/17/2010
REACTIVE SULFIDE			SW-846			Analyst: HN
Reactive Sulfide	ND		40.0	mg/Kg	1	3/17/2010
IGNITABILITY			SW1030			Analyst: JBA
Ignitability, Solid	Negative			no unit	1	3/23/2010 03:00 PM
PH			SW9045B			Analyst: TDW
pH	7.96		0.100	pH Units	1	3/23/2010 04:00 PM

Note: See Qualifiers Page for a list of qualifiers and their explanation.



Chain of Custody Form

ALS Laboratory Group
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Holland, MI 49424-9263
Tel: +1 616 399 6070
Fax: +1 616 399 6185

Page _____ of _____

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1. Any changes must be made in writing once samples and COC form have been submitted to AAS Laboratory Group.
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ALS Laboratory Group

Date: 21-Jul-10

Client: Navajo Refining Company

Project: Bottom Hole

Work Order: 1007504

Sample ID: WW Effluent #1

Lab ID: 1007504-01

Collection Date: 7/15/2010 01:42 PM

Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TEXAS TPH			TX1005		Prep Date: 7/16/2010	Analyst: SE
nC6 to nC12	ND		50	mg/Kg	1	7/18/2010 02:50 AM
>nC12 to nC28	ND		50	mg/Kg	1	7/18/2010 02:50 AM
>nC28 to nC35	ND		50	mg/Kg	1	7/18/2010 02:50 AM
Total Petroleum Hydrocarbon	ND		50	mg/Kg	1	7/18/2010 02:50 AM
Surr: 2-Fluorobiphenyl	117		70-130	%REC	1	7/18/2010 02:50 AM
Surr: Trifluoromethyl benzene	107		70-130	%REC	1	7/18/2010 02:50 AM

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Laboratory Group

Date: 21-Jul-10

Client: Navajo Refining Company

Project: Bottom Hole

Work Order: 1007504

Sample ID: WW Effluent #2

Lab ID: 1007504-02

Collection Date: 7/15/2010 01:46 PM

Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TEXAS TPH			TX1005		Prep Date: 7/16/2010	Analyst: SE
nC6 to nC12	ND		49	mg/Kg	1	7/18/2010 04:53 AM
>nC12 to nC28	ND		49	mg/Kg	1	7/18/2010 04:53 AM
>nC28 to nC35	ND		49	mg/Kg	1	7/18/2010 04:53 AM
Total Petroleum Hydrocarbon	ND		49	mg/Kg	1	7/18/2010 04:53 AM
Surr: 2-Fluorobiphenyl	114		70-130	%REC	1	7/18/2010 04:53 AM
Surr: Trifluoromethyl benzene	115		70-130	%REC	1	7/18/2010 04:53 AM

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Customer Information						Project Information				ALS Project Manager:		ALS Work Order #:		Parameter/Method Request for Analysis			
Purchase Order		Company Name	Narajo Refining Company	Project Name	Bottom Hole	A	B	C	D	E	F	G	H	I	J		
Work Order		Send Report To	Aaron Strange	Project Number													
				Bill To Company	Navajo Refining Company												
				Invoice Attn.	Aaron Strange												
				P.O. Box 159	P.O. Box 159												
				City/State/Zip	Artesia, NM 80211												
				Phone	(505) 748-3311												
				Fax	(505) 746-5421												
				e-Mail Address													
No.	Sample Description	Date	Time	Matrix	Pres.	Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	WW Effluent #1	7-15-10	1342	S	NO	1	X										
2	WW Effluent #2		1346	S		1	X										
3	WW Effluent #3		1353	S		1	X										
4	Temp Blank																
5																	
6																	
7																	
8																	
9																	
10																	

Shipment Method: Fed Ex
 Received by: Aaron Strange
 Date: 7-15-10 Time: 1615
 Relinquished by: Aaron Strange
 Date: 7-15-10 Time: 1615

Required Turnaround Time: (Check Box)
☒ Same Day
☐ Next Business Day
☐ 3-5 Days
☐ 7-10 Days
☐ Other

Results Due Date: _____
 Notes: _____

Logged by (Laboratory): _____
 Preservative Key: 1-HCl 2-HNO₃ 3-H₂O₂ 4-NaOH 5-Na₂S₂O₈ 6-NaHSO₄ 7-Other 8-4°C 9-5035

OC Package: (Check One Box Below)
☐ Level II S-d OC
☐ Level III S Id OC/RUN Data
☐ Level IV SW946/CUP
☐ Other

Note:

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District III
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District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources
Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised October 10, 2003

Submit 2 Copies to appropriate
District Office in accordance
with Rule 116 on back
side of form

Release Notification and Corrective Action

OPERATOR

☐ Initial Report ☒ Final Report

Name of Company: Navajo Refining Co. LLC	Contact: Aaron Strange
Address: 501 E. Main Street Artesia, N.M. 88210	Telephone No. 575-748-3311
Facility Name: Artesia Plant	Facility Type: Petroleum Refinery

Surface Owner	Mineral Owner	Lease No.
---------------	---------------	-----------

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
-------------	---------	----------	-------	---------------	------------------	---------------	----------------	--------

Latitude ~N32°45'54.4" Longitude ~W104°14'17.4"

NATURE OF RELEASE

Type of Release: Spill of Treated Waste Water (by Aggressive Bio. Treatment)	Volume of Release: Unknown	Volume Recovered: ~0 barrels
Source of Release: Effluent line leak between the Chukka and Gaines Injection Wells.	Date and Hour of Occurrence: 04/15/2010 Unknown	Date and Hour of Discovery: 04/15/2010 ~ 09:40
Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required	If YES, To Whom? Spoke with Carl Chavez from OCD in Santa Fe (505-476-3490), left a voicemail with OCD District Supervisor (575-748-1283 extension 104). Spoke with Art Vollmer from the NMED Haz Waste Bureau (505-476-6045).	
By Whom? Aaron Strange	Date and Hour: 04/15/2010 at ~10:02 to Carl Chavez (OCD Santa Fe), 04/15/2010 at ~10:07 to the OCD Artesia office, and 04/15/2010 at ~10:10 to NMED Haz Waste Bureau.	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse. NA	

If a Watercourse was Impacted, Describe Fully.* NA


Describe Cause of Problem and Remedial Action Taken.*

On 04/15/2010 at ~ 09:40 a leak was found between the Chukka and Gaines Injection Wells. The Effluent line was blocked in at the Waste Water Treater (inside the refinery) to stop the leak and repair the line. The leak was excavated and the line was clamped and is holding.

Describe Area Affected and Cleanup Action Taken.*

The area affected was the effluent line between the Chukka and Gaines Injection Wells at ~ N32°45'54.4", W104°14'17.4". The leak was excavated and the line was clamped and is holding. The leak did not stain the soil. Bottom Hole samples were collected and tested for TPH. This same location was also tested for BTEX, Metals, and Anions after the leak that occurred on 09/27/2010. This leak was just a few feet from the leaks that occurred on 02/20/2010 and 09/27/2010.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: 	<u>OIL CONSERVATION DIVISION</u>	
Printed Name: Aaron Strange	Approved by District Supervisor:	
Title: Sr. Environmental Technician	Approval Date:	Expiration Date:
E-mail Address: aaron.strange@hollycorp.com	Conditions of Approval:	Attached <input type="checkbox"/>
Date: 11/10/2010	Phone: 575-703-5057	

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources
Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised October 10, 2003

Submit 2 Copies to appropriate
District Office in accordance
with Rule 116 on back
side of form

Release Notification and Corrective Action

OPERATOR

☐ Initial Report ☒ Final Report

Name of Company: Navajo Refining Co. LLC	Contact: Aaron Strange
Address: 501 E. Main Street Artesia, N.M. 88210	Telephone No. 575-748-3311
Facility Name: Artesia Plant	Facility Type: Petroleum Refinery

Surface Owner	Mineral Owner	Lease No.
---------------	---------------	-----------

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
-------------	---------	----------	-------	---------------	------------------	---------------	----------------	--------

Latitude ~N32°45'54.5" Longitude ~W104°14'17.4"

NATURE OF RELEASE

Type of Release: Spill of Treated Waste Water (by Aggressive Bio. Treatment)	Volume of Release: Unknown	Volume Recovered: ~0 barrels
Source of Release: Effluent line leak between the Chukka and Gaines Injection Wells.	Date and Hour of Occurrence: 09/27/2010 Unknown	Date and Hour of Discovery: 09/27/2010 ~08:00
Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required	If YES, To Whom? Spoke with Carl Chavez from OCD in Santa Fe (505-476-3490), left a voicemail with OCD Artesia Office (575-748-1283 extension 102), and left a voicemail with Hope Monzeglio from the NMED Haz Waste Bureau (505-476-6045).	
By Whom? Aaron Strange	Date and Hour: 09/28/2010 at ~07:31 to Carl Chavez (OCD Santa Fe), 09/28/2010 at ~08:12 to the OCD Artesia office, and 09/28/2010 at ~08:16 to NMED Haz Waste Bureau.	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse. NA	

If a Watercourse was Impacted, Describe Fully.* NA


Describe Cause of Problem and Remedial Action Taken.*

On 09/27/2010 at ~08:00 a leak was found between the Chukka and Gaines Injection Wells. The Effluent line was blocked in at the Waste Water Treater (inside the refinery) to stop the leak and repair the line. The leak was excavated and the line was clamped and is holding.

Describe Area Affected and Cleanup Action Taken.*

The area affected was the effluent line between the Chukka and Gaines Injection Wells at ~N32°45'54.5", W104°14'17.4". The leak was excavated to make repairs and the soil was placed into roll-off bins. The leak did not stain the soil; however Navajo will dispose of the excavated soil as Non-Hazardous Waste per analytical results. Bottom Hole samples have been collected and tested for BTEX, Metals, and Anions. This leak was just a few feet from the leaks that occurred on 02/20/2010 and 04/15/2010.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: 	OIL CONSERVATION DIVISION		
Printed Name: Aaron Strange	Approved by District Supervisor:		
Title: Sr. Environmental Technician	Approval Date:	Expiration Date:	
E-mail Address: aaron.strange@hollycorp.com	Conditions of Approval:		Attached <input type="checkbox"/>
Date: 11/10/2010	Phone: 575-703-5057		

ALS Environmental

Date: 18-Oct-10

Client: Navajo Refining Company

Project: WW Effluent

Work Order: 1010346

Sample ID: Leak from 9-27-10 #1

Lab ID: 1010346-01

Collection Date: 10/7/2010 12:30 PM

Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
BTEX						
			SW8021B			Analyst: IGF
Benzene	ND		0.0010	mg/Kg	1	10/12/2010 04:20 PM
Toluene	ND		0.0010	mg/Kg	1	10/12/2010 04:20 PM
Ethylbenzene	ND		0.0010	mg/Kg	1	10/12/2010 04:20 PM
Xylenes, Total	ND		0.0030	mg/Kg	1	10/12/2010 04:20 PM
Surr: 4-Bromofluorobenzene	92.4		75-131	%REC	1	10/12/2010 04:20 PM
Surr: Trifluorotoluene	90.3		73-130	%REC	1	10/12/2010 04:20 PM
MERCURY						
			SW7471A			Prep Date: 10/14/2010 Analyst: JCJ
Mercury	5.26		3.45	µg/Kg	1	10/14/2010 03:40 PM
METALS						
			SW6020			Prep Date: 10/13/2010 Analyst: SKS
Aluminum	10,200		87.7	mg/Kg	100	10/14/2010 09:33 PM
Antimony	ND		0.439	mg/Kg	1	10/14/2010 06:42 AM
Arsenic	3.55		0.439	mg/Kg	1	10/14/2010 06:42 AM
Barium	134		43.9	mg/Kg	100	10/14/2010 09:33 PM
Beryllium	0.575		0.439	mg/Kg	1	10/14/2010 06:42 AM
Cadmium	ND		0.439	mg/Kg	1	10/14/2010 06:42 AM
Calcium	40,400		4,390	mg/Kg	100	10/14/2010 09:33 PM
Chromium	8.69		0.439	mg/Kg	1	10/14/2010 06:42 AM
Cobalt	3.61		0.439	mg/Kg	1	10/14/2010 06:42 AM
Copper	6.21		0.439	mg/Kg	1	10/14/2010 06:42 AM
Iron	6,830		43.9	mg/Kg	1	10/14/2010 06:42 AM
Lead	4.74		0.439	mg/Kg	1	10/14/2010 06:42 AM
Magnesium	9,320		43.9	mg/Kg	1	10/14/2010 06:42 AM
Manganese	255		43.9	mg/Kg	100	10/14/2010 09:33 PM
Nickel	7.85		0.439	mg/Kg	1	10/14/2010 06:42 AM
Potassium	2,670		43.9	mg/Kg	1	10/14/2010 06:42 AM
Selenium	0.701		0.439	mg/Kg	1	10/14/2010 06:42 AM
Silver	ND		0.439	mg/Kg	1	10/14/2010 06:42 AM
Sodium	689		43.9	mg/Kg	1	10/14/2010 06:42 AM
Strontium	221		43.9	mg/Kg	100	10/14/2010 09:33 PM
Thallium	ND		0.439	mg/Kg	1	10/14/2010 06:42 AM
Vanadium	16.3		0.439	mg/Kg	1	10/14/2010 06:42 AM
Zinc	21.0		0.439	mg/Kg	1	10/14/2010 06:42 AM
ANIONS						
			E300			Prep Date: 10/13/2010 Analyst: DM
Chloride	146		4.98	mg/Kg	1	10/14/2010 12:34 PM
Sulfate	7,620		49.8	mg/Kg	10	10/14/2010 04:11 PM
Surr: Selenate (surr)	108		85-115	%REC	10	10/14/2010 04:11 PM
Surr: Selenate (surr)	109		85-115	%REC	1	10/14/2010 12:34 PM

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Environmental

Date: 18-Oct-10

Client: Navajo Refining Company
Project: WW Effluent
Sample ID: Leak from 9-27-10 #2
Collection Date: 10/7/2010 12:34 PM

Work Order: 1010346
Lab ID: 1010346-02
Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
BTEX						
			SW8021B			Analyst: IGF
Benzene	ND		0.0010	mg/Kg	1	10/12/2010 01:01 PM
Toluene	ND		0.0010	mg/Kg	1	10/12/2010 01:01 PM
Ethylbenzene	ND		0.0010	mg/Kg	1	10/12/2010 01:01 PM
Xylenes, Total	ND		0.0030	mg/Kg	1	10/12/2010 01:01 PM
Surr: 4-Bromofluorobenzene	93.4		75-131	%REC	1	10/12/2010 01:01 PM
Surr: Trifluorotoluene	92.8		73-130	%REC	1	10/12/2010 01:01 PM
MERCURY						
			SW7471A			Prep Date: 10/14/2010 Analyst: JCJ
Mercury	8.09		3.57	µg/Kg	1	10/14/2010 03:42 PM
METALS						
			SW6020			Prep Date: 10/13/2010 Analyst: SKS
Aluminum	2,220		90.1	mg/Kg	100	10/14/2010 09:39 PM
Antimony	ND		0.450	mg/Kg	1	10/14/2010 06:48 AM
Arsenic	1.84		0.450	mg/Kg	1	10/14/2010 06:48 AM
Barium	174		45.0	mg/Kg	100	10/14/2010 09:39 PM
Beryllium	ND		0.450	mg/Kg	1	10/14/2010 06:48 AM
Cadmium	ND		0.450	mg/Kg	1	10/14/2010 06:48 AM
Calcium	54,000		4,500	mg/Kg	100	10/14/2010 09:39 PM
Chromium	2.52		0.450	mg/Kg	1	10/14/2010 06:48 AM
Cobalt	1.21		0.450	mg/Kg	1	10/14/2010 06:48 AM
Copper	1.86		0.450	mg/Kg	1	10/14/2010 06:48 AM
Iron	2,710		45.0	mg/Kg	1	10/14/2010 06:48 AM
Lead	2.08		0.450	mg/Kg	1	10/14/2010 06:48 AM
Magnesium	1,970		45.0	mg/Kg	1	10/14/2010 06:48 AM
Manganese	188		45.0	mg/Kg	100	10/14/2010 09:39 PM
Nickel	2.39		0.450	mg/Kg	1	10/14/2010 06:48 AM
Potassium	415		45.0	mg/Kg	1	10/14/2010 06:48 AM
Selenium	ND		0.450	mg/Kg	1	10/14/2010 06:48 AM
Silver	ND		0.450	mg/Kg	1	10/14/2010 06:48 AM
Sodium	195		45.0	mg/Kg	1	10/14/2010 06:48 AM
Strontium	119		0.450	mg/Kg	1	10/14/2010 06:48 AM
Thallium	ND		0.450	mg/Kg	1	10/14/2010 06:48 AM
Vanadium	6.30		0.450	mg/Kg	1	10/14/2010 06:48 AM
Zinc	6.76		0.450	mg/Kg	1	10/14/2010 06:48 AM
ANIONS						
			E300			Prep Date: 10/13/2010 Analyst: DM
Chloride	58.0		4.92	mg/Kg	1	10/14/2010 12:55 PM
Sulfate	6,630		49.2	mg/Kg	10	10/14/2010 04:32 PM
Surr: Selenate (surr)	110		85-115	%REC	10	10/14/2010 04:32 PM
Surr: Selenate (surr)	109		85-115	%REC	1	10/14/2010 12:55 PM

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Environmental

Date: 18-Oct-10

Client: Navajo Refining Company
Project: WW Effluent
Sample ID: Leak from 9-27-10 #3
Collection Date: 10/7/2010 12:49 PM

Work Order: 1010346
Lab ID: 1010346-03
Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
BTEX						
			SW8021B			Analyst: IGF
Benzene	ND		0.0010	mg/Kg	1	10/12/2010 02:03 PM
Toluene	ND		0.0010	mg/Kg	1	10/12/2010 02:03 PM
Ethylbenzene	ND		0.0010	mg/Kg	1	10/12/2010 02:03 PM
Xylenes, Total	ND		0.0030	mg/Kg	1	10/12/2010 02:03 PM
Surr: 4-Bromofluorobenzene	94.8		75-131	%REC	1	10/12/2010 02:03 PM
Surr: Trifluorotoluene	92.2		73-130	%REC	1	10/12/2010 02:03 PM
MERCURY						
			SW7471A			Prep Date: 10/14/2010 Analyst: JCJ
Mercury	6.73		3.61	µg/Kg	1	10/14/2010 03:44 PM
METALS						
			SW6020			Prep Date: 10/13/2010 Analyst: SKS
Aluminum	6,810		92.6	mg/Kg	100	10/14/2010 09:45 PM
Antimony	ND		0.463	mg/Kg	1	10/14/2010 06:54 AM
Arsenic	3.00		0.463	mg/Kg	1	10/14/2010 06:54 AM
Barium	73.3		0.463	mg/Kg	1	10/14/2010 06:54 AM
Beryllium	ND		0.463	mg/Kg	1	10/14/2010 06:54 AM
Cadmium	ND		0.463	mg/Kg	1	10/14/2010 06:54 AM
Calcium	79,800		4,630	mg/Kg	100	10/14/2010 09:45 PM
Chromium	5.65		0.463	mg/Kg	1	10/14/2010 06:54 AM
Cobalt	2.43		0.463	mg/Kg	1	10/14/2010 06:54 AM
Copper	4.62		0.463	mg/Kg	1	10/14/2010 06:54 AM
Iron	4,510		46.3	mg/Kg	1	10/14/2010 06:54 AM
Lead	3.76		0.463	mg/Kg	1	10/14/2010 06:54 AM
Magnesium	7,040		46.3	mg/Kg	1	10/14/2010 06:54 AM
Manganese	178		46.3	mg/Kg	100	10/14/2010 09:45 PM
Nickel	5.19		0.463	mg/Kg	1	10/14/2010 06:54 AM
Potassium	1,670		46.3	mg/Kg	1	10/14/2010 06:54 AM
Selenium	0.523		0.463	mg/Kg	1	10/14/2010 06:54 AM
Silver	ND		0.463	mg/Kg	1	10/14/2010 06:54 AM
Sodium	408		46.3	mg/Kg	1	10/14/2010 06:54 AM
Strontium	530		46.3	mg/Kg	100	10/14/2010 09:45 PM
Thallium	ND		0.463	mg/Kg	1	10/14/2010 06:54 AM
Vanadium	11.0		0.463	mg/Kg	1	10/14/2010 06:54 AM
Zinc	14.3		0.463	mg/Kg	1	10/14/2010 06:54 AM
ANIONS						
			E300			Prep Date: 10/13/2010 Analyst: DM
Chloride	50.9		4.93	mg/Kg	1	10/14/2010 01:17 PM
Sulfate	12,100		493	mg/Kg	100	10/14/2010 04:54 PM
Surr: Selenate (surr)	110		85-115	%REC	100	10/14/2010 04:54 PM
Surr: Selenate (surr)	107		85-115	%REC	1	10/14/2010 01:17 PM

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Environmental

Date: 18-Oct-10

Client: Navajo Refining Company
 Project: WW Effluent
 Sample ID: Leak from 9-27-10 #4
 Collection Date: 10/7/2010 01:02 PM

Work Order: 1010346
 Lab ID: 1010346-04
 Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
BTEX						
			SW8021B			Analyst: IGF
Benzene	ND		0.0010	mg/Kg	1	10/12/2010 02:24 PM
Toluene	ND		0.0010	mg/Kg	1	10/12/2010 02:24 PM
Ethylbenzene	ND		0.0010	mg/Kg	1	10/12/2010 02:24 PM
Xylenes, Total	ND		0.0030	mg/Kg	1	10/12/2010 02:24 PM
Surr: 4-Bromofluorobenzene	96.4		75-131	%REC	1	10/12/2010 02:24 PM
Surr: Trifluorotoluene	91.7		73-130	%REC	1	10/12/2010 02:24 PM
MERCURY						
			SW7471A			Prep Date: 10/14/2010 Analyst: JCJ
Mercury	13.7		3.51	µg/Kg	1	10/14/2010 03:46 PM
METALS						
			SW6020			Prep Date: 10/13/2010 Analyst: SKS
Aluminum	8,550		90.1	mg/Kg	100	10/14/2010 09:51 PM
Antimony	ND		0.450	mg/Kg	1	10/14/2010 07:00 AM
Arsenic	4.45		0.450	mg/Kg	1	10/14/2010 07:00 AM
Barium	86.8		0.450	mg/Kg	1	10/14/2010 07:00 AM
Beryllium	ND		0.450	mg/Kg	1	10/14/2010 07:00 AM
Cadmium	ND		0.450	mg/Kg	1	10/14/2010 07:00 AM
Calcium	53,900		4,500	mg/Kg	100	10/14/2010 09:51 PM
Chromium	7.28		0.450	mg/Kg	1	10/14/2010 07:00 AM
Cobalt	3.29		0.450	mg/Kg	1	10/14/2010 07:00 AM
Copper	7.54		0.450	mg/Kg	1	10/14/2010 07:00 AM
Iron	6,010		45.0	mg/Kg	1	10/14/2010 07:00 AM
Lead	4.56		2.25	mg/Kg	5	10/14/2010 07:42 PM
Magnesium	5,720		45.0	mg/Kg	1	10/14/2010 07:00 AM
Manganese	127		0.450	mg/Kg	1	10/14/2010 07:00 AM
Nickel	7.05		0.450	mg/Kg	1	10/14/2010 07:00 AM
Potassium	2,200		45.0	mg/Kg	1	10/14/2010 07:00 AM
Selenium	0.683		0.450	mg/Kg	1	10/14/2010 07:00 AM
Silver	ND		0.450	mg/Kg	1	10/14/2010 07:00 AM
Sodium	332		45.0	mg/Kg	1	10/14/2010 07:00 AM
Strontium	135		0.450	mg/Kg	1	10/14/2010 07:00 AM
Thallium	ND		2.25	mg/Kg	5	10/14/2010 07:42 PM
Vanadium	12.7		0.450	mg/Kg	1	10/14/2010 07:00 AM
Zinc	17.7		0.450	mg/Kg	1	10/14/2010 07:00 AM
ANIONS						
			E300			Prep Date: 10/13/2010 Analyst: DM
Chloride	89.6		4.97	mg/Kg	1	10/14/2010 01:39 PM
Sulfate	11,900		497	mg/Kg	100	10/14/2010 05:16 PM
Surr: Selenate (surr)	110		85-115	%REC	100	10/14/2010 05:16 PM
Surr: Selenate (surr)	108		85-115	%REC	1	10/14/2010 01:39 PM

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Environmental

Date: 18-Oct-10

Client: Navajo Refining Company

Project: WW Effluent

Work Order: 1010346

Sample ID: Background N32 46' 05.6"-W104 13' 42.0"

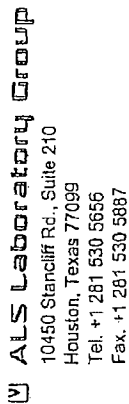
Lab ID: 1010346-05

Collection Date: 10/7/2010 01:10 PM

Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
BTEX			SW8021B			Analyst: IGF
Benzene	ND		0.0010	mg/Kg	1	10/12/2010 02:45 PM
Toluene	ND		0.0010	mg/Kg	1	10/12/2010 02:45 PM
Ethylbenzene	ND		0.0010	mg/Kg	1	10/12/2010 02:45 PM
Xylenes, Total	ND		0.0030	mg/Kg	1	10/12/2010 02:45 PM
Surr: 4-Bromofluorobenzene	91.7		75-131	%REC	1	10/12/2010 02:45 PM
Surr: Trifluorotoluene	89.5		73-130	%REC	1	10/12/2010 02:45 PM
MERCURY			SW7471A			Prep Date: 10/14/2010 Analyst: JCJ
Mercury	11.4		3.46	µg/Kg	1	10/14/2010 03:32 PM
METALS			SW6020			Prep Date: 10/13/2010 Analyst: SKS
Aluminum	7,740		90.1	mg/Kg	100	10/14/2010 09:58 PM
Antimony	ND		0.450	mg/Kg	1	10/14/2010 07:06 AM
Arsenic	1.92		0.450	mg/Kg	1	10/14/2010 07:06 AM
Barium	63.5		0.450	mg/Kg	1	10/14/2010 07:06 AM
Beryllium	ND		0.450	mg/Kg	1	10/14/2010 07:06 AM
Cadmium	ND		0.450	mg/Kg	1	10/14/2010 07:06 AM
Calcium	21,000		4,500	mg/Kg	100	10/14/2010 09:58 PM
Chromium	6.53		0.450	mg/Kg	1	10/14/2010 07:06 AM
Cobalt	2.49		0.450	mg/Kg	1	10/14/2010 07:06 AM
Copper	5.23		0.450	mg/Kg	1	10/14/2010 07:06 AM
Iron	5,960		45.0	mg/Kg	1	10/14/2010 07:06 AM
Lead	5.83		0.450	mg/Kg	1	10/14/2010 07:06 AM
Magnesium	2,790		45.0	mg/Kg	1	10/14/2010 07:06 AM
Manganese	140		0.450	mg/Kg	1	10/14/2010 07:06 AM
Nickel	5.89		0.450	mg/Kg	1	10/14/2010 07:06 AM
Potassium	1,840		45.0	mg/Kg	1	10/14/2010 07:06 AM
Selenium	ND		0.450	mg/Kg	1	10/14/2010 07:06 AM
Silver	ND		0.450	mg/Kg	1	10/14/2010 07:06 AM
Sodium	ND		45.0	mg/Kg	1	10/14/2010 07:06 AM
Strontium	23.7		0.450	mg/Kg	1	10/14/2010 07:06 AM
Thallium	ND		0.450	mg/Kg	1	10/14/2010 07:06 AM
Vanadium	8.36		0.450	mg/Kg	1	10/14/2010 07:06 AM
Zinc	18.9		0.450	mg/Kg	1	10/14/2010 07:06 AM
ANIONS			E300			Prep Date: 10/13/2010 Analyst: DM
Chloride	5.54		4.91	mg/Kg	1	10/14/2010 02:44 PM
Sulfate	28.9		4.91	mg/Kg	1	10/14/2010 02:44 PM
Surr: Selenate (surr)	110		85-115	%REC	1	10/14/2010 02:44 PM

Note: See Qualifiers Page for a list of qualifiers and their explanation.



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Customer Information						Project Information							ALS Work Order # 010596 Parameter/Method Request for Analysis									
Purchase Order		Company Name	Navajo Refining Company	Send Report to:	Aaron Strange	Project Name	WW Effluent	Project Number		Bill To Company	Navajo Refining Company	Invoice Ath	Aaron Strange	P.O. Box 159	City/State/Zip	Artesia, NM 88211	Phone	(505) 748-3311	Fax	(505) 748-5421	e-Mail Address	agbrown@SES-NM.com
No.	Sample Description	Date	Time	Matrix	# Bottles	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Hold
1	Leak from Q-27-10 #1	10-7-10	12:30	S	N0	2	X	X	X													
2	Leak from Q-27-10 #2		12:34				X	X	X													
3	Leak from Q-27-10 #3		12:49				X	X	X													
4	Leak from Q-27-10 #4		13:02				X	X	X													
5	Back ground W-10-4013-42.0"		13:10				X	X	X													
6	Leak from 5-3-10e45-4-3"		13:34				X	X	X													
7	Back ground W-10-4014-13.0"		13:40				X	X	X													
8	Temp Blank																					
9	Trip Blank																					
10																						

Shipment Method Fed Ex **Received by:** Aaron Strange **Time:** 10-7-10 **Date:** 10-7-10

Required Turnaround Time: (Check Box) ☒ Sid 10 WK Days ☐ 5 WK Days ☐ 24 Hour **Results Due Date:**

Notes:

QC Packages: (Check One Box Below) ☐ Level II Std QC ☐ TRRP Check List
☐ Level III Std QC/Raw Data ☐ TRRP Level IV
☐ Level IV SW346/CLP ☐ Other / EDD

Note:

1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Laboratory Group.
2. Unless otherwise agreed in a formal contract, services provided by ALS Laboratory Group are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

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ALS Environmental

Date: 12-Oct-10

Client: Navajo Refining Company
 Project: Disposal
 Sample ID: WW Effluent Leak
 Collection Date: 9/29/2010 02:33 PM

Work Order: 10091037
 Lab ID: 10091037-02
 Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TCLP MERCURY			SW7470		Prep Date: 10/6/2010	Analyst: JCJ
Mercury	ND		0.000200	mg/L	1	10/6/2010 04:11 PM
TCLP METALS			SW1311/6020		Prep Date: 10/7/2010	Analyst: ALR
Arsenic	ND		0.0500	mg/L	10	10/8/2010 06:34 AM
Barium	0.166		0.0500	mg/L	10	10/8/2010 06:34 AM
Cadmium	ND		0.0500	mg/L	10	10/8/2010 06:34 AM
Chromium	ND		0.0500	mg/L	10	10/8/2010 06:34 AM
Lead	ND		0.0500	mg/L	10	10/8/2010 06:34 AM
Selenium	ND		0.0500	mg/L	10	10/8/2010 06:34 AM
Silver	ND		0.0500	mg/L	10	10/8/2010 06:34 AM
TCLP SEMIVOLATILES			SW1311/8270		Prep Date: 10/6/2010	Analyst: ACN
2,4,5-Trichlorophenol	ND		5.0	µg/L	1	10/7/2010 05:07 PM
2,4,6-Trichlorophenol	ND		5.0	µg/L	1	10/7/2010 05:07 PM
2,4-Dinitrotoluene	ND		5.0	µg/L	1	10/7/2010 05:07 PM
Cresols, Total	ND		15	µg/L	1	10/7/2010 05:07 PM
Hexachlorobenzene	ND		5.0	µg/L	1	10/7/2010 05:07 PM
Hexachlorobutadiene	ND		5.0	µg/L	1	10/7/2010 05:07 PM
Hexachloroethane	ND		5.0	µg/L	1	10/7/2010 05:07 PM
Nitrobenzene	ND		5.0	µg/L	1	10/7/2010 05:07 PM
Pentachlorophenol	ND		5.0	µg/L	1	10/7/2010 05:07 PM
Pyridine	ND		5.0	µg/L	1	10/7/2010 05:07 PM
Surr: 2,4,6-Tribromophenol	50.5		42-124	%REC	1	10/7/2010 05:07 PM
Surr: 2-Fluorobiphenyl	49.1		48-120	%REC	1	10/7/2010 05:07 PM
Surr: 2-Fluorophenol	38.9		20-120	%REC	1	10/7/2010 05:07 PM
Surr: 4-Terphenyl-d14	67.3		51-135	%REC	1	10/7/2010 05:07 PM
Surr: Nitrobenzene-d5	42.3		41-120	%REC	1	10/7/2010 05:07 PM
Surr: Phenol-d6	37.2		20-120	%REC	1	10/7/2010 05:07 PM
TCLP VOLATILES			SW1311/8260B		Prep Date: 10/6/2010	Analyst: PC
1,1-Dichloroethene	ND		100	µg/L	20	10/7/2010 04:32 PM
1,2-Dichloroethane	ND		100	µg/L	20	10/7/2010 04:32 PM
1,4-Dichlorobenzene	ND		100	µg/L	20	10/7/2010 04:32 PM
2-Butanone	ND		200	µg/L	20	10/7/2010 04:32 PM
Benzene	330		100	µg/L	20	10/7/2010 04:32 PM
Carbon tetrachloride	ND		100	µg/L	20	10/7/2010 04:32 PM
Chlorobenzene	ND		100	µg/L	20	10/7/2010 04:32 PM
Chloroform	ND		100	µg/L	20	10/7/2010 04:32 PM
Tetrachloroethene	ND		100	µg/L	20	10/7/2010 04:32 PM
Trichloroethene	ND		100	µg/L	20	10/7/2010 04:32 PM

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Environmental

Date: 12-Oct-10

Client: Navajo Refining Company

Project: Disposal

Work Order: 10091037

Sample ID: WW Effluent Leak

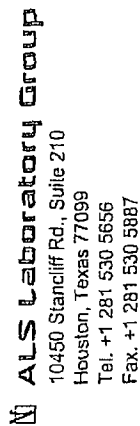
Lab ID: 10091037-02

Collection Date: 9/29/2010 02:33 PM

Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Vinyl chloride	ND		100	µg/L	20	10/7/2010 04:32 PM
Surr: 1,2-Dichloroethane-d4	101		70-125	%REC	20	10/7/2010 04:32 PM
Surr: 4-Bromofluorobenzene	99.0		72-125	%REC	20	10/7/2010 04:32 PM
Surr: Dibromofluoromethane	95.5		71-125	%REC	20	10/7/2010 04:32 PM
Surr: Toluene-d8	99.6		75-125	%REC	20	10/7/2010 04:32 PM
REACTIVE CYANIDE			SW-846			Analyst: HN
Reactive Cyanide	ND		40.0	mg/Kg	1	10/5/2010 08:30 AM
REACTIVE SULFIDE			SW-846			Analyst: HN
Reactive Sulfide	ND		40.0	mg/Kg	1	10/5/2010 08:30 AM
IGNITABILITY			SW1030			Analyst: JLC
Ignitability, Solid	Negative			no unit	1	10/5/2010 10:00 AM
PH			SW9045B			Analyst: JLC
pH	7.80		0.100	pH Units	1	10/11/2010 10:00 AM

Note: See Qualifiers Page for a list of qualifiers and their explanation.



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Page 1 of 1

Customer Information				Project Information				ALS Project Manager: <u>WJ</u> ALS Work Order #: <u>1001034</u>											
Parameter/Method Request for Analysis				Project Name				Parameter/Method Request for Analysis											
Purchase Order				Project Number				A TCLP VOAS											
Work Order				Bill To Company				B TCLP SEMI VOAS											
Company Name				Invoice Ath				C TCLP metals											
Send Report To				Address				D RCI											
Address				City/State/Zip				E											
City/State/Zip				Phone				F											
Phone				Fax				G											
Fax				e-Mail Address				H											
e-Mail Address				Date				I											
Sample Description				Time				J											
No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold		
1	Soil SE of T-58	9-29-10	13:33	S	NO	1	X	X	X	X									
2	WW Effluent Leak	9-29-10	14:33	S	NO	1	X	X	X	X									
3	Temp Blank																		
4	Trip Blank																		
5																			
6																			
7																			
8																			
9																			
10																			

Sample(s) Please Print & Sign: Aaron Strange

Relinquished by: Aaron Strange Date: 9-29-10 Time: 16:15

Relinquished by: Aaron Strange Date: 9-29-10 Time: 16:15

Shipment Method: FedEx

Required Turnaround Time: (Check Box) ☒ STD: 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ Other

Results Due Date: 9/30/10 08:45

QC Package: (Check One Box Below)

☐ Level II Std QC ☐ TRAP Checklist

☐ Level III Std QC/Raw Date ☐ TRAP Level IV

☐ Level IV SW845/CLP ☐ Other

Logged by (Laboratory): _____ Date: _____ Time: _____

Preservative Key: 1-HCl 2-HNO₃ 3-H₂SO₄ 4-NaOH 5-Na₂S₂O₃ 6-NaHSO₃ 7-Other 8-4°C 9-5035

Note:

1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Laboratory Group.
2. Unless otherwise agreed in a formal contract, services provided by ALS Laboratory Group are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

Copyright 2008 by ALS Laboratory Group.

Chavez, Carl J, EMNRD

From: Strange, Aaron [aaron.strange@hollycorp.com]
Sent: Friday, November 12, 2010 7:33 AM
To: Chavez, Carl J, EMNRD; Monzeglio, Hope, NMENV; Dade, Randy, EMNRD; Hill, Larry, EMNRD
Cc: Moore, Darrell; Lackey, Johnny
Subject: RE: C-141 final report
Attachments: CIMG0064.jpg; CIMG0066.jpg; CIMG0067.jpg; CIMG0068.jpg; New Image0059.jpg; effluent leaks 010.jpg; effluent leaks 011.jpg; effluent leaks 012.jpg

Hope, Carl, Randy, and Buddy,

Please see the attached photos per the email below

Thank you,

Aaron Strange
Environmental Technician, Senior
Off: (575) 746-5468
Cell: (575) 703-5057

From: Strange, Aaron
Sent: Friday, November 12, 2010 7:27 AM
To: Strange, Aaron; 'Chavez, Carl J, EMNRD'; 'Monzeglio, Hope, NMENV'; 'randy.dade@state.nm.us'; 'larry.hill@state.nm.us'
Cc: Moore, Darrell; Lackey, Johnny
Subject: RE: C-141 final report

Hope, Carl, Randy, and Buddy,

Please see the attached photos per the email below. I have attached about 1/3rd of the photos and will send the rest in two other emails following this email.

Thank you,

Aaron Strange
Environmental Technician, Senior
Off: (575) 746-5468
Cell: (575) 703-5057

From: Strange, Aaron
Sent: Thursday, November 11, 2010 11:36 AM
To: 'Chavez, Carl J, EMNRD'; 'Monzeglio, Hope, NMENV'; 'randy.dade@state.nm.us'; 'larry.hill@state.nm.us'
Cc: Moore, Darrell; Lackey, Johnny
Subject: C-141 final report

Hope, Carl, Randy, and Buddy,

Please see the attached final C-141s from the effluent leaks on 2/20/2010, 4/14/2010, and 9/27/2010. These are the three leaks that were very close together. Also attached are the associated analytical results. I am also sending the associated photos on another email following this.

Thank you,

Aaron Strange
Environmental Technician, Senior
Environmental Department
Navajo Refining Co, LLC
Artesia NM
Off: (575) 746-5468
Cell: (575) 703-5057

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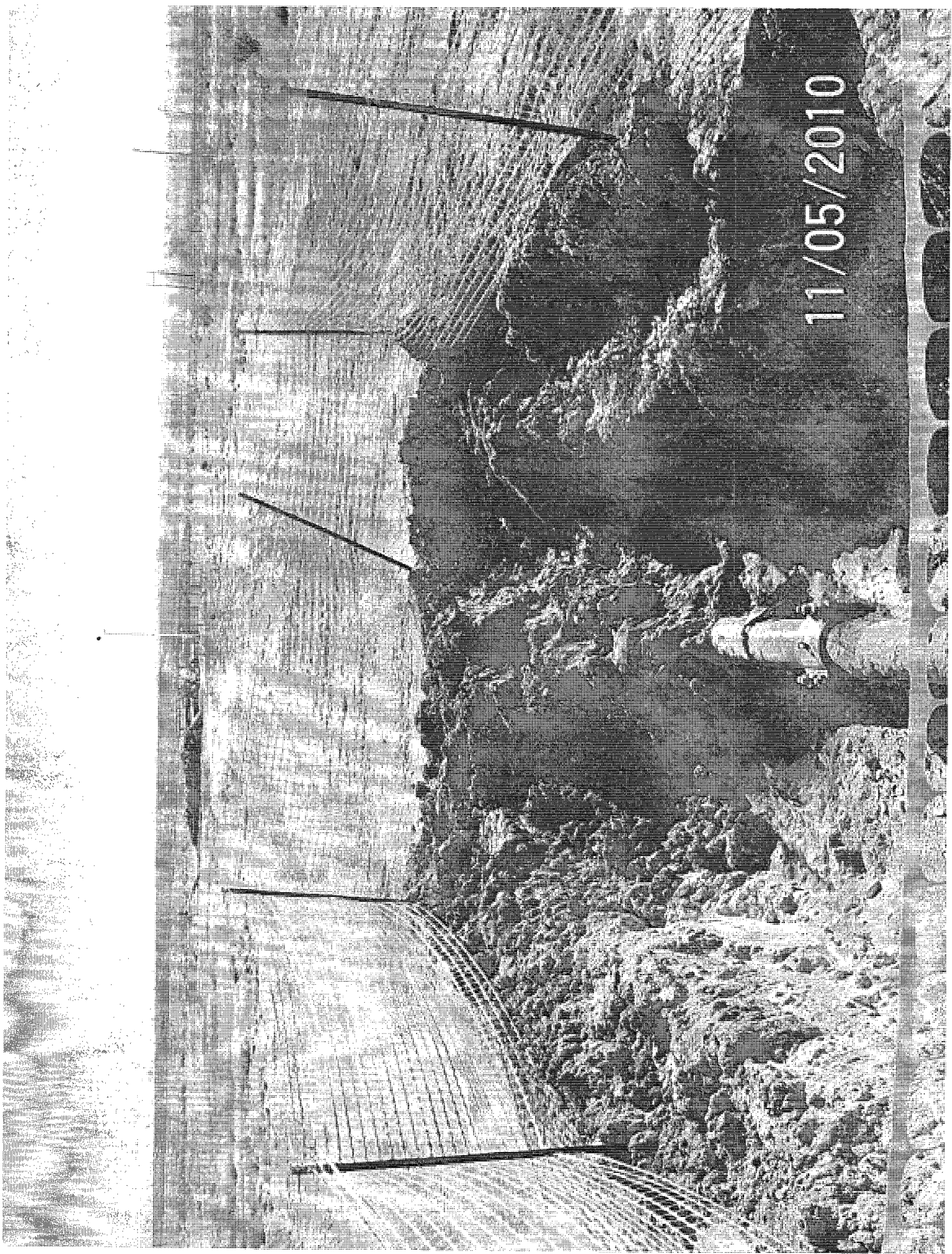








11/05/2010



Chavez, Carl J, EMNRD

From: Strange, Aaron [aaron.strange@hollycorp.com]
Sent: Friday, November 12, 2010 7:34 AM
To: Chavez, Carl J, EMNRD; Monzeglio, Hope, NMENV; Dade, Randy, EMNRD; Hill, Larry, EMNRD
Cc: Moore, Darrell; Lackey, Johnny
Subject: RE: C-141 final report
Attachments: effluent leaks 013.jpg; effluent leaks 001.jpg; effluent leaks 002.jpg; effluent leaks 003.jpg; effluent leaks 004.jpg; effluent leaks 005.jpg; effluent leaks 006.jpg; effluent leaks 007.jpg; effluent leaks 008.jpg; effluent leaks 009.jpg

Hope, Carl, Randy, and Buddy,

Please see the attached photos per the emails below. This should be the last of the photos.

Thank you,

Aaron Strange
Environmental Technician, Senior
Off: (575) 746-5468
Cell: (575) 703-5057

From: Strange, Aaron
Sent: Friday, November 12, 2010 7:33 AM
To: 'Chavez, Carl J, EMNRD'; 'Monzeglio, Hope, NMENV'; 'randy.dade@state.nm.us'; 'larry.hill@state.nm.us'
Cc: Moore, Darrell; Lackey, Johnny
Subject: RE: C-141 final report

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Thank you,

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Environmental Technician, Senior
Off: (575) 746-5468
Cell: (575) 703-5057

From: Strange, Aaron
Sent: Friday, November 12, 2010 7:27 AM
To: Strange, Aaron; 'Chavez, Carl J, EMNRD'; 'Monzeglio, Hope, NMENV'; 'randy.dade@state.nm.us'; 'larry.hill@state.nm.us'
Cc: Moore, Darrell; Lackey, Johnny
Subject: RE: C-141 final report

Hope, Carl, Randy, and Buddy,

Please see the attached photos per the email below. I have attached about 1/3rd of the photos and will send the rest in two other emails following this email.

Thank you,

Aaron Strange
Environmental Technician, Senior

Off: (575) 746-5468
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From: Strange, Aaron
Sent: Thursday, November 11, 2010 11:36 AM
To: 'Chavez, Carl J, EMNRD'; 'Monzeglio, Hope, NMENV'; 'randy.dade@state.nm.us'; 'larry.hill@state.nm.us'
Cc: Moore, Darrell; Lackey, Johnny
Subject: C-141 final report

Hope, Carl, Randy, and Buddy,

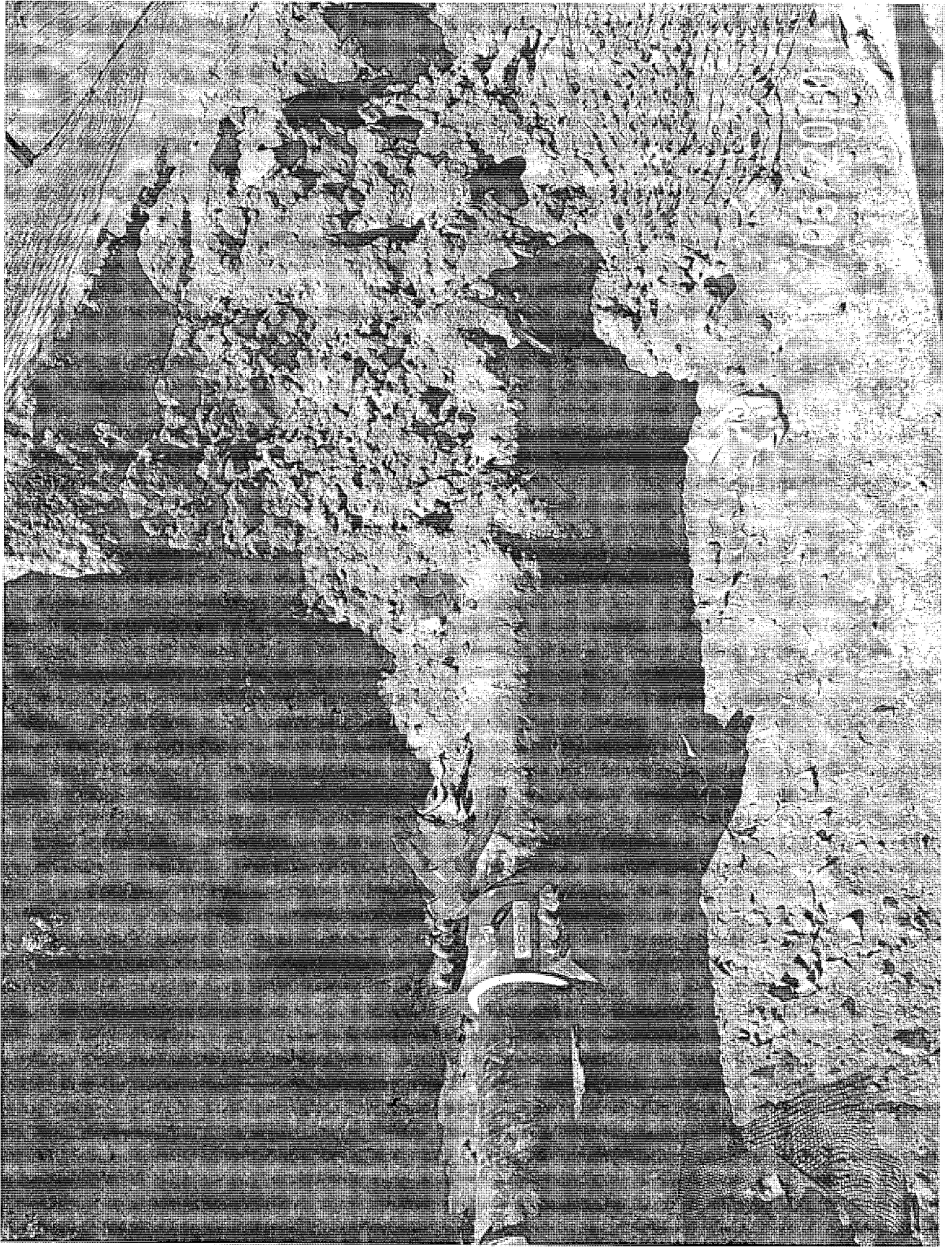
Please see the attached final C-141s from the effluent leaks on 2/20/2010, 4/14/2010, and 9/27/2010. These are the three leaks that were very close together. Also attached are the associated analytical results. I am also sending the associated photos on another email following this.

Thank you,

Aaron Strange
Environmental Technician, Senior

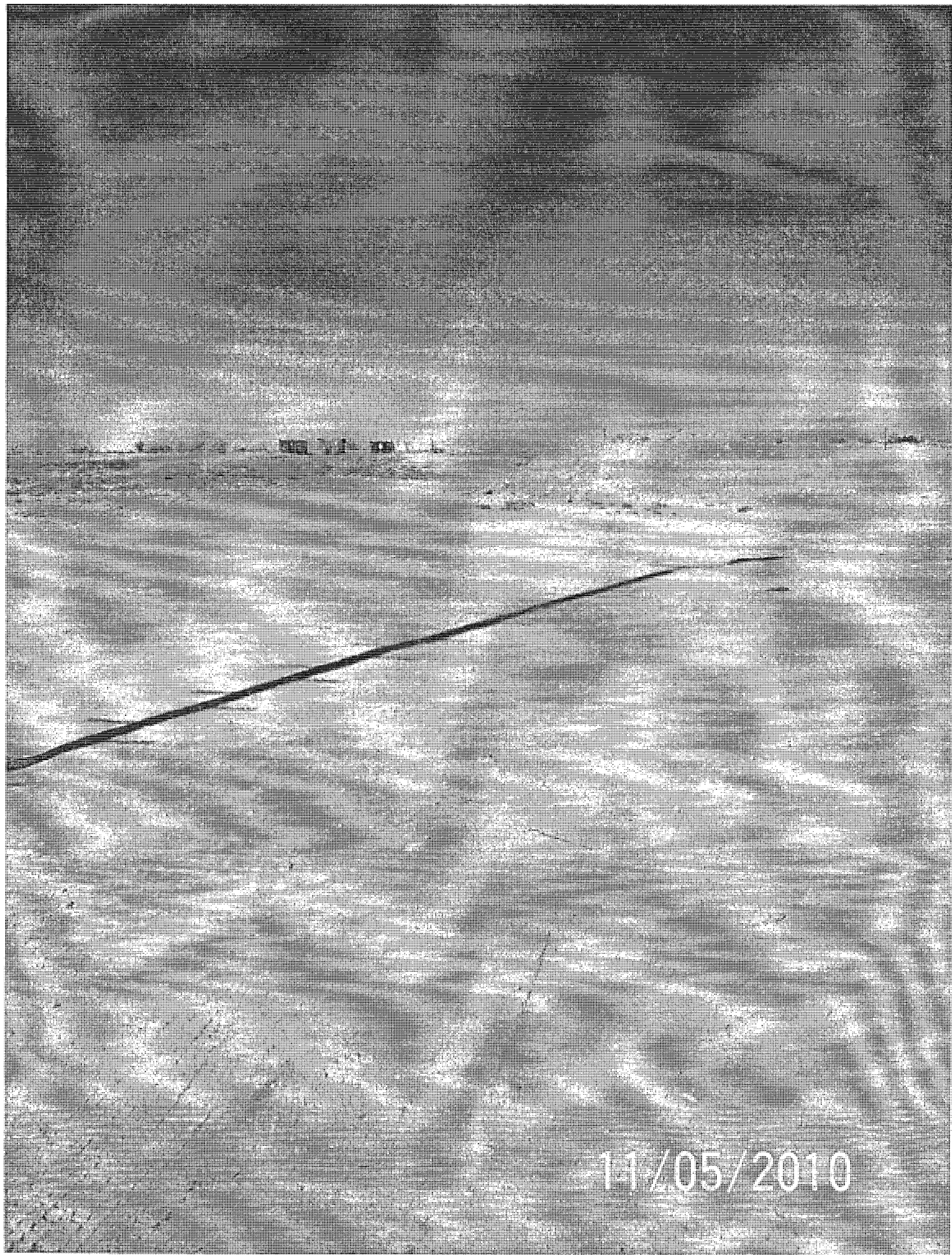
Environmental Department
Navajo Refining Co, LLC
Artesia NM
Off: (575) 746-5468
Cell: (575) 703-5057

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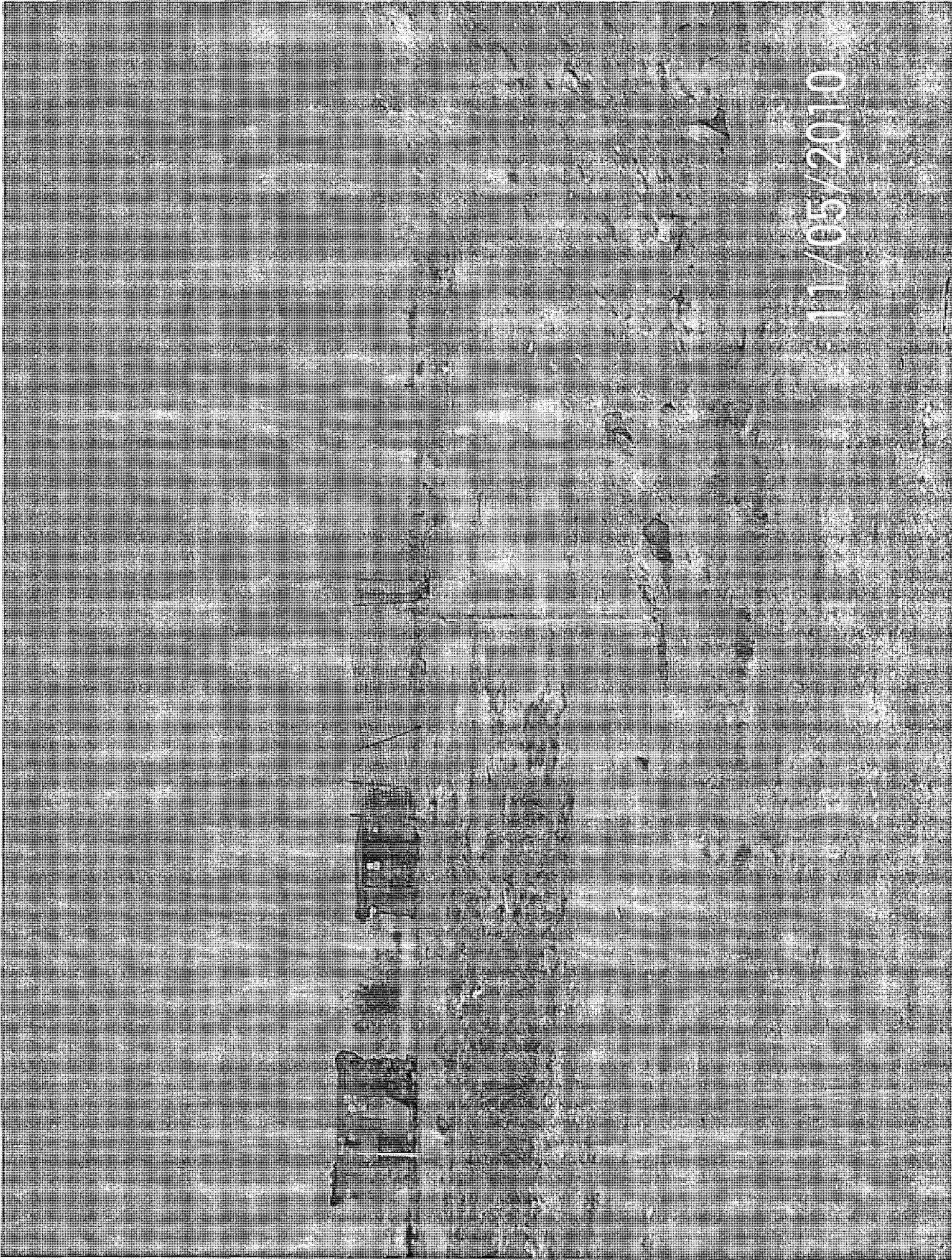
05/20/90

05/20/90





11/05/2010



11/05/2010

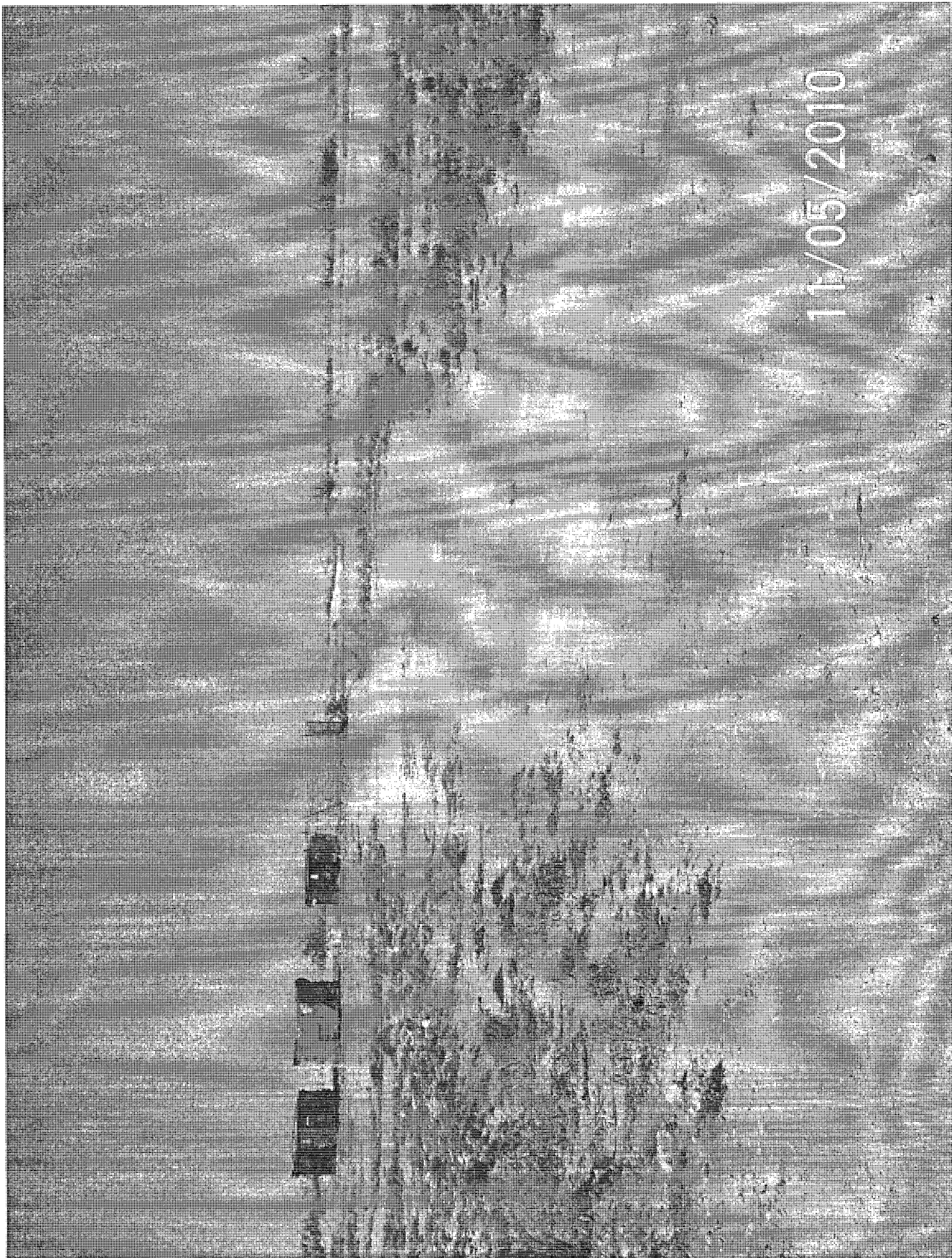
11/05/2010

11/05/2010



11/05/2010

11/05/2010



11/05/2010







Chavez, Carl J, EMNRD

From: Strange, Aaron [aaron.strange@hollycorp.com]
Sent: Friday, October 08, 2010 4:37 PM
To: Chavez, Carl J, EMNRD; Monzeglio, Hope, NMENV; Dade, Randy, EMNRD; Hill, Larry, EMNRD
Subject: RE: C-141 Effluent Line Leak
Attachments: 2010-05-03 Effluent Line Leak.pdf; 2010-04-15 Effluent Line Leak.pdf

Carl,

While looking over the effluent line leaks, I could tell if two C-141s had been sent. I have updated the two of them with GPS coordinates and have attached them to this email.

Thank you,
Aaron

Aaron Strange
Environmental Technician, Senior

Off: (575) 746-5468
Cell: (575) 703-5057

From: Strange, Aaron
Sent: Friday, October 01, 2010 4:19 PM
To: 'Chavez, Carl J, EMNRD'; 'Monzeglio, Hope, NMENV'; 'randy.dade@state.nm.us'
Cc: Moore, Darrell; Lackey, Johnny
Subject: C-141 Effluent Line Leak

Carl, Randy, Buddy, and Hope,

Please see the attached C-141.

Thanks,

Aaron Strange
Environmental Technician, Senior

Environmental Department
Navajo Refining Co, LLC
Artesia NM
Off: (575) 746-5468
Cell: (575) 703-5057

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District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised October 10, 2003

Submit 2 Copies to appropriate
District Office in accordance
with Rule 116 on back
side of form

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company: Navajo Refining Co. LLC	Contact: Aaron Strange	
Address: 501 E. Main Street Artesia, N.M. 88210	Telephone No. 575-748-3311	
Facility Name: Artesia Plant	Facility Type: Petroleum Refinery	
Surface Owner	Mineral Owner	Lease No.

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
-------------	---------	----------	-------	---------------	------------------	---------------	----------------	--------

Latitude ~N32°46'03.8" Longitude ~W104°13'44.4"

NATURE OF RELEASE

Type of Release: Spill of Treated Waster Water (by Aggressive Bio. Treatment)	Volume of Release: Unknown	Volume Recovered: ~0 barrels
Source of Release: Effluent line leak between the Chukka and Mewborne Injection Wells.	Date and Hour of Occurrence: 05/03/2010 Unknown	Date and Hour of Discovery: 05/03/2010 ~ 15:00
Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required	If YES, To Whom? Notified Carl Chavez from OCD in Santa Fe (505-476-3490), OCD Artesia office (575-748-1283), and Hope Monzeglio with the NMED Haz Waste Bureau (505-476-6045).	
By Whom? Darrell Moore	Date and Hour: 05/03/2010 at ~18:06 to Carl Chavez (OCD Santa Fe), 05/03/2010 at ~18:10 to the OCD Artesia office, and 05/03/2010 at ~18:08 to NMED Haz Waste Bureau.	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse. NA	

If a Watercourse was Impacted, Describe Fully.* NA

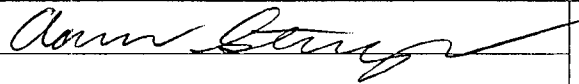
Describe Cause of Problem and Remedial Action Taken.*

On 04/15/2010 at ~ 09:40 a leak was found between the Chukka and Mewborne Injection Wells. The Effluent line was blocked in at the Waste Water Treater (inside the refinery) to stop the leak and repair the line. The leak was excavated and the line was clamped and is holding.

Describe Area Affected and Cleanup Action Taken.*

The area affected was the effluent line between the Chukka and Mewborne Injection Wells at ~ N32°46'03.8", W104°13'44.4". The leak was excavated and the line was clamped and is holding. The leak did not stain the soil. Bottom Hole samples have be collected and are being tested for BTEX, Metals, and Anions.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: 	OIL CONSERVATION DIVISION	
Printed Name: Aaron Strange	Approved by District Supervisor:	
Title: Sr. Environmental Technician	Approval Date:	Expiration Date:
E-mail Address: aaron.strange@hollycorp.com	Conditions of Approval:	Attached <input type="checkbox"/>
Date: 10/08/2010	Phone: 575-703-5057	

District I
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Energy Minerals and Natural Resources
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Santa Fe, NM 87505

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Revised October 10, 2003

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side of form

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company: Navajo Refining Co. LLC	Contact: Aaron Strange
Address: 501 E. Main Street Artesia, N.M. 88210	Telephone No. 575-748-3311
Facility Name: Artesia Plant	Facility Type: Petroleum Refinery

Surface Owner	Mineral Owner	Lease No.
---------------	---------------	-----------

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
-------------	---------	----------	-------	---------------	------------------	---------------	----------------	--------

Latitude ~N32°45'54.4" Longitude ~W104°14'17.4"

NATURE OF RELEASE

Type of Release: Spill of Treated Waster Water (by Aggressive Bio. Treatment)	Volume of Release: Unknown	Volume Recovered: ~0 barrels
Source of Release: Effluent line leak between the Chukka and Gaines Injection Wells.	Date and Hour of Occurrence: 04/15/2010 Unknown	Date and Hour of Discovery: 04/15/2010 ~ 09:40
Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required	If YES, To Whom? Spoke with Carl Chavez from OCD in Santa Fe (505-476-3490), left a voicemail with OCD District Supervisor (575-748-1283 extension 104). Spoke with Art Vollmer from the NMED Haz Waste Bureau (505-476-6045).	
By Whom? Aaron Strange	Date and Hour: 04/15/2010 at ~10:02 to Carl Chavez (OCD Santa Fe), 04/15/2010 at ~10:07 to the OCD Artesia office, and 04/15/2010 at ~10:10 to NMED Haz Waste Bureau.	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse. NA	

If a Watercourse was Impacted, Describe Fully.* NA

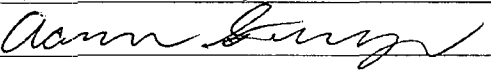
Describe Cause of Problem and Remedial Action Taken.*

On 04/15/2010 at ~ 09:40 a leak was found between the Chukka and Gaines Injection Wells. The Effluent line was blocked in at the Waste Water Treater (inside the refinery) to stop the leak and repair the line. The leak was excavated and the line was clamped and is holding.

Describe Area Affected and Cleanup Action Taken.*

The area affected was the effluent line between the Chukka and Gaines Injection Wells at ~ N32°45'54.4", W104°14'17.4". The leak was excavated and the line was clamped and is holding. The leak did not stain the soil. Bottom Hole samples were collected and tested for TPH. This leak was just a few feet from the leak that occurred on 2/20/2010.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: 	<u>OIL CONSERVATION DIVISION</u>		
Printed Name: Aaron Strange	Approved by District Supervisor:		
Title: Sr. Environmental Technician	Approval Date:	Expiration Date:	
E-mail Address: aaron.strange@hollycorp.com	Conditions of Approval:		Attached <input type="checkbox"/>
Date: 10/08/2010	Phone: 575-703-5057		

Chavez, Carl J, EMNRD

From: Strange, Aaron [aaron.strange@hollycorp.com]
Sent: Friday, October 01, 2010 4:19 PM
To: Chavez, Carl J, EMNRD; Monzeglio, Hope, NMENV; Dade, Randy, EMNRD
Cc: Moore, Darrell; Lackey, Johnny
Subject: C-141 Effluent Line Leak
Attachments: 2010-09-27 Effluent Line Leak.pdf

Carl, Randy, Buddy, and Hope,

Please see the attached C-141.

Thanks,

Aaron Strange
Environmental Technician, Senior

Environmental Department

Navajo Refining Co, LLC

Artesia NM

Off: (575) 746-5468

Cell: (575) 703-5057

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Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company: Navajo Refining Co. LLC	Contact: Aaron Strange
Address: 501 E. Main Street Artesia, N.M. 88210	Telephone No. 575-748-3311
Facility Name: Artesia Plant	Facility Type: Petroleum Refinery

Surface Owner	Mineral Owner	Lease No.
---------------	---------------	-----------

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
-------------	---------	----------	-------	---------------	------------------	---------------	----------------	--------

Latitude ~N32°45'54.5" Longitude ~W104°14'17.4"

NATURE OF RELEASE

Type of Release: Spill of Treated Waster Water (by Aggressive Bio. Treatment)	Volume of Release: Unknown	Volume Recovered: ~0 barrels
Source of Release: Effluent line leak between the Chukka and Gaines Injection Wells.	Date and Hour of Occurrence: 09/27/2010 ~ 07:20 (Unknown)	Date and Hour of Discovery: 09/27/2010 ~ 08:00
Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required	If YES, To Whom? Spoke with Carl Chavez from OCD in Santa Fe (505-476-3490), left a voicemail with OCD Artesia Office (575-748-1283 extension 102), and left a voicemail with Hope Monzeglio from the NMED Haz Waste Bureau (505-476-6045).	
By Whom? Aaron Strange	Date and Hour: 09/28/2010 at ~07:31 to Carl Chavez (OCD Santa Fe), 09/28/2010 at ~08:12 to the OCD Artesia office, and 09/28/2010 at ~08:16 to NMED Haz Waste Bureau.	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse. NA	

If a Watercourse was Impacted, Describe Fully.* NA

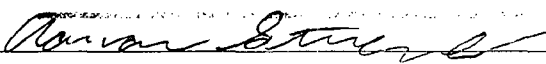
Describe Cause of Problem and Remedial Action Taken.*

On 09/27/2010 at ~ 08:00 a leak was found between the Chukka and Gaines Injection Wells. The Effluent line was blocked in at the Waste Water Treater (inside the refinery) to stop the leak and repair the line. The leak was excavated and the line was clamped and is holding.

Describe Area Affected and Cleanup Action Taken.*

The area affected was the effluent line between the Chukka and Gaines Injection Wells at ~ N32°45'54.5", W104°14'17.4". The leak was excavated to make repairs and the soil was placed into roll-off bins. The leak did not stain the soil; however Navajo will dispose of the excavated soil per analytical results. Bottom Hole samples will be collected and tested for BTEX, Metals, and Anions. This leak was just a few feet from the leaks that occurred on 2/20/2010 and 4/15/2010.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: 	OIL CONSERVATION DIVISION	
Printed Name: Aaron Strange	Approved by District Supervisor:	
Title: Sr. Environmental Technician	Approval Date:	Expiration Date:
E-mail Address: aaron.strange@hollycorp.com	Conditions of Approval:	Attached <input type="checkbox"/>
Date: 10/01/2010	Phone: 575-703-5057	

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Tuesday, September 28, 2010 1:04 PM
To: Chavez, Carl J, EMNRD
Cc: Dade, Randy, EMNRD
Subject: Artesia Refinery (GW-028) Effluent Line Leaks & Note to File

Aaron Strange called this morning at around 7:45 a.m. to report a recent discovery of a leak (~ 15 ft. from the 2 previous C-141 releases) along the effluent line to the UIC disposal wells ~ 1 mile west of the Pecos River. The lines are driven daily and this one was noticed with corrective action (installation of clamp seal on line and excavation of contaminated soils).

Went over Quarterly Effluent Monitor Reports for UICI-008 to identify chemicals of concern to verify remediation occurred and was completed, i.e., BTEX and Metals. Found one C-141 release form dated 2/20/2010 for one of the two past releases. Requested soil sample data from the previous 2 releases mentioned by Aaron along the effluent line. Analyticals from this most recent release.

Aaron will be sending a C-141 for this release. The refinery is planning to replace the entire line next year. Randy Dade is planning to inspect the line along the release location. I asked whether the location of the past releases is located near a bend in the line due to their proximity. Aaron did not know at the time of the call.

Ok.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3490
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: <http://www.emnrd.state.nm.us/ocd/index.htm>
(Pollution Prevention Guidance is under "Publications")

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Tuesday, April 27, 2010 7:44 AM
To: 'Lackey, Johnny'
Cc: VonGonten, Glenn, EMNRD; Monzeglio, Hope, NMENV; Whatley, Michael; Moore, Darrell
Subject: RE: NAVAJO UNDERGROUND LINES

Thanks for the clarification.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3490
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: <http://www.emnrd.state.nm.us/ocd/index.htm>
(Pollution Prevention Guidance is under "Publications")

From: Lackey, Johnny [mailto:Johnny.Lackey@hollycorp.com]
Sent: Thursday, April 22, 2010 11:27 AM
To: Chavez, Carl J, EMNRD
Cc: VonGonten, Glenn, EMNRD; Monzeglio, Hope, NMENV; Whatley, Michael; Moore, Darrell
Subject: RE: NAVAJO UNDERGROUND LINES

Carl. See my responses below.

Johnny Lackey
Environmental Manager
Navajo Refining Company, L.L.C.
Office - 575-746-5490
Cell - 972-261-8075
Fax - 575-746-5451
Johnny.Lackey@hollycorp.com

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From: Chavez, Carl J, EMNRD [mailto:CarlJ.Chavez@state.nm.us]
Sent: Wednesday, April 21, 2010 4:34 PM
To: Lackey, Johnny
Cc: VonGonten, Glenn, EMNRD; Monzeglio, Hope, NMENV
Subject: RE: NAVAJO UNDERGROUND LINES

Johnny:

Sorry, I don't think OCD is very comfortable with an approach to leak detection at pipelines where the refinery implements a repair or replacement without corrective actions or investigation to determine the extent of the contamination, but attempts to rely on downgradient monitoring wells, recovery systems, or the addition of a monitor well to detect any contamination from leaky pipelines or infrastructure at a refinery.

If allowed, this would be allowing the refinery to openly contaminate the water resources of the state. However, this method with active investigation and corrective action to remediate or remove point source(s) contamination may address this concern, but otherwise, OCD would be allowing Navajo Refining Company to openly contaminate New Mexico's water resources. OCD cannot allow this.

Navajo: We're not suggesting that Navajo depend on existing monitor wells, recovery trenches, etc. to detect leaks from underground lines, that's why we want to implement the Praxair technology on the lines we have taken over from Holly Energy Partner's and add these to our routine testing to detect any leaks that may be present through routine testing. We currently hydro test lines that Navajo operates and if leaks are detected we take the necessary steps to repair/remediate etc. My comment about the existing monitor wells and recovery trenches was to point out that after the leak is repaired and cleaned up, we already have these detection methods in place and felt it would be unnecessary to add additional monitoring for these new sources,

Regarding the discovery of pipeline releases, yes C-141s are needed and I notice that while the contents of Tank 413 (older distillate tank) is listed in your most recent submittal of above ground tank schedule for the discharge permit, Tank 115 and its information has not been updated on our above ground tank schedule. What does Tank 115 contain and how old is it? Please update the tank list and tank diagram to include all updated tanks that are missing from the existing table in the OCD file by May 5, 2010 so we may keep the tank list and any new updated tank diagrams showing the location of each new tank installed by the refinery. Thank you.

Navajo: I answered the question regarding Tank 115 in a previous email, however, the line that leaked was in the general proximity of Tank 115, not connected to Tank 115. This is a product line that we took over from HEP as described in my earlier request to the OCD for consideration of the Praxair Technology for underground piping leak detection. The product in the line is gasoline and corrected action will be taken to clean up the spill area.

Hopefully this clears up any confusion regarding these sources.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3490
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: <http://www.emnrd.state.nm.us/oed/index.htm>
(Pollution Prevention Guidance is under "Publications")

From: Lackey, Johnny [mailto:Johnny.Lackey@hollycorp.com]
Sent: Wednesday, April 21, 2010 4:10 PM
To: Chavez, Carl J, EMNRD
Cc: Whatley, Michael; Moore, Darrell; Douglas_Wilson@Praxair.com
Subject: RE: NAVAJO UNDERGROUND LINES

Thanks for the prompt reply Carl.

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through use of this technology, the line is dug up, if a leak is confirmed it is repaired and areas around the leak are UT'd to determine if there are additional areas that may need further investigation, repair or replacement of that segment of line.

Navajo will submit the C-141 forms for these leaks. The leaks have been repaired. We currently have monitor wells and recovery trenches down gradient from these leaks.

Johnny Lackey
Environmental Manager
Navajo Refining Company, L.L.C.
Office - 575-746-5490
Cell - 972-261-8075
Fax - 575-746-5451
Johnny.Lackey@hollycorp.com

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From: Chavez, Carl J, EMNRD [<mailto:CarlJ.Chavez@state.nm.us>]
Sent: Wednesday, April 21, 2010 6:55 AM
To: Lackey, Johnny
Cc: Whatley, Michael; Moore, Darrell; Schmidlen, Jeff; Douglas_Wilson@Praxair.com
Subject: RE: NAVAJO UNDERGROUND LINES

Johnny:

Good morning. The OCD is in receipt of your request for approval of the Praxair technology and is evaluating your request. I am curious as to why Navajo is also not including the ultrasonic wall thickness (Impro) monitoring that complimented Praxair's technology at the time OCD received joint presentations from Praxair and Impro. Is Navajo forgetting the Impro services component of pipeline testing to determine when wall thickness decreases to a point of repair and/or replacement?

Also, OCD will be checking the chemicals in the associated tanks referenced in the leaky pipelines as over time these leaks become point sources for ground water contamination and depending on the days, months, years, etc. Therefore, by receipt of this e-mail, please submit a C-141 for the releases so Navajo and OCD can track corrective actions performed to fix the leaks. Also, if Navajo did not dig out around the leaks to remove the source of contamination, it should proposed monitoring of the ground water downgradient at a minimum to determine if there is a ground water contamination problem downgradient from the leaky lines.

Thank you.

Carl J. Chavez, CHMM
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1220 South St. Francis Dr., Santa Fe, New Mexico 87505
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E-mail: CarlJ.Chavez@state.nm.us
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(Pollution Prevention Guidance is under "Publications")

From: Lackey, Johnny [<mailto:Johnny.Lackey@hollycorp.com>]
Sent: Tuesday, April 20, 2010 12:51 PM
To: Chavez, Carl J, EMNRD

Cc: Whatley, Michael; Moore, Darrell; Schmidlen, Jeff; Douglas_Wilson@Praxair.com
Subject: NAVAJO UNDERGROUND LINES

Carl,

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Praxair provides leak detection technology for underground pipe testing. To test Praxair's technology for underground piping leak detection, Navajo proactively had Praxair install monitors on selected segments of piping that we assumed operating responsibilities from Holly Energy Partner's. Praxair injected their tracer into these selected segments (13 lines) and their sampling results identified two lines that indicated a leak was present (See attached Praxair Report). Both lines that had suspected leaks are included in the package of assets acquired from Holly Energy Partners. The lines with potential leaks are as follows:

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The Praxair process would let Navajo test the line segments that cannot be removed from service without a scheduled outage allowing testing of these lines within the discharge permit time frame without refinery disruption. This process eliminates the potential for product or oily water release if there is a failure during pressure testing or hydrostatic testing of the lines.

Attached is a spreadsheet listing the additional lines to be added to our test schedule, copies of the isometric drawings for each line segment (The sketch number on the spreadsheet references the corresponding isometric drawing) and Praxair's Report detailing the trial test results mentioned above.

Navajo requests approval from the OCD to utilize Praxair's Leak Detection Technology for underground pipe testing at our Artesia and Lovington refineries. Navajo and Praxair will be happy to meet with the OCD in Santa Fe to present this technology in detail.

Thanks,

Johnny Lackey
Environmental Manager
Navajo Refining Company, L.L.C.
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Cell - 972-261-8075
Fax - 575-746-5451
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Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Wednesday, April 21, 2010 4:18 PM
To: 'Strange, Aaron'
Cc: Chavez, Carl J, EMNRD
Subject: Release Notifications & C-141s for Navajo Refining Company (GW-14 and GW-28)

Aaron:

OCD would appreciate notification e-mails with a copy to the OCD District Supervisor on releases with an indication of whether a C-141 Form is to follow. As I mentioned at refineries, where the discovery of leakage from pipelines, tanks, etc. are not known, it is best to take the conservative approach to reporting all of these type of spills/releases where the volume is not known. And on all fire and explosions, Navajo Refining Company seem to be following the permit condition on reporting, etc. Thank you.

Please contact me if you have questions. Thank you.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3490
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: <http://www.emnrd.state.nm.us/oecd/index.htm>
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Chavez, Carl J, EMNRD

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Cc: VonGonten, Glenn, EMNRD; Monzeglio, Hope, NMENV
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Office - 575-746-5490
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Johnny.Lackey@hollycorp.com

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Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Thursday, April 15, 2010 10:15 AM
To: Chavez, Carl J, EMNRD
Cc: Dade, Randy, EMNRD
Subject: Navajo Release Notification (GW-028)

Aaron Strange notified me today at 10:01 a.m. about a release at their effluent line to WDW-2 or 3? He said they blocked in discharge to the wells and he thinks they are routing effluent to ABTs? The leak was noticed around 9:40 a.m. and is within 100 to 150 feet of the injection well, so the leak is not near the Pecos River. The cause is a suspected leaky clamp on the line.

By receipt of this note, if OCD Artesia could investigate and while you're there inquire about the location of the last leak (~1 mo. ago) along the discharge line. OCD does not recall receiving a C-141 for that release called in by Darrell Moore and we don't know the details. Thanks.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3490
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: <http://www.emnrd.state.nm.us/ocd/index.htm>
(Pollution Prevention Guidance is under "Publications")

Chavez, Carl J, EMNRD

From: Strange, Aaron [aaron.strange@hollycorp.com]
Sent: Wednesday, March 31, 2010 7:52 AM
To: Chavez, Carl J, EMNRD
Subject: RE: Excavated Line Testing Soil.

Hello Carl,

There was no release associated with excavated soil mentioned below. A section of pipe was excavated for inspection in conjunction with the line testing. No leaks were found, however the soil removed had visual signs (appeared gray) of historic contamination.

Aaron Strange
Environmental Technician, Senior
Off: (575) 746-5468
Cell: (575) 703-5057

From: Chavez, Carl J, EMNRD [mailto:CarlJ.Chavez@state.nm.us]
Sent: Tuesday, March 30, 2010 2:59 PM
To: Strange, Aaron
Subject: RE: Excavated Line Testing Soil.

Aaron:

Thanks for the submittal. Is there a C-141 for this release? Thanks.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3490
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E-mail: CarlJ.Chavez@state.nm.us
Website: <http://www.emnrd.state.nm.us/oed/index.htm>
(Pollution Prevention Guidance is under "Publications")

From: Strange, Aaron [mailto:aaron.strange@hollycorp.com]
Sent: Wednesday, March 17, 2010 3:45 PM
To: Kim Flowers; Chavez, Carl J, EMNRD
Subject: Excavated Line Testing Soil.

Kim,

Please see the attachment requesting the approval of excavated soil from line testing north of the Diesel Boosters from the Artesia Plant.

Thanks,

Aaron Strange
Environmental Technician, Senior
Environmental Department
Navajo Refining Co, LLC
Artesia NM
Off: (575) 746-5468
Cell: (575) 703-5057

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District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources
Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised October 10, 2003

Submit 2 Copies to appropriate
District Office in accordance
with Rule 116 on back
side of form

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company: Navajo Refining Co. LLC	Contact: Aaron Strange
Address: 501 E. Main Street Artesia, N.M. 88210	Telephone No. 575-748-3311
Facility Name: Artesia Plant	Facility Type: Petroleum Refinery

Surface Owner	Mineral Owner	Lease No.
---------------	---------------	-----------

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
-------------	---------	----------	-------	---------------	------------------	---------------	----------------	--------

Latitude _____ Longitude _____

NATURE OF RELEASE

Type of Release: Spill of Treated Waster Water (by Aggressive Bio. Treatment)	Volume of Release: Unknown	Volume Recovered: ~0 barrels
Source of Release: Effluent line leak between the Chukka and Gaines Injection Wells.	Date and Hour of Occurrence: 02/20/2010 ~ 12:10	Date and Hour of Discovery: 02/20/2010 ~ 12:30
Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required	If YES, To Whom? Left a voicemail with Carl Chavez with OCD in Santa Fe (505-476-3490), left a voicemail with Hope Monzeglio from the NMED Haz Waste Bureau (505-476-6045), and left a voicemail with the OCD Artesia Office (575-748-1283 extension 104). OCD (Artesia) called back.	
By Whom? Darrell Moore	Date and Hour: 02/20/2010 at ~13:50 to Carl Chavez (OCD Santa Fe), 02/20/2010 at ~14:15 to Hope Monzeglio (NMED Haz Waste Bureau), and 02/31/2010 at ~14:17 to the OCD Artesia office.	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse. NA	

If a Watercourse was Impacted, Describe Fully.* NA


Describe Cause of Problem and Remedial Action Taken.*

On 02/20/2010 at ~ 12:30 the waste water effluent line began to leak between the Chukka and Gaines Injection Wells. The effluent line was blocked in at the Waste Water Treater (inside the refinery) at ~ 13:04 on 02/20/2010 to stop the leak and repair the line. The leak was excavated and the line was clamped and is holding.

Describe Area Affected and Cleanup Action Taken.*

The area affected was the effluent line between the Chukka and Gaines Injection wells. The leak was excavated to make repairs and the soil was placed into six roll off bins. The leak did not stain the soil; however Navajo will dispose of the excavated soil per analytical results.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: 	OIL CONSERVATION DIVISION		
Printed Name: Aaron Strange	Approved by District Supervisor:		
Title: Sr. Environmental Technician	Approval Date:	Expiration Date:	
E-mail Address: aaron.strange@hollycorp.com	Conditions of Approval:		Attached <input type="checkbox"/>
Date: 03/05/2010	Phone: 575-703-5057		

GW - 028

C-141s
(2)

Chavez, Carl J, EMNRD

From: Combs, Robert <Robert.Combs@HollyFrontier.com>
Sent: Tuesday, September 01, 2015 10:42 AM
To: Chavez, Carl J, EMNRD
Subject: Test 2
Attachments: Revised WW line investigation plan.pdf

Carl,

Please let me know if you receive this file or if it again is encrypted. You should not have to register to read our emails. This is a problem on our end and we will work to resolve it.

Thanks,
Robert

Robert Combs

Environmental Specialist
The HollyFrontier Companies
P.O. Box 159
Artesia, NM 88211-0159
office: 575-746-5382
cell: 575-308-2718
fax: 575-746-5451
Robert.Combs@hollyfrontier.com

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Mr. Scott Denton
Environmental Manager
Navajo Refining Company, LLC
501 East Main
Artesia, New Mexico 88211

ARCADIS U.S., Inc.
2929 Briarpark Drive
Suite 300
Houston
Texas 77042
Tel 713 953 4800
Fax 713 977 4620
www.arcadis-us.com

Subject:

Revised Potential Soil Response Action Levels for Wastewater Pipeline Break near the Evaporation Ponds Area, Navajo Refining Company Artesia Refinery

ENVIRONMENT

Dear Mr. Denton:

Date:

August 21, 2015

ARCADIS is providing this letter discussing potential soil response action levels in relation to the reported release of wastewater that occurred approximately 1500 feet south of the inactive former Evaporation Ponds (EPs) associated with the Navajo Refining Company, L.L.C. (NRC) Artesia Refinery (Refinery). The EPs are a Resource Conservation and Recovery Act (RCRA) regulated unit. Documentation of the information relevant to the release was provided on June 11, 2015. Based on conversations with the New Mexico Energy, Minerals and Natural Resources Department Oil Conservation Division (OCD), the proposed assessment has been revised.

Contact:

Pamela R. Krueger

Phone:

713.953.4816

Email:

pam.krueger@arcadis-us.com

It is our understanding that the release occurred due to a break in the pipeline that conveys treated wastewater from the Refinery to injection wells located approximately 12 miles east of the Refinery. The break occurred approximately three miles east of the Refinery, south of the Evaporation Ponds (Figure 1).

Our ref:

TX001155

The wastewater that is conveyed through the pipeline is sampled quarterly and analyzed for waste characterization purposes. A copy of the first quarter 2015 wastewater analytical report is provided in Attachment 1 to this letter. The sample was analyzed for total metals, anions, cations, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), corrosivity, reactivity, ignitability, specific conductance, specific gravity, total dissolved solids (TDS), and pH. In addition, the sample was analyzed for eight metals using the toxicity characteristic leaching procedure (TCLP).

The analytical results indicate that the wastewater is not corrosive, not reactive, not ignitable, not toxic (no TCLP metals detected), and contains no VOCs above the New Mexico Water Quality Control Commission (WQCC) standards. The following compounds were reported above the WQCC standards:

Imagine the result

- Phenol was reported at 0.0081 mg/L, above the WQCC standard of 0.005mg/L
- Iron was reported at 3.7 mg/L, above the WQCC standard of 1.0 mg/L
- Manganese was reported at 0.25 mg/L, above the WQCC standard of 0.2 mg/L
- Chloride was reported at 300 mg/L, above the WQCC standard of 250 mg/L
- Fluoride was reported at 11 mg/L, above the WQCC standard of 1.6 mg/L
- Sulfate was reported at 2,100 mg/L, above the WQCC standard of 600 mg/L
- TDS was reported at 3,710 mg/L, above the WQCC standard of 1,000 mg/L

ARCADIS understands that the OCD requested that a soil investigation and remediation be performed, as well as a limited groundwater investigation.

Although the wastewater sample analytical results do exceed the WQCC standards for water quality parameters, including chloride, it should be noted that the area in which the release occurred is known to have elevated chloride concentrations in soil and groundwater, along with other cations, anions and total metals. In 2013, as part of the Phase IV Corrective Action Investigation of the EPs, ARCADIS collected soil samples from 12 soil borings and analyzed the samples for thirteen total metals and for three anions, including chloride, fluoride, and sulfate. A statistical evaluation of the background soil sample results was performed to determine an appropriate upper tolerance limit (UTL) for the data obtained. A copy of the statistical evaluation memo is provided as Attachment 2 to this letter, including a table with a summary of the UTLs calculated for each parameter evaluated.

Figure 1 shows the locations of the background soil samples collected in 2013 (locations BG-01 through BG-12). The borings were located on both sides of the Pecos River, in locations both to the east and west of the EPs. These areas were selected based on their proximity to the EPs, yet outside of the RCRA-regulated unit and outside of the area of potential impacts from the operation of the EPs. Thus, these soil borings were considered representative of the native conditions of soil in the vicinity of the EPs. As a result, it would be appropriate to use the UTLs from this background soil study as alternative action levels for screening potential impacts from the wastewater line release.

As per the OCD requests, soil samples and groundwater samples will be collected as close as possible to the pipeline break and from a location approximately 50 feet to the northwest, or hydraulically upgradient, of the pipeline break. Two soil borings will

be installed and converted into temporary wells. The proposed locations of these borings/temporary wells are provided on Figure 1.

The soil borings will be installed by a State of New Mexico licensed well driller, using a truck-mounted hollow-stem auger rig. Soil samples will be collected continuously and screened using a photo-ionization detector (PID) and visual observations. Discrete soil samples will be collected for laboratory analysis from the following depths below ground surface: 0-1 feet (surface), 3-4 feet (below the 3 foot deep pipeline), and capillary zone above encountered groundwater. The soil samples will be analyzed for the following:

- Total Petroleum Hydrocarbons (TPH):
 - Gasoline Range Organics (GRO)
 - Diesel Range Organics (DRO)
 - Oil Range Organics (ORO)
- Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)
- Chloride
- Fluoride
- Sulfate
- Iron
- Manganese
- Phenol

The soil analytical results will be compared to the calculated background UTL (chloride, fluoride, sulfate, iron, and manganese). For parameters that do not have a calculated background UTL, the analytical results will be compared to the lower of the OCD spill cleanup guidelines and/or the residential or soil-leaching-to-groundwater soil screening levels (SSLs) published by the New Mexico Environment Department. Table 1 presents the proposed screening values for the analytical suite.

The soil borings will be extended to five feet below the observed depth of groundwater. The temporary monitoring wells will be constructed of 2-inch polyvinyl chlorinated (PVC) casing with 5 feet of 0.010-inch well screen. Solid 2-inch diameter PVC casing will be attached to the screen interval and extended to the ground surface. Clean sand will be placed in the annular space to approximately 2 feet above the well screen top as filter pack, then a two-foot bentonite seal will be placed above the filter pack. The PVC casing will be cut off approximately 3 feet above the ground surface. Since the wells will be temporary, a manhole and pad will not be installed.

Both temporary wells will be developed by bailing or pumping to remove fine-grained materials. Water quality parameters will be monitored throughout the development process and development will be considered complete when the parameters have

stabilized. The volume of development water will be recorded and the development water will be disposed of in the refinery process wastewater system.

Groundwater samples will be collected from each of the two temporary monitoring wells, unless there is more than 0.03 feet of phase-separated hydrocarbons (PSH) present in the wells. Groundwater samples will be collected no sooner than 24 hours after the temporary wells have been developed. The groundwater samples will be analyzed for the following:

- TPH (GRO, DRO, ORO)
- BTEX
- Phenol

The groundwater analytical results will be compared to the WQCC standards. The WQCC standards do not include a value for TPH, therefore, the NMED screening value for TPH in groundwater will be used for comparison. Table 2 provides a summary of the groundwater screening values.

A letter report will be prepared and submitted to OCD, documenting the field activities and the analytical results of the investigation. If any of the soil or groundwater results exceed the proposed screening levels, then additional delineation may be warranted and will be proposed in the letter report.

Should you have any questions or comments, please feel free to contact me at 713.953.4816.

Sincerely,

ARCADIS U.S., Inc.



Pamela R. Krueger
Principal-in-Charge

Enclosures:

Figure 1

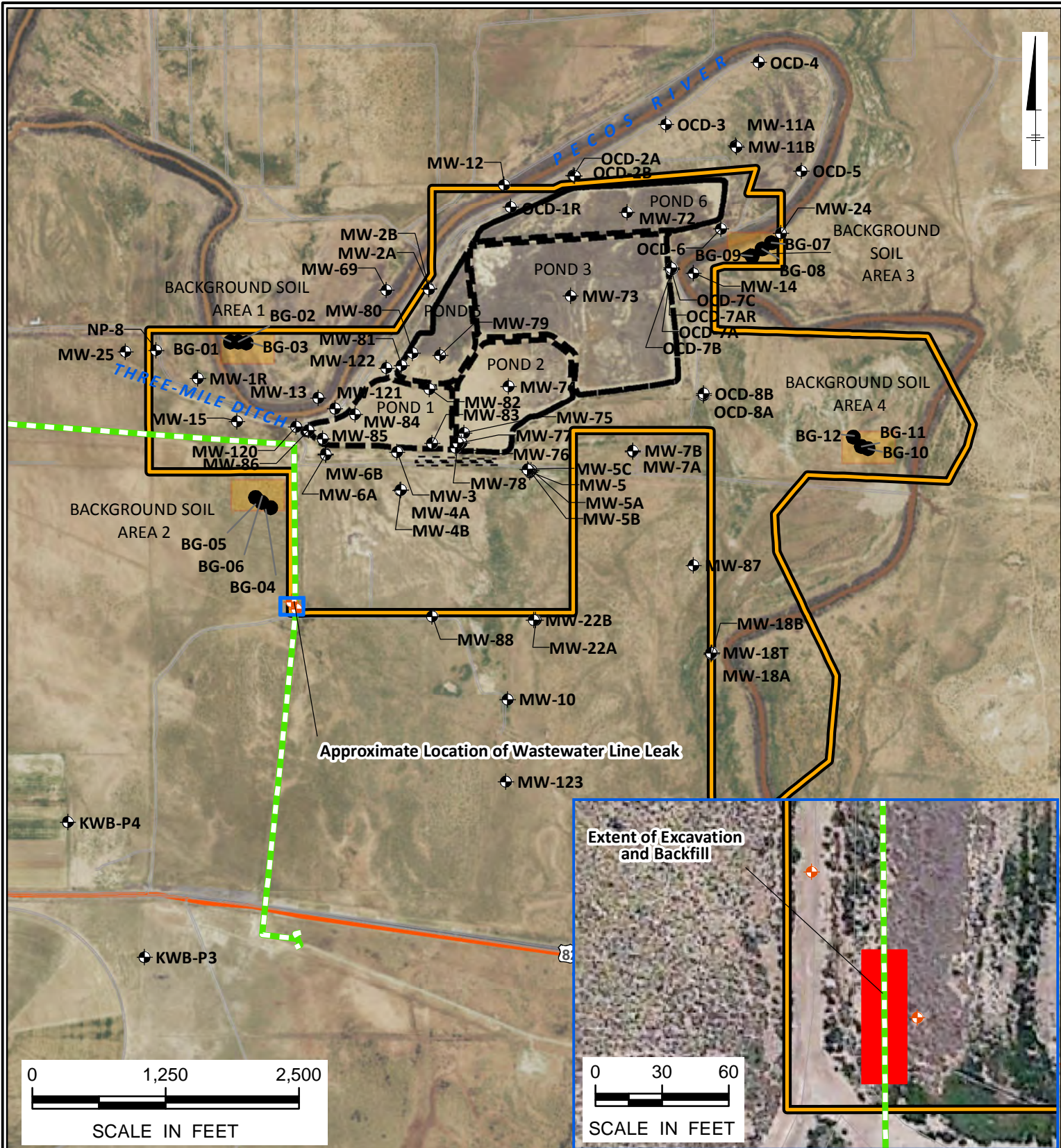
Table 1

Table 2

Attachment 1: Wastewater Analytical Report

Attachment 2: EP Background Soil Statistical Evaluation Memo

Figure



LEGEND

- EXISTING MONITORING WELLS
- ◆ PROPOSED BORINGS/TEMPORARY WELLS
- BACKGROUND SOIL SAMPLES
- WASTE WATER
- APPROXIMATE PIPELINE LOCATION
- ▭ NAVAJO PROPERTY BOUNDARY
- ▭ POND BOUNDARIES
- ▭ PHASE IV BACKGROUND SAMPLE LOCATION
- ▭ EXTENT OF EXCAVATION AND BACKFILL

NAVAJO REFINING COMPANY
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

APPROXIMATE LOCATION OF WASTEWATER LINE LEAK



FIGURE

1

Tables

Table 1
Proposed Action Levels for Soil Delineation
Wastewater Line Leak, Artesia, NM

Parameter	OCD Spill Guideline ^a (mg/kg)	Background UTL (mg/kg)	Residential SSL (mg/kg)	DAF 20 SSL (mg/kg)
TPH GRO	100	--	--	--
TPH DRO	100	--	1000	--
TPH ORO	100	--	1000	--
Benzene	10	--	17.8	0.0380
Ethylbenzene	--	--	75.1	0.262
Toluene	--	--	5228	12.1
Xylenes	--	--	871	2.98
BTEX	50	--	--	--
Chloride	--	5264	--	--
Fluoride	--	17.9	--	--
Sulfate	--	9336	--	--
Iron	--	17344	--	--
Manganese	--	488	--	--
Phenol	--	--	18490	52.3

^a Ranking criteria score of >19 based on depth to groundwater
Values shaded in grey are the proposed action levels

BTEX = benzene, toluene, ethylbenzene, total xylenes combined

DAF 20 = dilution attenuation factor of 20

DRO = diesel range organics

GRO = gasoline range organics

mg/kg = milligrams per kilogram

ORO = oil range organics

SSL = soil screening level

TPH = total petroleum hydrocarbons

UTL = upper tolerance limit

Table 2
Proposed Action Levels for Groundwater Delineation
Wastewater Line Leak, Artesia, NM

Parameter	WQCC Standard (mg/L)	NMED TPH Screening Level (mg/L)
TPH GRO	--	--
TPH DRO	--	0.2
TPH ORO	--	0.2
Benzene	0.01	--
Ethylbenzene	0.75	--
Toluene	0.75	--
Xylenes	0.62	--
Phenol	0.005	--

DRO = diesel range organics

GRO = gasoline range organics

mg/kg = milligrams per kilogram

NMED = New Mexico Environment Department

ORO = oil range organics

TPH = total petroleum hydrocarbons

WQCC = Water Quality Control Commission



Attachment 1

Wastewater Analytical Report



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

March 25, 2015

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

RE: Quarterly WDW-1, 2, &3 Inj Well

OrderNo.: 1502959

Dear Dan Crawford:

Hall Environmental Analysis Laboratory received 2 sample(s) on 2/24/2015 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.

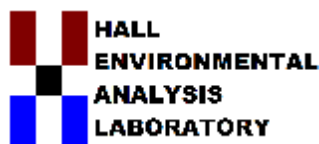
Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109



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

Case Narrative

WO#: 1502959
Date: 3/25/2015

CLIENT: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

The following compounds were also scanned for by NIST library search and not detected. The detection level for these compounds would be ~10ppb:

Allyl alcohol
t-amyl ethyl ether
Bis(2-chloroethyl)sulfide
Bromoacetone
Chloral hydrate
1-chlorobutane
1-chlorohexane
2-chloroethanol
Crotonaldehyde
Cis-1,4-Dichloro-2butene
1,3-Dichloro-2-propanol
1,2,3,4-Depoxybutane
Ethanol
Ethylene oxide
Malonitrile
Methanol
Methyl acrylate
2-Nitropropane
Paraldehyde
Pentafluorobenzene
2-Pentanone
2-picoline
1-propanol
2-propanol
Propargyl alcohol
Beta-propiolactone
n-propylamine

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1502959**

Date Reported: **3/25/2015**

CLIENT: Navajo Refining Company

Client Sample ID: WDW-1,2,&3 Effluent

Project: Quarterly WDW-1, 2, &3 Inj Well

Collection Date: 2/23/2015 8:30:00 AM

Lab ID: 1502959-001

Matrix: AQUEOUS

Received Date: 2/24/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 300.0: ANIONS							Analyst: LGT
Fluoride	11	5.0	*	mg/L	50	2/24/2015 11:37:59 PM	R24502
Chloride	300	25		mg/L	50	2/24/2015 11:37:59 PM	R24502
Nitrogen, Nitrite (As N)	ND	0.50		mg/L	5	2/24/2015 11:25:35 PM	R24502
Bromide	1.1	0.50		mg/L	5	2/24/2015 11:25:35 PM	R24502
Nitrogen, Nitrate (As N)	ND	0.50		mg/L	5	2/24/2015 11:25:35 PM	R24502
Phosphorus, Orthophosphate (As P)	ND	2.5		mg/L	5	2/24/2015 11:25:35 PM	R24502
Sulfate	2100	25		mg/L	50	2/24/2015 11:37:59 PM	R24502
EPA METHOD 7470: MERCURY							Analyst: MED
Mercury	ND	0.00020		mg/L	1	2/26/2015 9:31:31 AM	17887
MERCURY, TCLP							Analyst: MED
Mercury	ND	0.020		mg/L	1	3/10/2015 8:26:24 AM	18037
EPA METHOD 6010B: TCLP METALS							Analyst: ELS
Arsenic	ND	5.0		mg/L	1	3/7/2015 2:01:03 PM	18024
Barium	ND	100		mg/L	1	3/7/2015 2:01:03 PM	18024
Cadmium	ND	1.0		mg/L	1	3/7/2015 2:01:03 PM	18024
Chromium	ND	5.0		mg/L	1	3/7/2015 2:01:03 PM	18024
Lead	ND	5.0		mg/L	1	3/7/2015 2:01:03 PM	18024
Selenium	ND	1.0		mg/L	1	3/7/2015 2:01:03 PM	18024
Silver	ND	5.0		mg/L	1	3/7/2015 2:01:03 PM	18024
EPA 6010B: TOTAL METALS							Analyst: ELS
Aluminum	2.0	0.020		mg/L	1	3/7/2015 1:56:58 PM	18024
Antimony	ND	0.050		mg/L	1	3/7/2015 1:56:58 PM	18024
Arsenic	0.029	0.020		mg/L	1	3/7/2015 1:56:58 PM	18024
Barium	ND	0.020		mg/L	1	3/7/2015 1:56:58 PM	18024
Beryllium	ND	0.0030		mg/L	1	3/7/2015 1:56:58 PM	18024
Cadmium	ND	0.0020		mg/L	1	3/7/2015 1:56:58 PM	18024
Calcium	85	1.0		mg/L	1	3/10/2015 12:46:11 PM	18050
Chromium	ND	0.0060		mg/L	1	3/7/2015 1:56:58 PM	18024
Cobalt	ND	0.0060		mg/L	1	3/7/2015 1:56:58 PM	18024
Copper	0.0068	0.0060		mg/L	1	3/7/2015 1:56:58 PM	18024
Iron	3.7	0.050		mg/L	1	3/7/2015 1:56:58 PM	18024
Lead	ND	0.0050		mg/L	1	3/7/2015 1:56:58 PM	18024
Magnesium	26	1.0		mg/L	1	3/10/2015 12:46:11 PM	18050
Manganese	0.25	0.0020		mg/L	1	3/7/2015 1:56:58 PM	18024
Nickel	0.035	0.010		mg/L	1	3/7/2015 1:56:58 PM	18024
Potassium	35	1.0		mg/L	1	3/10/2015 12:46:11 PM	18050
Selenium	ND	0.050		mg/L	1	3/7/2015 1:56:58 PM	18024

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
	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
	O RSD is greater than RSDlimit	P Sample pH Not In Range
	R RPD outside accepted recovery limits	RL Reporting Detection Limit
	S Spike Recovery outside accepted recovery limits	

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1502959**

Date Reported: **3/25/2015**

CLIENT: Navajo Refining Company

Client Sample ID: WDW-1,2,&3 Effluent

Project: Quarterly WDW-1, 2, &3 Inj Well

Collection Date: 2/23/2015 8:30:00 AM

Lab ID: 1502959-001

Matrix: AQUEOUS

Received Date: 2/24/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA 6010B: TOTAL METALS							Analyst: ELS
Silver	ND	0.0050		mg/L	1	3/7/2015 1:56:58 PM	18024
Sodium	1300	20		mg/L	20	3/10/2015 12:51:05 PM	18050
Thallium	ND	0.050		mg/L	1	3/7/2015 1:56:58 PM	18024
Vanadium	ND	0.050		mg/L	1	3/7/2015 1:56:58 PM	18024
Zinc	0.064	0.020		mg/L	1	3/7/2015 1:56:58 PM	18024
EPA METHOD 8260B: VOLATILES							Analyst: SUB
Acetonitrile	ND	5.0		µg/L	1	3/3/2015	R24992
Allyl chloride	ND	0.50		µg/L	1	3/3/2015	R24992
Chloroprene	ND	0.50		µg/L	1	3/3/2015	R24992
Cyclohexane	ND	0.50		µg/L	1	3/3/2015	R24992
Diethyl ether	ND	0.50		µg/L	1	3/3/2015	R24992
Diisopropyl ether	ND	0.50		µg/L	1	3/3/2015	R24992
Epichlorohydrin	ND	5.0		µg/L	1	3/3/2015	R24992
Ethyl acetate	ND	0.50		µg/L	1	3/3/2015	R24992
Ethyl methacrylate	ND	2.5		µg/L	1	3/3/2015	R24992
Ethyl tert-butyl ether	ND	0.50		µg/L	1	3/3/2015	R24992
Freon-113	ND	0.50		µg/L	1	3/3/2015	R24992
Isobutanol	ND	50		µg/L	1	3/3/2015	R24992
Isopropyl acetate	ND	0.50		µg/L	1	3/3/2015	R24992
Methacrylonitrile	ND	5.0		µg/L	1	3/3/2015	R24992
Methyl acetate	ND	0.50		µg/L	1	3/3/2015	R24992
Methyl ethyl ketone	ND	2.5		µg/L	1	3/3/2015	R24992
Methyl isobutyl ketone	ND	2.5		µg/L	1	3/3/2015	R24992
Methyl methacrylate	ND	2.5		µg/L	1	3/3/2015	R24992
Methylcyclohexane	ND	1.0		µg/L	1	3/3/2015	R24992
n-Amyl acetate	ND	0.50		µg/L	1	3/3/2015	R24992
n-Hexane	ND	1.0		µg/L	1	3/3/2015	R24992
Nitrobenzene	ND	5.0		µg/L	1	3/3/2015	R24992
Pentachloroethane	ND	5.0		µg/L	1	3/3/2015	R24992
p-isopropyltoluene	1.4	0.50		µg/L	1	3/3/2015	R24992
Propionitrile	ND	5.0		µg/L	1	3/3/2015	R24992
Tetrahydrofuran	ND	0.50		µg/L	1	3/3/2015	R24992
Benzene	ND	0.50		µg/L	1	3/3/2015	R24992
Toluene	ND	0.50		µg/L	1	3/3/2015	R24992
Ethylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Methyl tert-butyl ether (MTBE)	ND	10		µg/L	1	3/3/2015	R24992
1,2,4-Trimethylbenzene	2.8	0.50		µg/L	1	3/3/2015	R24992
1,3,5-Trimethylbenzene	2.7	0.50		µg/L	1	3/3/2015	R24992
1,2-Dichloroethane (EDC)	ND	0.50		µg/L	1	3/3/2015	R24992

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	Page 3 of 25
	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	
	O	RSD is greater than RSDlimit	P	Sample pH Not In Range	
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit	
	S	Spike Recovery outside accepted recovery limits			

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1502959**

Date Reported: **3/25/2015**

CLIENT: Navajo Refining Company

Client Sample ID: WDW-1,2,&3 Effluent

Project: Quarterly WDW-1, 2, &3 Inj Well

Collection Date: 2/23/2015 8:30:00 AM

Lab ID: 1502959-001

Matrix: AQUEOUS

Received Date: 2/24/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
1,2-Dibromoethane (EDB)	ND	0.50		µg/L	1	3/3/2015	R24992
Naphthalene	ND	0.50		µg/L	1	3/3/2015	R24992
Acetone	57	2.5		µg/L	1	3/3/2015	R24992
Bromobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Bromodichloromethane	ND	0.50		µg/L	1	3/3/2015	R24992
Bromoform	ND	0.50		µg/L	1	3/3/2015	R24992
Bromomethane	ND	0.50		µg/L	1	3/3/2015	R24992
Carbon disulfide	0.53	0.50		µg/L	1	3/3/2015	R24992
Carbon Tetrachloride	ND	0.50		µg/L	1	3/3/2015	R24992
Chlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Chloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
Chloroform	ND	0.50		µg/L	1	3/3/2015	R24992
Chloromethane	ND	0.50		µg/L	1	3/3/2015	R24992
2-Chlorotoluene	ND	0.50		µg/L	1	3/3/2015	R24992
4-Chlorotoluene	ND	0.50		µg/L	1	3/3/2015	R24992
cis-1,2-DCE	ND	0.50		µg/L	1	3/3/2015	R24992
cis-1,3-Dichloropropene	ND	0.50		µg/L	1	3/3/2015	R24992
1,2-Dibromo-3-chloropropane	ND	0.50		µg/L	1	3/3/2015	R24992
Dibromochloromethane	ND	0.50		µg/L	1	3/3/2015	R24992
Dibromomethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,2-Dichlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
1,3-Dichlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
1,4-Dichlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Dichlorodifluoromethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,1-Dichloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,1-Dichloroethene	ND	0.50		µg/L	1	3/3/2015	R24992
1,2-Dichloropropane	ND	0.50		µg/L	1	3/3/2015	R24992
1,3-Dichloropropane	ND	0.50		µg/L	1	3/3/2015	R24992
2,2-Dichloropropane	ND	0.50		µg/L	1	3/3/2015	R24992
1,1-Dichloropropene	ND	0.50		µg/L	1	3/3/2015	R24992
Hexachlorobutadiene	ND	0.50		µg/L	1	3/3/2015	R24992
2-Hexanone	ND	0.50		µg/L	1	3/3/2015	R24992
Isopropylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Methylene Chloride	ND	2.5		µg/L	1	3/3/2015	R24992
n-Butylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
n-Propylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
sec-Butylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Styrene	ND	0.50		µg/L	1	3/3/2015	R24992
tert-Butylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992

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	Page 4 of 25
	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	
	O RSD is greater than RSDlimit	P Sample pH Not In Range	
	R RPD outside accepted recovery limits	RL Reporting Detection Limit	
	S Spike Recovery outside accepted recovery limits		

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1502959**

Date Reported: **3/25/2015**

CLIENT: Navajo Refining Company

Client Sample ID: WDW-1,2,&3 Effluent

Project: Quarterly WDW-1, 2, &3 Inj Well

Collection Date: 2/23/2015 8:30:00 AM

Lab ID: 1502959-001

Matrix: AQUEOUS

Received Date: 2/24/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
1,1,1,2-Tetrachloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,1,2,2-Tetrachloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
Tetrachloroethene (PCE)	ND	0.50		µg/L	1	3/3/2015	R24992
trans-1,2-DCE	ND	0.50		µg/L	1	3/3/2015	R24992
trans-1,3-Dichloropropene	ND	0.50		µg/L	1	3/3/2015	R24992
1,2,3-Trichlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
1,2,4-Trichlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
1,1,1-Trichloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,1,2-Trichloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
Trichloroethene (TCE)	ND	0.50		µg/L	1	3/3/2015	R24992
Trichlorofluoromethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,2,3-Trichloropropane	ND	0.50		µg/L	1	3/3/2015	R24992
Vinyl chloride	ND	0.50		µg/L	1	3/3/2015	R24992
mp-Xylenes	2.4	1.0		µg/L	1	3/3/2015	R24992
o-Xylene	1.7	0.50		µg/L	1	3/3/2015	R24992
tert-Amyl methyl ether	ND	0.50		µg/L	1	3/3/2015	R24992
tert-Butyl alcohol	21	10		µg/L	1	3/3/2015	R24992
Acrolein	ND	0.50		µg/L	1	3/3/2015	R24992
Acrylonitrile	ND	0.50		µg/L	1	3/3/2015	R24992
Bromochloromethane	ND	0.50		µg/L	1	3/3/2015	R24992
2-Chloroethyl vinyl ether	ND	0.50		µg/L	1	3/3/2015	R24992
Iodomethane	ND	0.50		µg/L	1	3/3/2015	R24992
trans-1,4-Dichloro-2-butene	ND	0.50		µg/L	1	3/3/2015	R24992
Vinyl acetate	ND	0.50		µg/L	1	3/3/2015	R24992
1,4-Dioxane	ND	20		µg/L	1	3/3/2015	R24992
Surr: 1,2-Dichlorobenzene-d4	110	70-130		%REC	1	3/3/2015	R24992
Surr: 4-Bromofluorobenzene	100	70-130		%REC	1	3/3/2015	R24992
Surr: Toluene-d8	99.6	70-130		%REC	1	3/3/2015	R24992
EPA 8270C: SEMIVOLATILES/MOD							Analyst: SUB
1,1-Biphenyl	ND	5.0		µg/L	1	3/2/2015	R24992
Atrazine	ND	5.0		µg/L	1	3/2/2015	R24992
Benzaldehyde	ND	5.0		µg/L	1	3/2/2015	R24992
Caprolactam	ND	5.0		µg/L	1	3/2/2015	R24992
N-Nitroso-di-n-butylamine	ND	5.0		µg/L	1	3/2/2015	R24992
Acetophenone	ND	10		µg/L	1	3/2/2015	R24992
1-Methylnaphthalene	ND	10		µg/L	1	3/2/2015	R24992
2,3,4,6-Tetrachlorophenol	ND	10		µg/L	1	3/2/2015	R24992
2,4,5-Trichlorophenol	ND	10		µg/L	1	3/2/2015	R24992
2,4,6-Trichlorophenol	ND	10		µg/L	1	3/2/2015	R24992

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	Page 5 of 25
	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	
	O	RSD is greater than RSDlimit	P	Sample pH Not In Range	
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit	
	S	Spike Recovery outside accepted recovery limits			

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1502959

Date Reported: 3/25/2015

CLIENT: Navajo Refining Company

Client Sample ID: WDW-1,2,&3 Effluent

Project: Quarterly WDW-1, 2, &3 Inj Well

Collection Date: 2/23/2015 8:30:00 AM

Lab ID: 1502959-001

Matrix: AQUEOUS

Received Date: 2/24/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA 8270C: SEMIVOLATILES/MOD							Analyst: SUB
2,4-Dichlorophenol	ND	10		µg/L	1	3/2/2015	R24992
2,4-Dimethylphenol	710	10		µg/L	1	3/2/2015	R24992
2,4-Dinitrophenol	ND	10		µg/L	1	3/2/2015	R24992
2,4-Dinitrotoluene	ND	10		µg/L	1	3/2/2015	R24992
2,6-Dinitrotoluene	ND	10		µg/L	1	3/2/2015	R24992
2-Chloronaphthalene	ND	10		µg/L	1	3/2/2015	R24992
2-Chlorophenol	ND	10		µg/L	1	3/2/2015	R24992
2-Methylnaphthalene	ND	10		µg/L	1	3/2/2015	R24992
2-Methylphenol	480	10		µg/L	1	3/2/2015	R24992
2-Nitroaniline	ND	10		µg/L	1	3/2/2015	R24992
2-Nitrophenol	ND	10		µg/L	1	3/2/2015	R24992
3,3'-Dichlorobenzidine	ND	10		µg/L	1	3/2/2015	R24992
3-Nitroaniline	ND	10		µg/L	1	3/2/2015	R24992
4,6-Dinitro-2-methylphenol	ND	10		µg/L	1	3/2/2015	R24992
4-Bromophenyl phenyl ether	ND	10		µg/L	1	3/2/2015	R24992
4-Chloro-3-methylphenol	ND	5.0		µg/L	1	3/2/2015	R24992
4-Chloroaniline	ND	10		µg/L	1	3/2/2015	R24992
4-Chlorophenyl phenyl ether	ND	10		µg/L	1	3/2/2015	R24992
4-Nitroaniline	ND	10		µg/L	1	3/2/2015	R24992
4-Nitrophenol	ND	10		µg/L	1	3/2/2015	R24992
Acenaphthene	ND	10		µg/L	1	3/2/2015	R24992
Acenaphthylene	ND	10		µg/L	1	3/2/2015	R24992
Anthracene	ND	10		µg/L	1	3/2/2015	R24992
Benzo(g,h,i)perylene	ND	10		µg/L	1	3/2/2015	R24992
Benz(a)anthracene	ND	0.10		µg/L	1	3/2/2015	R24992
Benzo(a)pyrene	ND	0.10		µg/L	1	3/2/2015	R24992
Benzo(b)fluoranthene	ND	0.10		µg/L	1	3/2/2015	R24992
Benzo(k)fluoranthene	ND	0.10		µg/L	1	3/2/2015	R24992
Bis(2-chloroethoxy)methane	ND	10		µg/L	1	3/2/2015	R24992
Bis(2-chloroethyl)ether	ND	10		µg/L	1	3/2/2015	R24992
Bis(2-chloroisopropyl)ether	ND	10		µg/L	1	3/2/2015	R24992
Bis(2-ethylhexyl)phthalate	ND	5.0		µg/L	1	3/2/2015	R24992
Butyl benzyl phthalate	ND	10		µg/L	1	3/2/2015	R24992
Carbazole	ND	10		µg/L	1	3/2/2015	R24992
Chrysene	ND	0.10		µg/L	1	3/2/2015	R24992
Dibenz(a,h)anthracene	ND	0.10		µg/L	1	3/2/2015	R24992
Dibenzofuran	ND	10		µg/L	1	3/2/2015	R24992
Diethyl phthalate	ND	10		µg/L	1	3/2/2015	R24992
Dimethyl phthalate	ND	10		µg/L	1	3/2/2015	R24992

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	Page 6 of 25
	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	
	O	RSD is greater than RSDlimit	P	Sample pH Not In Range	
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit	
	S	Spike Recovery outside accepted recovery limits			

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1502959**

Date Reported: **3/25/2015**

CLIENT: Navajo Refining Company

Client Sample ID: WDW-1,2,&3 Effluent

Project: Quarterly WDW-1, 2, &3 Inj Well

Collection Date: 2/23/2015 8:30:00 AM

Lab ID: 1502959-001

Matrix: AQUEOUS

Received Date: 2/24/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA 8270C: SEMIVOLATILES/MOD							Analyst: SUB
Di-n-butyl phthalate	ND	10		µg/L	1	3/2/2015	R24992
Di-n-octyl phthalate	ND	10		µg/L	1	3/2/2015	R24992
Fluoranthene	ND	10		µg/L	1	3/2/2015	R24992
Fluorene	ND	10		µg/L	1	3/2/2015	R24992
Hexachlorobenzene	ND	1.0		µg/L	1	3/2/2015	R24992
Hexachlorobutadiene	ND	10		µg/L	1	3/2/2015	R24992
Hexachlorocyclopentadiene	ND	10		µg/L	1	3/2/2015	R24992
Hexachloroethane	ND	10		µg/L	1	3/2/2015	R24992
Indeno(1,2,3-cd)pyrene	ND	5.0		µg/L	1	3/2/2015	R24992
Isophorone	ND	10		µg/L	1	3/2/2015	R24992
Naphthalene	ND	10		µg/L	1	3/2/2015	R24992
Nitrobenzene	ND	10		µg/L	1	3/2/2015	R24992
N-Nitrosodi-n-propylamine	ND	10		µg/L	1	3/2/2015	R24992
N-Nitrosodiphenylamine	ND	2.0		µg/L	1	3/2/2015	R24992
Pentachlorophenol	ND	10		µg/L	1	3/2/2015	R24992
Phenanthrene	ND	10		µg/L	1	3/2/2015	R24992
Phenol	8.1	5.0		µg/L	1	3/2/2015	R24992
Pyrene	ND	10		µg/L	1	3/2/2015	R24992
o-Toluidine	ND	5.0		µg/L	1	3/2/2015	R24992
Pyridine	ND	5.0		µg/L	1	3/2/2015	R24992
1,2,4,5-Tetrachlorobenzene	ND	10		µg/L	1	3/2/2015	R24992
Surr: 2,4,6-Tribromophenol	121	10-123		%REC	1	3/2/2015	R24992
Surr: 2-Fluorobiphenyl	80.8	19-130		%REC	1	3/2/2015	R24992
Surr: 2-Fluorophenol	83.8	21-110		%REC	1	3/2/2015	R24992
Surr: Nitrobenzene-d5	85.6	25-130		%REC	1	3/2/2015	R24992
Surr: Phenol-d5	86.4	10-125		%REC	1	3/2/2015	R24992
Surr: Terphenyl-d14	29.7	21-141		%REC	1	3/2/2015	R24992
CORROSIVITY							Analyst: SUB
pH	7.01	0.100		pH Units	1	2/27/2015	R24992
IGNITABILITY METHOD 1010							Analyst: SUB
Ignitability	>200	0		°F	1	3/6/2015	R24992
CYANIDE, REACTIVE							Analyst: SUB
Cyanide, Reactive	ND	1.00		mg/L	1	3/5/2015	R24992
SULFIDE, REACTIVE							Analyst: SUB
Reactive Sulfide	ND	1.0		mg/L	1	3/3/2015	R24992
SM2510B: SPECIFIC CONDUCTANCE							Analyst: JRR
Conductivity	4600	0.010		µmhos/cm	1	3/3/2015 3:37:29 PM	R24621

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.
	E	Value above quantitation range
	J	Analyte detected below quantitation limits
	O	RSD is greater than RSDlimit
	R	RPD outside accepted recovery limits
	S	Spike Recovery outside accepted recovery limits

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

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1502959**

Date Reported: **3/25/2015**

CLIENT: Navajo Refining Company

Client Sample ID: WDW-1,2,&3 Effluent

Project: Quarterly WDW-1, 2, &3 Inj Well

Collection Date: 2/23/2015 8:30:00 AM

Lab ID: 1502959-001

Matrix: AQUEOUS

Received Date: 2/24/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
SM4500-H+B: PH							Analyst: JRR
pH	7.13	1.68	H	pH units	1	3/3/2015 3:37:29 PM	R24621
SM2320B: ALKALINITY							Analyst: JRR
Bicarbonate (As CaCO3)	240	20		mg/L CaCO3	1	3/3/2015 3:37:29 PM	R24621
Carbonate (As CaCO3)	ND	2.0		mg/L CaCO3	1	3/3/2015 3:37:29 PM	R24621
Total Alkalinity (as CaCO3)	240	20		mg/L CaCO3	1	3/3/2015 3:37:29 PM	R24621
SPECIFIC GRAVITY							Analyst: JRR
Specific Gravity	1.002	0			1	3/5/2015 12:07:00 PM	R24648
SM2540C MOD: TOTAL DISSOLVED SOLIDS							Analyst: KS
Total Dissolved Solids	3710	200	*	mg/L	1	2/27/2015 8:17:00 AM	17895

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
	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
	O	RSD is greater than RSDlimit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	Spike Recovery outside accepted recovery limits		

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1502959**

Date Reported: **3/25/2015**

CLIENT: Navajo Refining Company

Client Sample ID: TRIP BLANK

Project: Quarterly WDW-1, 2, &3 Inj Well

Collection Date:

Lab ID: 1502959-002

Matrix: TRIP BLANK

Received Date: 2/24/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
Acetonitrile	ND	5.0		µg/L	1	3/3/2015	R24992
Allyl chloride	ND	0.50		µg/L	1	3/3/2015	R24992
Chloroprene	ND	0.50		µg/L	1	3/3/2015	R24992
Cyclohexane	ND	0.50		µg/L	1	3/3/2015	R24992
Diethyl ether	ND	0.50		µg/L	1	3/3/2015	R24992
Diisopropyl ether	ND	0.50		µg/L	1	3/3/2015	R24992
Epichlorohydrin	ND	5.0		µg/L	1	3/3/2015	R24992
Ethyl acetate	ND	0.50		µg/L	1	3/3/2015	R24992
Ethyl methacrylate	ND	2.5		µg/L	1	3/3/2015	R24992
Ethyl tert-butyl ether	ND	0.50		µg/L	1	3/3/2015	R24992
Freon-113	ND	0.50		µg/L	1	3/3/2015	R24992
Isobutanol	ND	0.50		µg/L	1	3/3/2015	R24992
Isopropyl acetate	ND	0.50		µg/L	1	3/3/2015	R24992
Methacrylonitrile	ND	2.5		µg/L	1	3/3/2015	R24992
Methyl acetate	ND	0.50		µg/L	1	3/3/2015	R24992
Methyl ethyl ketone	ND	2.5		µg/L	1	3/3/2015	R24992
Methyl isobutyl ketone	ND	2.5		µg/L	1	3/3/2015	R24992
Methyl methacrylate	ND	2.5		µg/L	1	3/3/2015	R24992
Methylcyclohexane	ND	1.0		µg/L	1	3/3/2015	R24992
n-Amyl acetate	ND	0.50		µg/L	1	3/3/2015	R24992
n-Hexane	ND	1.0		µg/L	1	3/3/2015	R24992
Nitrobenzene	ND	5.0		µg/L	1	3/3/2015	R24992
Pentachloroethane	ND	5.0		µg/L	1	3/3/2015	R24992
p-isopropyltoluene	ND	0.50		µg/L	1	3/3/2015	R24992
Propionitrile	ND	5.0		µg/L	1	3/3/2015	R24992
Tetrahydrofuran	ND	0.50		µg/L	1	3/3/2015	R24992
Benzene	ND	0.50		µg/L	1	3/3/2015	R24992
Toluene	ND	0.50		µg/L	1	3/3/2015	R24992
Ethylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Methyl tert-butyl ether (MTBE)	ND	10		µg/L	1	3/3/2015	R24992
1,2,4-Trimethylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
1,3,5-Trimethylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
1,2-Dichloroethane (EDC)	ND	0.50		µg/L	1	3/3/2015	R24992
1,2-Dibromoethane (EDB)	ND	0.50		µg/L	1	3/3/2015	R24992
Naphthalene	ND	0.50		µg/L	1	3/3/2015	R24992
Acetone	5.0	2.5		µg/L	1	3/3/2015	R24992
Bromobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Bromodichloromethane	ND	0.50		µg/L	1	3/3/2015	R24992
Bromoform	ND	0.50		µg/L	1	3/3/2015	R24992

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	Page 9 of 25
	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	
	O	RSD is greater than RSDlimit	P	Sample pH Not In Range	
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit	
	S	Spike Recovery outside accepted recovery limits			

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1502959**

Date Reported: **3/25/2015**

CLIENT: Navajo Refining Company

Client Sample ID: TRIP BLANK

Project: Quarterly WDW-1, 2, &3 Inj Well

Collection Date:

Lab ID: 1502959-002

Matrix: TRIP BLANK

Received Date: 2/24/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
Bromomethane	ND	0.50		µg/L	1	3/3/2015	R24992
Carbon disulfide	ND	0.50		µg/L	1	3/3/2015	R24992
Carbon Tetrachloride	ND	0.50		µg/L	1	3/3/2015	R24992
Chlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Chloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
Chloroform	ND	0.50		µg/L	1	3/3/2015	R24992
Chloromethane	ND	0.50		µg/L	1	3/3/2015	R24992
2-Chlorotoluene	ND	0.50		µg/L	1	3/3/2015	R24992
4-Chlorotoluene	ND	0.50		µg/L	1	3/3/2015	R24992
cis-1,2-DCE	ND	0.50		µg/L	1	3/3/2015	R24992
cis-1,3-Dichloropropene	ND	0.50		µg/L	1	3/3/2015	R24992
1,2-Dibromo-3-chloropropane	ND	0.50		µg/L	1	3/3/2015	R24992
Dibromochloromethane	ND	0.50		µg/L	1	3/3/2015	R24992
Dibromomethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,2-Dichlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
1,3-Dichlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
1,4-Dichlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Dichlorodifluoromethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,1-Dichloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,1-Dichloroethene	ND	0.50		µg/L	1	3/3/2015	R24992
1,2-Dichloropropane	ND	0.50		µg/L	1	3/3/2015	R24992
1,3-Dichloropropane	ND	0.50		µg/L	1	3/3/2015	R24992
2,2-Dichloropropane	ND	0.50		µg/L	1	3/3/2015	R24992
1,1-Dichloropropene	ND	0.50		µg/L	1	3/3/2015	R24992
Hexachlorobutadiene	ND	0.50		µg/L	1	3/3/2015	R24992
2-Hexanone	ND	0.50		µg/L	1	3/3/2015	R24992
Isopropylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Methylene Chloride	ND	2.5		µg/L	1	3/3/2015	R24992
n-Butylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
n-Propylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
sec-Butylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Styrene	ND	0.50		µg/L	1	3/3/2015	R24992
tert-Butylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
1,1,1,2-Tetrachloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,1,2,2-Tetrachloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
Tetrachloroethene (PCE)	ND	0.50		µg/L	1	3/3/2015	R24992
trans-1,2-DCE	ND	0.50		µg/L	1	3/3/2015	R24992
trans-1,3-Dichloropropene	ND	0.50		µg/L	1	3/3/2015	R24992
1,2,3-Trichlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992

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
	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
	O	RSD is greater than RSDlimit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	Spike Recovery outside accepted recovery limits		

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1502959**

Date Reported: **3/25/2015**

CLIENT: Navajo Refining Company

Client Sample ID: TRIP BLANK

Project: Quarterly WDW-1, 2, &3 Inj Well

Collection Date:

Lab ID: 1502959-002

Matrix: TRIP BLANK

Received Date: 2/24/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
1,2,4-Trichlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
1,1,1-Trichloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,1,2-Trichloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
Trichloroethene (TCE)	ND	0.50		µg/L	1	3/3/2015	R24992
Trichlorofluoromethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,2,3-Trichloropropane	ND	0.50		µg/L	1	3/3/2015	R24992
Vinyl chloride	ND	0.50		µg/L	1	3/3/2015	R24992
mp-Xylenes	ND	1.0		µg/L	1	3/3/2015	R24992
o-Xylene	ND	0.50		µg/L	1	3/3/2015	R24992
tert-Amyl methyl ether	ND	0.50		µg/L	1	3/3/2015	R24992
tert-Butyl alcohol	ND	10		µg/L	1	3/3/2015	R24992
Acrolein	ND	1.0		µg/L	1	3/3/2015	R24992
Acrylonitrile	ND	0.50		µg/L	1	3/3/2015	R24992
Bromochloromethane	ND	0.50		µg/L	1	3/3/2015	R24992
2-Chloroethyl vinyl ether	ND	0.50		µg/L	1	3/3/2015	R24992
Iodomethane	ND	0.50		µg/L	1	3/3/2015	R24992
trans-1,4-Dichloro-2-butene	ND	0.50		µg/L	1	3/3/2015	R24992
Vinyl acetate	ND	0.50		µg/L	1	3/3/2015	R24992
1,4-Dioxane	ND	20		µg/L	1	3/3/2015	R24992
Surr: 1,2-Dichlorobenzene-d4	102	70-130		%REC	1	3/3/2015	R24992
Surr: 4-Bromofluorobenzene	98.4	70-130		%REC	1	3/3/2015	R24992
Surr: Toluene-d8	100	70-130		%REC	1	3/3/2015	R24992

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
	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
	O	RSD is greater than RSDlimit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	Spike Recovery outside accepted recovery limits		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID MB	SampType: MBLK		TestCode: EPA Method 300.0: Anions							
Client ID: PBW	Batch ID: R24502		RunNo: 24502							
Prep Date:	Analysis Date: 2/24/2015		SeqNo: 721446		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								
Bromide	ND	0.10								
Nitrogen, Nitrate (As N)	ND	0.10								
Phosphorus, Orthophosphate (As P)	ND	0.50								
Sulfate	ND	0.50								

Sample ID LCS	SampType: LCS		TestCode: EPA Method 300.0: Anions							
Client ID: LCSW	Batch ID: R24502		RunNo: 24502							
Prep Date:	Analysis Date: 2/24/2015		SeqNo: 721447		Units: mg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.54	0.10	0.5000	0	108	90	110			
Chloride	4.8	0.50	5.000	0	95.3	90	110			
Nitrogen, Nitrite (As N)	0.95	0.10	1.000	0	95.4	90	110			
Bromide	2.5	0.10	2.500	0	99.1	90	110			
Nitrogen, Nitrate (As N)	2.5	0.10	2.500	0	101	90	110			
Phosphorus, Orthophosphate (As P)	5.0	0.50	5.000	0	100	90	110			
Sulfate	9.8	0.50	10.00	0	97.6	90	110			

Qualifiers:

- | | |
|---|--|
| * Value exceeds Maximum Contaminant Level. | B Analyte detected in the associated Method Blank |
| E Value above quantitation range | H Holding times for preparation or analysis exceeded |
| J Analyte detected below quantitation limits | ND Not Detected at the Reporting Limit |
| O RSD is greater than RSDlimit | P Sample pH Not In Range |
| R RPD outside accepted recovery limits | RL Reporting Detection Limit |
| S Spike Recovery outside accepted recovery limits | |

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	MB-R24992		SampType:	MBLK		TestCode:	EPA Method 8260B: VOLATILES			
Client ID:	PBW		Batch ID:	R24992		RunNo:	24992			
Prep Date:			Analysis Date:	3/3/2015		SeqNo:	736964	Units:	µg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acetonitrile	ND	0.50								
Allyl chloride	ND	0.50								
Chloroprene	ND	0.50								
Ethyl methacrylate	ND	0.50								
Isobutanol	ND	0.50								
Methacrylonitrile	ND	0.50								
Methyl ethyl ketone	ND	2.5								
Methyl isobutyl ketone	ND	2.5								
Methyl methacrylate	ND	0.50								
Propionitrile	ND	0.50								
Benzene	ND	0.50								
Toluene	ND	0.50								
Ethylbenzene	ND	0.50								
1,2-Dichloroethane (EDC)	ND	0.50								
1,2-Dibromoethane (EDB)	ND	0.50								
Acetone	ND	2.5								
Bromodichloromethane	ND	0.50								
Bromoform	ND	0.50								
Bromomethane	ND	0.50								
Carbon disulfide	ND	0.50								
Carbon Tetrachloride	ND	0.50								
Chlorobenzene	ND	0.50								
Chloroethane	ND	0.50								
Chloroform	ND	0.50								
Chloromethane	ND	0.50								
cis-1,2-DCE	ND	0.50								
cis-1,3-Dichloropropene	ND	0.50								
1,2-Dibromo-3-chloropropane	ND	0.50								
Dibromochloromethane	ND	0.50								
Dibromomethane	ND	0.50								
1,2-Dichlorobenzene	ND	0.50								
1,4-Dichlorobenzene	ND	0.50								
Dichlorodifluoromethane	ND	0.50								
1,1-Dichloroethane	ND	0.50								
1,1-Dichloroethene	ND	0.50								
1,2-Dichloropropane	ND	0.50								
1,3-Dichloropropane	ND	0.50								
2,2-Dichloropropane	ND	0.50								
1,1-Dichloropropene	ND	0.50								

Qualifiers:

* Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
O RSD is greater than RSDlimit
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID MB-R24992	SampType: MBLK			TestCode: EPA Method 8260B: VOLATILES						
Client ID: PBW	Batch ID: R24992			RunNo: 24992						
Prep Date:	Analysis Date: 3/3/2015			SeqNo: 736964		Units: µg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2-Hexanone	ND	0.50								
Methylene Chloride	ND	2.5								
Styrene	ND	0.50								
1,1,1,2-Tetrachloroethane	ND	0.50								
1,1,2,2-Tetrachloroethane	ND	0.50								
Tetrachloroethene (PCE)	ND	0.50								
trans-1,2-DCE	ND	0.50								
trans-1,3-Dichloropropene	ND	0.50								
1,1,1-Trichloroethane	ND	0.50								
1,1,2-Trichloroethane	ND	0.50								
Trichloroethene (TCE)	ND	0.50								
Trichlorofluoromethane	ND	0.50								
1,2,3-Trichloropropane	ND	0.50								
Vinyl chloride	ND	0.50								
mp-Xylenes	ND	1.0								
o-Xylene	ND	0.50								
Acrolein	ND	0.50								
Acrylonitrile	ND	0.50								
Bromochloromethane	ND	0.50								
Iodomethane	ND	0.50								
trans-1,4-Dichloro-2-butene	ND	0.50								
Vinyl acetate	ND	0.50								

Sample ID LCS-R24992	SampType: LCS			TestCode: EPA Method 8260B: VOLATILES						
Client ID: LCSW	Batch ID: R24992			RunNo: 24992						
Prep Date:	Analysis Date: 3/3/2015			SeqNo: 736965		Units: µg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	9.8		10.00	0	98.4	80	120			
Toluene	10		10.00	0	99.8	80	120			
Ethylbenzene	10		10.00	0	101	80	120			
Chlorobenzene	9.8		10.00	0	98.5	80	120			
1,1-Dichloroethene	9.2		10.00	0	91.7	80	120			
Tetrachloroethene (PCE)	9.8		10.00	0	98.4	80	120			
Trichloroethene (TCE)	9.6		10.00	0	96.1	80	120			
o-Xylene	10		10.00	0	104	80	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	MB-R24992		SampType:	MBLK		TestCode:	EPA 8270C: Semivolatiles/Mod			
Client ID:	PBW		Batch ID:	R24992		RunNo:	24992			
Prep Date:			Analysis Date:	3/2/2015		SeqNo:	736968	Units:	µg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acetophenone	ND	10								
1-Methylnaphthalene	ND	10								
2,3,4,6-Tetrachlorophenol	ND	10								
2,4,5-Trichlorophenol	ND	10								
2,4,6-Trichlorophenol	ND	10								
2,4-Dichlorophenol	ND	10								
2,4-Dimethylphenol	ND	10								
2,4-Dinitrophenol	ND	10								
2,4-Dinitrotoluene	ND	10								
2,6-Dinitrotoluene	ND	10								
2-Chloronaphthalene	ND	10								
2-Chlorophenol	ND	10								
2-Methylnaphthalene	ND	10								
2-Methylphenol	ND	10								
2-Nitroaniline	ND	10								
2-Nitrophenol	ND	10								
3,3'-Dichlorobenzidine	ND	10								
3-Nitroaniline	ND	10								
4,6-Dinitro-2-methylphenol	ND	10								
4-Bromophenyl phenyl ether	ND	10								
4-Chloro-3-methylphenol	ND	5.0								
4-Chloroaniline	ND	10								
4-Chlorophenyl phenyl ether	ND	10								
4-Nitroaniline	ND	10								
4-Nitrophenol	ND	10								
Acenaphthene	ND	10								
Acenaphthylene	ND	10								
Anthracene	ND	10								
Benzo(g,h,i)perylene	ND	10								
Benz(a)anthracene	ND	0.10								
Benzo(a)pyrene	ND	0.10								
Benzo(b)fluoranthene	ND	0.10								
Benzo(k)fluoranthene	ND	0.10								
Bis(2-chloroethoxy)methane	ND	10								
Bis(2-chloroethyl)ether	ND	10								
Bis(2-chloroisopropyl)ether	ND	10								
Bis(2-ethylhexyl)phthalate	ND	5.0								
Butyl benzyl phthalate	ND	10								
Carbazole	ND	10								

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	MB-R24992		SampType: MBLK		TestCode: EPA 8270C: Semivolatiles/Mod					
Client ID:	PBW		Batch ID: R24992		RunNo: 24992					
Prep Date:			Analysis Date: 3/2/2015		SeqNo: 736968		Units: µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chrysene	ND	0.10								
Dibenz(a,h)anthracene	ND	0.10								
Dibenzofuran	ND	10								
Diethyl phthalate	ND	10								
Dimethyl phthalate	ND	10								
Di-n-butyl phthalate	ND	10								
Di-n-octyl phthalate	ND	10								
Fluoranthene	ND	10								
Fluorene	ND	10								
Hexachlorobenzene	ND	1.0								
Hexachlorobutadiene	ND	10								
Hexachlorocyclopentadiene	ND	10								
Hexachloroethane	ND	10								
Isophorone	ND	10								
Naphthalene	ND	10								
Nitrobenzene	ND	10								
N-Nitrosodi-n-propylamine	ND	10								
Pentachlorophenol	ND	10								
Phenanthrene	ND	1.0								
Phenol	ND	5.0								
Pyrene	ND	10								
1,2,4,5-Tetrachlorobenzene	ND	10								

Sample ID	LCS-R24992		SampType: LCS		TestCode: EPA 8270C: Semivolatiles/Mod					
Client ID:	LCSW		Batch ID: R24992		RunNo: 24992					
Prep Date:			Analysis Date: 3/2/2015		SeqNo: 736969		Units: µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2,4-Dinitrotoluene	5.6		5.000	0	112	49	134			
2-Chlorophenol	4.7		5.000	0	94.8	50	131			
4-Chloro-3-methylphenol	4.2		5.000	0	83.0	42	139			
4-Nitrophenol	2.8		5.000	0	56.8	19	137			
Acenaphthene	5.3		5.000	0	106	36	122			
Bis(2-ethylhexyl)phthalate	5.4		5.000	0	109	43	142			
N-Nitrosodi-n-propylamine	5.3		5.000	0	107	46	135			
Pentachlorophenol	4.0		5.000	0	79.4	22	138			
Phenol	4.1		5.000	0	81.2	45	134			
Pyrene	6.2		5.000	0	123	45	138			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	MB-17887		SampType:	MBLK		TestCode:	EPA Method 7470: Mercury				
Client ID:	PBW		Batch ID:	17887		RunNo:	24523				
Prep Date:	2/25/2015		Analysis Date:	2/26/2015		SeqNo:	722178		Units: mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercury	ND	0.00020									

Sample ID	LCS-17887			SampType:	LCS		TestCode:	EPA Method 7470: Mercury			
Client ID:	LCSW			Batch ID:	17887		RunNo:	24523			
Prep Date:	2/25/2015			Analysis Date:	2/26/2015		SeqNo:	722179		Units:	mg/L
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercury	0.0051	0.00020	0.005000	0	102	80	120				

Qualifiers:

* Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
O RSD is greater than RSDlimit
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	MB-18037		SampType:	MBLK		TestCode:	MERCURY, TCLP				
Client ID:	PBW		Batch ID:	18037		RunNo:	24714				
Prep Date:	3/9/2015		Analysis Date:	3/10/2015		SeqNo:	728042		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercury	ND	0.020									

Sample ID	LCS-18037			SampType:	LCS		TestCode:	MERCURY, TCLP			
Client ID:	LCSW			Batch ID:	18037		RunNo:	24714			
Prep Date:	3/9/2015			Analysis Date:	3/10/2015		SeqNo:	728043		Units:	mg/L
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercury	ND	0.020	0.005000	0	105	80	120				

Qualifiers:

* Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
O RSD is greater than RSDlimit
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID MB-18024	SampType: MBLK		TestCode: EPA 6010B: Total Metals							
Client ID: PBW	Batch ID: 18024		RunNo: 24683							
Prep Date: 3/6/2015	Analysis Date: 3/7/2015		SeqNo: 727309		Units: mg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020								
Antimony	ND	0.050								
Arsenic	ND	0.020								
Barium	ND	0.020								
Beryllium	ND	0.0030								
Cadmium	ND	0.0020								
Chromium	ND	0.0060								
Cobalt	ND	0.0060								
Copper	ND	0.0060								
Iron	ND	0.050								
Lead	ND	0.0050								
Manganese	ND	0.0020								
Nickel	ND	0.010								
Selenium	ND	0.050								
Silver	ND	0.0050								
Thallium	ND	0.050								
Vanadium	ND	0.050								
Zinc	ND	0.020								

Sample ID LCS-18024	SampType: LCS		TestCode: EPA 6010B: Total Metals							
Client ID: LCSW	Batch ID: 18024		RunNo: 24683							
Prep Date: 3/6/2015	Analysis Date: 3/7/2015		SeqNo: 727310		Units: mg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.48	0.020	0.5000	0	95.4	80	120			
Antimony	0.52	0.050	0.5000	0	104	80	120			
Arsenic	0.47	0.020	0.5000	0	93.5	80	120			
Barium	0.49	0.020	0.5000	0	97.1	80	120			
Beryllium	0.50	0.0030	0.5000	0	99.1	80	120			
Cadmium	0.48	0.0020	0.5000	0	96.1	80	120			
Chromium	0.49	0.0060	0.5000	0	97.8	80	120			
Cobalt	0.49	0.0060	0.5000	0	97.4	80	120			
Copper	0.52	0.0060	0.5000	0	105	80	120			
Iron	0.51	0.050	0.5000	0	102	80	120			
Lead	0.48	0.0050	0.5000	0	97.0	80	120			
Manganese	0.49	0.0020	0.5000	0	98.6	80	120			
Nickel	0.49	0.010	0.5000	0	98.6	80	120			
Selenium	0.49	0.050	0.5000	0	98.0	80	120			
Silver	0.10	0.0050	0.1000	0	102	80	120			

Qualifiers:

* Value exceeds Maximum Contaminant Level.	B Analyte detected in the associated Method Blank
E Value above quantitation range	H Holding times for preparation or analysis exceeded
J Analyte detected below quantitation limits	ND Not Detected at the Reporting Limit
O RSD is greater than RSDlimit	P Sample pH Not In Range
R RPD outside accepted recovery limits	RL Reporting Detection Limit
S Spike Recovery outside accepted recovery limits	

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	LCS-18024		SampType: LCS		TestCode: EPA 6010B: Total Metals					
Client ID:	LCSW		Batch ID: 18024		RunNo: 24683					
Prep Date:	3/6/2015		Analysis Date: 3/7/2015		SeqNo: 727310		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Thallium	0.48	0.050	0.5000	0	97.0	80	120			
Vanadium	0.49	0.050	0.5000	0	98.2	80	120			
Zinc	0.48	0.020	0.5000	0	95.1	80	120			

Sample ID	1502959-001BMS		SampType:	MS		TestCode:	EPA 6010B: Total Metals				
Client ID:	WDW-1,2,&3 Effluen		Batch ID:	18050		RunNo:	24731				
Prep Date:	3/9/2015		Analysis Date:	3/10/2015		SeqNo:	728505		Units: mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Magnesium	76	1.0	50.00	25.84	101	75	125				
Potassium	84	1.0	50.00	34.66	98.8	75	125				

Sample ID	1502959-001BMSD		SampType: MSD		TestCode: EPA 6010B: Total Metals					
Client ID:	WDW-1,2,&3 Effluen		Batch ID: 18050		RunNo: 24731					
Prep Date:	3/9/2015		Analysis Date: 3/10/2015		SeqNo: 728506		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Magnesium	75	1.0	50.00	25.84	98.6	75	125	1.52	20	
Potassium	86	1.0	50.00	34.66	102	75	125	1.89	20	

Sample ID	MB-18050	SampType: MBLK		TestCode: EPA 6010B: Total Metals						
Client ID:	PBW	Batch ID: 18050		RunNo: 24731						
Prep Date:	3/9/2015	Analysis Date: 3/10/2015		SeqNo: 728508			Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	ND	1.0								
Magnesium	ND	1.0								
Potassium	ND	1.0								
Sodium	ND	1.0								

Sample ID	LCS-18050		SampType: LCS		TestCode: EPA 6010B: Total Metals					
Client ID:	LCSW		Batch ID: 18050		RunNo: 24731					
Prep Date:	3/9/2015		Analysis Date: 3/10/2015		SeqNo: 728509		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	57	1.0	50.00	0	113	80	120			
Magnesium	56	1.0	50.00	0	113	80	120			
Potassium	53	1.0	50.00	0	105	80	120			
Sodium	58	1.0	50.00	0	116	80	120			

Qualifiers:

- | | |
|---|--|
| * Value exceeds Maximum Contaminant Level. | B Analyte detected in the associated Method Blank |
| E Value above quantitation range | H Holding times for preparation or analysis exceeded |
| J Analyte detected below quantitation limits | ND Not Detected at the Reporting Limit |
| O RSD is greater than RSDlimit | P Sample pH Not In Range |
| R RPD outside accepted recovery limits | RL Reporting Detection Limit |
| S Spike Recovery outside accepted recovery limits | |

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	MB-R24992		SampType:	MBLK		TestCode:	CYANIDE, Reactive				
Client ID:	PBW		Batch ID:	R24992		RunNo:	24992				
Prep Date:			Analysis Date:	3/5/2015		SeqNo:	736973		Units: mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Cyanide, Reactive	ND	1.00									

Sample ID	LCS-R24992			SampType:	LCS		TestCode:	CYANIDE, Reactive			
Client ID:	LCSW			Batch ID:	R24992		RunNo:	24992			
Prep Date:				Analysis Date:	3/5/2015		SeqNo:	736974		Units:	mg/L
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Cyanide, Reactive	0.480		0.5000	0	96.0	80	120				

Qualifiers:

* Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
O RSD is greater than RSDlimit
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	MB-R24992		SampType:	MBLK		TestCode:	SULFIDE, Reactive				
Client ID:	PBW		Batch ID:	R24992		RunNo:	24992				
Prep Date:			Analysis Date:	3/3/2015		SeqNo:	736976		Units: mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Reactive Sulfide	ND	1.0									

Sample ID	LCS-R24992		SampType:	LCS		TestCode:	SULFIDE, Reactive				
Client ID:	LCSW		Batch ID:	R24992		RunNo:	24992				
Prep Date:			Analysis Date:	3/3/2015		SeqNo:	736977		Units: mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Reactive Sulfide	0.20		0.2000	0	100	70	130				

Qualifiers:

* Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
O RSD is greater than RSDlimit
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID mb-1	SampType: MBLK			TestCode: SM2320B: Alkalinity						
Client ID: PBW	Batch ID: R24621			RunNo: 24621						
Prep Date:	Analysis Date: 3/3/2015			SeqNo: 725674		Units: mg/L CaCO3				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	ND	20								

Sample ID lcs-1	SampType: LCS			TestCode: SM2320B: Alkalinity						
Client ID: LCSW	Batch ID: R24621			RunNo: 24621						
Prep Date:	Analysis Date: 3/3/2015			SeqNo: 725675		Units: mg/L CaCO3				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	79	20	80.00	0	99.2	90	110			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
O RSD is greater than RSDlimit
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	1502959-001ADUP	SampType:	DUP	TestCode:	Specific Gravity					
Client ID:	WDW-1,2,&3 Effluen	Batch ID:	R24648	RunNo:	24648					
Prep Date:		Analysis Date:	3/5/2015	SeqNo:	726439	Units:				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Specific Gravity	0.9999	0						0.220	20	

Qualifiers:

* Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
O RSD is greater than RSDlimit
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	MB-17895		SampType:	MBLK		TestCode:	SM2540C MOD: Total Dissolved Solids				
Client ID:	PBW		Batch ID:	17895		RunNo:	24545				
Prep Date:	2/25/2015		Analysis Date:	2/27/2015		SeqNo:	722782		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-17895		SampType: LCS		TestCode: SM2540C MOD: Total Dissolved Solids					
Client ID:	LCSW		Batch ID: 17895		RunNo: 24545					
Prep Date:	2/25/2015		Analysis Date: 2/27/2015		SeqNo: 722783		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			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
O RSD is greater than RSDlimit
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

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



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

Sample Log-In Check List

Client Name: NAVAJO REFINING CO

Work Order Number: 1502959

RcptNo: 1

Received by/date:

Ag 02/24/15

Logged By: Ashley Gallegos

2/24/2015 8:00:00 AM

Ag

Completed By: Ashley Gallegos

2/24/2015 9:49:07 AM

Ag

Reviewed By:

CS 02/24/15

Chain of Custody

1. Custody seals intact on sample bottles?

Yes ☐

No ☐

Not Present ☒

2. Is Chain of Custody complete?

Yes ☒

No ☐

Not Present ☐

3. How was the sample delivered?

Courier

Log In

4. Was an attempt made to cool the samples?

Yes ☒

No ☐

NA ☐

5. Were all samples received at a temperature of $>0^{\circ}\text{C}$ to 6.0°C ?

Yes ☒

No ☐

NA ☐

6. Sample(s) in proper container(s)?

Yes ☒

No ☐

7. Sufficient sample volume for indicated test(s)?

Yes ☒

No ☐

8. Are samples (except VOA and ONG) properly preserved?

Yes ☒

No ☐

9. Was preservative added to bottles?

Yes ☐

No ☒

NA ☐

10. VOA vials have zero headspace?

Yes ☒

No ☒

No VOA Vials ☐

11. Were any sample containers received broken?

Yes ☐

No ☒

of preserved bottles checked for pH:

2 2
(≤ 2 or > 12 unless noted)

12. Does paperwork match bottle labels?

Yes ☒

No ☐

(Note discrepancies on chain of custody)

13. Are matrices correctly identified on Chain of Custody?

Yes ☒

No ☐

Adjusted? *NA*

14. Is it clear what analyses were requested?

Yes ☒

No ☐

15. Were all holding times able to be met?

Yes ☒

No ☐

Checked by: *JA*

(If no, notify customer for authorization.)

Special Handling (if applicable)

16. 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:

17. Additional remarks:

18. Cooler Information

Cooler No	Temp $^{\circ}\text{C}$	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.0	Good	Yes			

Chain-of-Custody Record		Turn-Around Time:
Client: Navajo Refining Co.		<input type="checkbox"/> Standar <input type="checkbox"/> Rush
Mailing Address: P.O. Box 159 Artesia,		Project Name:
NM 88211-0159		Quarterly WDW-1, 2, & 3 Inj Well
Phone #: 575-748-3311		Project #: P.O. # 167796
email or Fax#: 575-746-5451		Project Manager:
QA/QC Package:		
<input type="checkbox"/> Standard <input type="checkbox"/> Level 4 (Full Validation)		Dan Crawford
<input type="checkbox"/> Other _____		Sampler:
<input type="checkbox"/> EDD (Type) _____		On Ice: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
		Sample Temperature: 10

Turn-Around Time:	<input type="checkbox"/> Standar	<input checked="" type="checkbox"/> Rush
Project Name:	Quarterly WDW-1, 2, & 3 Inj Well	
	Project #: P.O. # 167796	
Project Manager:	Dan Crawford	
Sampler:	On Ice: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
	Sample Temperature: 10	

Chain-of-Custody Record
Client: Navajo Refining Co.
Mailing Address: P.O. Box 159 Artesia,
NM 88211-0159
Phone #: 575-748-3311
email or Fax#: 575-746-5451
QA/QC Package:
<input type="checkbox"/> Standard
<input type="checkbox"/> Other _____
<input type="checkbox"/> EDD (Type) _____
<input type="checkbox"/> Level 4 (Full Validation)

HALL ENVIRONMENTAL ANALYSIS LABORATORY

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

Analysis Request

[illegible]

Remarks: Report these results separately from all other Chain of Custody kits provided.

	Date	Time
Received by:	<i>C. M. Halliday</i> 02/24/15 0800	
	Date	Time
Received by:		

Date:	2/23/15	Time:	0430	Relinquished by: Elizabeth Salsberry
Signature:		Signature:		Relinquished to:

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.



Navajo Refining Company, LLC
501 E. Main
Artesia, NM 88210
(Tel) 575.748.3311
(Fax) 575.746.5451

Injection Well Quarterly Sample Details Attachment



Project Name	WDW-1,2, & 3 Qrtly Inj Well
Samplers Name	Elizabeth Salsberry
Samplers Affiliation	Navajo Refining Co. LLC
Start Date and Time	2/23/2015 @ 08:25
End Date and Time	2/23/2015 @ 08:35

Sample Type	Grab <input checked="" type="checkbox"/>
Time Weighted Composite	<input type="checkbox"/>
Flow Weighted Composite	<input type="checkbox"/>

Physical Property	Solid <input type="checkbox"/>
	Liquid <input checked="" type="checkbox"/>
	Sludge <input type="checkbox"/>

Parts / Sample Intervals	One
--------------------------	-----

Type of Sampler	Directly to sample jars
-----------------	-------------------------

Outfall / Sample Location: Waste water effluent pumps to injection wells.

☐ P-849 sample point (first from east)
☒ P-854 sample point (second from east)
☐ P-856 sample point (third from east)
☐ P-857 sample point (fourth from east)

Container	Size	Material	# of Containers	Preservatives							Analysis and/or Method Requested
				Neat (None)	HCL	HNO3	H2SO4	NaOH	Na2S2O3	NaHSO4	
1			3	X			X				Specific Gravity HCO3, CO3, Cl, SO4, TDS, pH, cond. FI, Cation/anion bal., Br, Eh/40 CFR 136.3
2			1			X					VOCs/SW-846 Method 8260C (see attached list 'VOCs')
3			3		X						SVOCs/SW-846 Method 8270D (see attached list 'SVOCs')
4			2	X							R.C./40 CFR part 261
5			2	X							Metals/SW-846 Mthd 6010, 7470 (see attached list 'Metals')
6			2	X							Ca, K, Mg, Na/40 CFR 136.3
7			1	X							TCLP Metals, only /40 CFR Part 261/ SW-846 Method 1311
8											
9											
10											

Field Data (Weather, Observations, Etc): 2/23/2015 08:35 Tmp. 19.4, Humidity 100%, Wind Dir. NNE, Wind Speed 11.5 mph, Conditions light snow

Date and Time:

Field Temp. 95.6°F

Field pH 6.86

Storage Method	Ice <input checked="" type="checkbox"/>
	Refrigerated <input type="checkbox"/>
	Other <input type="checkbox"/>

Shipping Media	Ice <input checked="" type="checkbox"/>
	Other <input type="checkbox"/>

Classification	Analyte name ⁽¹⁾	Method	Units	RL
Inorganics	Mercury	SW-846 Method 7470		
Inorganics	Arsenic	SW-846 Method 6010		
Inorganics	Silver	SW-846 Method 6010		
Inorganics	Aluminum	SW-846 Method 6010		
Inorganics	Barium	SW-846 Method 6010		
Inorganics	Beryllium	SW-846 Method 6010		
Inorganics	Calcium	SW-846 Method 6010		
Inorganics	Cadmium	SW-846 Method 6010		
Inorganics	Cobalt	SW-846 Method 6010		
Inorganics	Chromium	SW-846 Method 6010		
Inorganics	Copper	SW-846 Method 6010		
Inorganics	Iron	SW-846 Method 6010		
Inorganics	Mercury	SW-846 Method 6010		
Inorganics	Potassium	SW-846 Method 6010		
Inorganics	Magnesium	SW-846 Method 6010		
Inorganics	Manganese	SW-846 Method 6010		
Inorganics	Sodium	SW-846 Method 6010		
Inorganics	Nickel	SW-846 Method 6010		
Inorganics	Lead	SW-846 Method 6010		
Inorganics	Antimony	SW-846 Method 6010		
Inorganics	Selenium	SW-846 Method 6010		
Inorganics	Thallium	SW-846 Method 6010		
Inorganics	Vanadium	SW-846 Method 6010		
Inorganics	Zinc	SW-846 Method 6010		

** dilute elements only if necessary

⁽¹⁾ 23 TAL Metals



Attachment 2

EP Background Soil Statistical
Evaluation Memo



ARCADIS U.S., Inc.
100 East Campus View Blvd.
Suite 200
Columbus
Ohio 43235
Tel 614 985 9100
Fax 614 985 9170

MEMO

To:
Karel Schnebele

Copies:
Pam Krueger

From:
Mark Lupo

A handwritten signature in blue ink, appearing to read "mjl", is placed over the printed name "Mark Lupo".

Date:
August 14, 2013

ARCADIS Project No.:
TX000864.0004

Subject:
Statistical Determination of Background Concentrations in Soil, Navajo Refinery,
Artesia, New Mexico.

Soil borings were advanced in four designated background soil areas surrounding the Evaporation Ponds near the Navajo Refinery in Artesia, New Mexico in order to determine the background concentrations of key constituents in soil. The data were statistically analyzed in order to calculate values representative of naturally occurring background concentrations. In this memo, the method and results of these calculations are presented.

Location of the Soil Borings

Four areas were designated as "background soil areas" in which soil borings were advanced for collecting background samples. The areas were selected to be representative of native soils similar to those encountered both in the Refinery and in the Evaporation Ponds. However, the four areas were also selected in locations that would not be expected to have impacts from refinery operations or other potential hydrocarbon impacts. Three borings were advanced in each of the areas, designated BG-01 to BG-12. Two samples were collected for analysis from each boring. The first sample was collected one foot below ground surface (bgs) in a soil identified in the boring logs as sandy silt. The second sample was collected within the first foot after encountering a soil identified as silty clay in the boring logs. Table 1 lists the borings, the depths of the samples, and the background areas from which they were obtained.

List of Chemical Constituents

Statistical analysis was conducted for the following thirteen metallic constituents: arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, vanadium, and zinc. Three ions were also selected for statistical analysis due to interest to the project team: chloride, fluoride, and sulfate. Of the metals for which data were available, only silver lacked a sufficient number of detections to allow parametric testing. Silver was detected only once out of 24 samples, in BG-05 at a depth of one foot bgs. Eleven of the metals were detected in 24 of 24 samples, as were the ions. Selenium had one non-detection, and mercury had three. The analytical data used in the statistical analysis are presented in Table 1.

Statistical Test Method

Representative background concentrations of the COCs were determined by constructing a statistical interval that would capture 95 percent (%) of the background values with 95% confidence. In statistics, this interval is called a Tolerance Interval, and its upper limit is called the Upper Tolerance Limit (UTL). Because of the application and the COCs, the interval was single-tailed. In this memorandum, all UTLs are "95/95 UTLs", that is, they are the upper limit of an interval designed to capture 95% of the background values with 95% confidence.

A UTL can be computed for a given COC from the mean of the background values (\bar{x}) and the standard deviation (S) using the following parametric formula:

$$UTL = \bar{x} + S \kappa$$

The value of the parameter κ is chosen based upon the level of confidence, the coverage, and the number of points in the data set. The appropriate values of κ can be found in a table provided by the United States Environmental Protection Agency (USEPA) in its 2009 Unified Guidance document for groundwater statistics. (Table 17-3, USEPA, 2009). These values are also available in the statistics literature. In computing the UTLs in this memorandum, we used the table provided by the USEPA (USEPA, 2009).

There are requirements for the use of the above equation. The data must be independent, normally distributed, and free of severe outliers. The distribution of the data points can be tested using a normality test. The Shapiro-Wilk test was run at a 5% level of significance. The Shapiro-Wilk Test is a robust test and is recommended in Unified Guidance (USEPA, 2009). If the data set failed the normality test, a transformation was made and the normality test was repeated. The transformations were made in the following order: square root, cube root, and logarithmic (Box and Cox, 1964). In the event that the data could not be normalized, the parametric equation above could not be used and a non-parametric method for determining the UTL was used. Non-parametric methods are not discussed further in this memo, because their use was not necessary, as discussed below. In addition to testing for normality, the Dixon

test was applied to identify any statistical outliers that might be present. The Dixon test was run at a 5% level of significance. Only one outlier was identified (for cadmium) and its handling is discussed below where the cadmium results are presented.

Environmental data often include non-detected results. Statisticians refer to this condition as censorship. If the detection rate is 85% or better, non-detections were replaced by one half of the detection limit. If the detection rate had been less than 85% for any data set, procedures specified in Unified Guidance (USEPA, 2009) would have been applied. These measures were not needed, because none of the data sets for which UTLs were computed had detection rates less than 85%.

Because the data were collected from two distinct soil types, it was of interest to see if the background data points were of the same statistical population. Toward that end, the data collected from sandy silt and silty clay were compared using a parametric Student's t-test at 95% confidence. If the test identified a statistical difference between the two groups, separate UTLs were computed for each of the two soil types.

Laboratories indicate the concentration as "estimated" and place a "J-flag" if a COC is detected at a concentration higher than the Method Detection Limit (MDL), but lower than the Practical Quantitation Limit (PQL), sometimes called a "reporting limit". All values that were J-flagged were used in the computation of UTLs as if they were quantitative.

Results

The results of the UTL calculations are summarized in Table 2. Each of the sixteen COCs for which a UTL was computed is discussed in a separate section below. In these sections, distribution determinations and outlier tests are discussed. Statistical independence was assumed, since it appears that an effort was made to identify the background soil areas. It is also clear that no two data points came from the same location, but that the twelve borings were distinct.

Arsenic

Arsenic was detected in all of the 24 background samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 2.18 mg/kg. The average concentrations of arsenic in the two soil types were 2.11 mg/kg and 2.24 mg/kg for the sandy silt and the silty clay, respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 3.92 mg/kg. This means that 95% of soil samples can be expected to have a naturally occurring arsenic concentration of 3.92 mg/kg or less with 95% confidence. Thus 3.92 mg/kg can be adopted as the background concentration for arsenic in soil at this site.

Barium

Barium was detected in all of the 24 background samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 144 mg/kg. The average concentrations of barium in the two soil types were 158 mg/kg and 130 mg/kg for the sandy silt and the silty clay, respectively. The t-test indicated that barium was statistically elevated in the sandy silt. The parametric analysis of variance (ANOVA) did not indicate a difference in the populations, but its non-parametric counterpart, the Kruskal-Wallis test did. Therefore the barium data for sandy silt and silty clay were treated as separate statistical populations. Both data sets were normally distributed. No statistical outliers were identified in either group. The sandy silt data had a UTL of 252 mg/kg. The silty clay had a UTL of 227 mg/kg. Thus, a soil sample collected from sandy silt can be expected to have a naturally occurring barium concentration of 252 mg/kg or less. In like manner, a sample collected from silty clay can be expected to have a naturally occurring barium concentration of 227 mg/kg or less.

Cadmium

All but one of the cadmium analyses resulted in a concentration that was below the reporting limit. Cadmium was detected in all 24 samples at concentrations above the method detection limit. Although the data is thus 96% composed of J-flagged data, the data have a discernable distribution. The full data set failed the Shapiro-Wilk test of normality. Successive transformations were undertaken using the method of Box and Cox (1964). The data were found to be lognormally distributed. One statistical outlier was identified, which was the result from BG-12 at one foot bgs. Usually, that data point would be set aside. It would be compelling to do so, because the other 23 data points would be normally distributed (with no other outliers). However, removing the outlier from the calculation would also remove the only point that was not J-flagged.

The decision to include outlier was based upon the following reasoning. First, there is no evidence to suggest that the measurement of the cadmium concentration at BG-12 was the result of an error on the part of field personnel or the laboratory. On the contrary, this concentration of 0.465 mg/kg is believable when compared to the other two samples collected in sandy silt in Background Soil Area 4. BG-11 had the second highest concentration of 0.242 mg/kg. BG-10 had 0.184 mg/kg, which was also greater than the arithmetic mean for the sandy silt. It is therefore more likely that the high concentration is an accurate measurement rather than a sampling or analytical error. The present view of the environmental statistics community is to retain data points rather than dismiss them unless there is evidence of some sort of error or distortion in the data point. The evidence points in the opposite direction. Second, the data set is lognormally distributed with the data point from BG-12 included. That a known distribution is exhibited supports the view that the data point belongs to the population. Third, the twelve data points of each of the sandy silt and silty clay subsets pass the Shapiro-Wilk test when lognormally transformed. Finally, as stated already, the data point in question is the only member of the data set that is not flagged as estimated. For all of these reasons, the outlier was retained.

Whenever a data set is not normally distributed, the arithmetic mean may not be the best estimate of central tendency. It is more accurate to compute the mean in transformed space and back-transform the result. In lognormally distributed data sets, such a measure is known as the geometric mean. For the complete cadmium data set, the geometric mean was 0.139 mg/kg. The geometric mean of the sandy silt was 0.153 mg/kg; the geometric mean of the silty clay was 0.126 mg/kg. The parametric t-test was performed on the log-transformed data and indicated that the data from the two soil types were a single population. The UTL was computed and back-transformed to be 0.339 mg/kg. This means that a soil sample could be expected to have a naturally occurring cadmium concentration of 0.339 mg/kg or less.

Chromium

Chromium was detected in all 24 of the background soil samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 10.0 mg/kg. The average concentrations of chromium in the two soil types were nearly the same: 10.03 mg/kg and 9.97 mg/kg for the sandy silt and the silty clay respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 18.8 mg/kg. This means that a soil sample could be expected to have a naturally occurring chromium concentration of 18.8 mg/kg or less.

Copper

Copper was detected in all 24 of the background soil samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 6.62 mg/kg. The average concentrations of copper in the two soil types were nearly the same: 6.64 mg/kg and 6.61 mg/kg for the sandy silt and the silty clay respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 12.4 mg/kg. This means that a soil sample could be expected to have a naturally occurring copper concentration of 12.4 mg/kg or less.

Iron

Iron was detected in all 24 of the background soil samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 9,242 mg/kg. The average concentrations of iron in the two soil types were nearly the same: 9,335 mg/kg and 9,149 mg/kg for the sandy silt and the silty clay respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 17,344 mg/kg. This means that a soil sample could be expected to have a naturally occurring iron concentration of 17,344 mg/kg or less.

Lead

Lead was detected in all 24 of the background soil samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 6.66 mg/kg. The

average concentrations of lead in the two soil types were 6.94 mg/kg and 6.38 mg/kg for the sandy silt and the silty clay respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 12.1 mg/kg. This means that a soil sample could be expected to have a naturally occurring lead concentration of 12.1 mg/kg or less.

Manganese

Manganese was detected in all 24 of the background soil samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 305 mg/kg. The average concentrations of manganese in the two soil types were 309 mg/kg and 301 mg/kg for the sandy silt and the silty clay respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 488 mg/kg. This means that a soil sample could be expected to have a naturally occurring manganese concentration of 488 mg/kg or less.

Mercury

The mercury data set contained 21 detections and 3 non-detections. The detection rate of 87.5% is greater than the 85% threshold, below which it would no longer be acceptable to replace the non-detections with one half of the method detection limit. With these substitutions, the data were found to be lognormally distributed. The geometric mean, the relevant measure of the mean of a lognormally distributed data set, was 0.00210 mg/kg. The geometric mean of the mercury concentration in sandy silt was 0.00195 mg/kg; the geometric mean in the silty clay was 0.00225 mg/kg. The parametric t-test was performed on the log-transformed data and indicated that the data from the two soil types were a single population. The UTL was computed and back-transformed to be 0.0302 mg/kg. This means that a soil sample could be expected to have a naturally occurring mercury concentration of 0.0302 mg/kg or less.

Nickel

Nickel was detected in all 24 of the background soil samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 9.15 mg/kg. The average concentrations of nickel in the two soil types were nearly the same: 9.25 mg/kg and 9.05 mg/kg for the sandy silt and the silty clay respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 16.2 mg/kg. This means that a soil sample could be expected to have a naturally occurring nickel concentration of 16.2 mg/kg or less.

Selenium

The selenium data set contained 23 detections out of 24 data points. The detection rate of 96% is great enough to justify replacing the non-detection with one half of the method detection limit. With this substitution, the data were statistically analyzed. The data set was found to be normally distributed and

free of outliers. The selenium data had an average value of 0.378 mg/kg. The average concentrations of selenium in the two soil types were 0.391 mg/kg and 0.365 mg/kg for the sandy silt and the silty clay respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 0.682 mg/kg. This means that a soil sample could be expected to have a naturally occurring selenium concentration of 0.682 mg/kg or less.

Vanadium

Vanadium was detected in all 24 of the background soil samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 15.6 mg/kg. The average concentrations of vanadium in the two soil types were 14.6 mg/kg and 16.6 mg/kg for the sandy silt and the silty clay respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 28.3 mg/kg. This means that a soil sample could be expected to have a naturally occurring vanadium concentration of 28.3 mg/kg or less.

Zinc

Zinc was detected in all 24 of the background soil samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 25.1 mg/kg. The average concentrations of zinc in the two soil types were 26.1 mg/kg and 24.1 mg/kg for the sandy silt and the silty clay respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 46.6 mg/kg. This means that a soil sample could be expected to have a naturally occurring zinc concentration of 46.6 mg/kg or less.

Chloride

Chloride was detected in all 24 of the background soil samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 1,952 mg/kg. The average concentrations of chloride in the two soil types were 1,704 mg/kg and 2,200 mg/kg for the sandy silt and the silty clay respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 5,264 mg/kg. This means that a soil sample could be expected to have a naturally occurring chloride concentration of 5,264 mg/kg or less.

Fluoride

Fluoride was detected in all of the 24 background soil samples. The data were found to be cube-root normally distributed. The relevant measure of the mean of a cube-root normal data set is to compute the mean of the cube roots of the data points and cube the result. This value was 3.56 mg/kg. The cube-root corrected mean of the fluoride concentration in sandy silt was 2.80 mg/kg; for the silty clay it was 4.45 mg/kg. The parametric t-test was performed on the cube-root transformed data and indicated that the

fluoride data from the two soil types were a single population. The UTL was computed and back-transformed to be 17.9 mg/kg. This means that a soil sample could be expected to have a naturally occurring fluoride concentration of 17.9 mg/kg or less.

Sulfate

Sulfate data was detected in all of the 24 background soil samples. The data were found to be cube-root normally distributed. The cube-root corrected mean was 1,464 mg/kg. The cube-root corrected mean of the sulfate concentration in sandy silt was 553 mg/kg; for the silty clay it was 3,113 mg/kg. The parametric t-test was performed on the cube-root transformed data and indicated that sulfate was statistically elevated in the silty clay compared to the sandy silt. The parametric analysis of variance (ANOVA) and its non-parametric counterpart, the Kruskal-Wallis test concurred. Therefore the sulfate data for sandy silt and silty clay were treated as separate statistical populations. Both data sets were cube-root normally distributed. No statistical outliers were identified in either group. The sandy silt data had a UTL of 9,336 mg/kg. The silty clay had a UTL of 21,620 mg/kg. Thus, a soil sample collected from sandy silt could be expected to have a naturally occurring sulfate concentration of 9,336 mg/kg or less. In like manner, a sample collected from silty clay could be expected to have a naturally occurring sulfate concentration of 21,260 mg/kg or less.

Discussion

It has been stated above that the tolerance intervals from which the UTLs were computed were designed with 95% coverage. By definition, 5% of all background samples will have concentrations that exceed the UTLs. From a practical standpoint, this means that if a soil sample has a concentration that is less than or equal to the UTL, it can be considered to be background, but the converse is not true. If a sample exceeds the UTL it might indicate contamination, but this is not necessarily the case. In order to categorize such a sample as “above background”, another line of evidence is necessary. It may be convenient to simply judge samples as “background” and “above background” on the basis of these UTLs, but in practice, one would be wrong 5% of the time. Stated another way, a suite of samples that were truly from the background and were compared to the UTLs presented in Table 2 would exceed the UTLs and be falsely identified as “above background” 5% of the time. In summary, a thorough interpretation of the field data must be made in view of the definition of the coverage of the UTL. To simply classify all concentrations that exceed the UTL as contaminated is a conservative assumption.

Conclusion

The background soil data were statistically analyzed for sixteen constituents, including thirteen metals and three ions. After testing to be sure the concentrations of the constituent collected from two soil types were a single population, UTLs were computed for the combined data set or for the subsets for the soil types, as appropriate. Procedures were followed to correctly identify the distribution of the data and to account

for outliers. The UTLs are presented in the text of this memo and in a summary table (Table 2). The UTLs were computed for 95% coverage and with 95% confidence. For a given constituent, 95% of background soil samples can be expected to have a concentration at or less than the UTL presented in this memo with 95% confidence. If a soil sample collected in the Refinery area or near the Evaporation Ponds had a concentration less than or equal to its UTL, that concentration of that constituent could be considered to be naturally occurring.

References

Box G.E.P. and D.R. Cox. 1964. An analysis of transformations (with discussion). *Journal of Royal Statistical Society Series B*, 26, 211-252.

United States Environmental Protection Agency. 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance. Office of Resource Conservation and Recovery, Program Implementation and Information Division, U.S. Environmental Protection Agency. EPA 530-R-09-007. March, 2009.



Table 1. Data from Background Soil Borings
Navajo Refining Company, Artesia Refinery, New Mexico

		Depth	Arsenic	Barium	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Mercury		
Boring	Area	feet	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		
BG-01	1	1	1.07	97.2	0.0964	J	3.70	2.25	3,740	3.00	191	0.00048	U
BG-01	1	5	2.12	144	0.0955	J	8.65	6.98	8,940	6.57	348	0.00157	J
BG-02	1	1	1.12	129	0.129	J	5.56	3.21	5,210	3.99	204	0.00121	J
BG-02	1	5	2.75	176	0.139	J	13.8	9.59	12,700	8.77	371	0.00448	
BG-03	1	1	2.28	186	0.131	J	10.9	6.44	10,400	6.62	344	0.00155	J
BG-03	1	6	2.88	162	0.198	J	16.9	10.1	15,300	9.54	431	0.00274	J
BG-04	2	1	2.62	153	0.187	J	14.8	9.48	13,700	9.13	405	0.00580	
BG-04	2	3	1.61	85.6	0.123	J	8.02	4.86	6,370	4.00	178	0.00184	J
BG-05	2	1	1.99	150	0.163	J	8.82	7.34	7,600	7.66	268	0.0300	
BG-05	2	4	3.56	58.6	0.145	J	9.58	7.11	8,070	5.43	241	0.00199	J
BG-06	2	1	2.54	178	0.144	J	10.6	7.49	9,670	7.80	348	0.00574	
BG-06	2	4	2.36	88.6	0.140	J	8.96	5.81	7,130	5.51	266	0.00181	J
BG-07	3	1	0.93	103	0.0719	J	3.80	2.27	3,810	2.93	181	0.00048	U
BG-07	3	5	1.42	139	0.0884	J	6.67	4.42	6,550	4.57	244	0.00157	J
BG-08	3	1	1.92	167	0.132	J	8.99	6.31	8,000	5.83	299	0.00050	U
BG-08	3	4	1.88	145	0.104	J	8.47	5.71	8,230	5.98	261	0.00141	J
BG-09	3	1	1.94	214	0.120	J	9.45	5.51	9,090	6.11	328	0.00076	J
BG-09	3	4	1.24	129	0.0906	J	6.47	3.39	5,910	4.05	232	0.00192	J
BG-10	4	1	2.34	176	0.184	J	12.2	8.33	11,500	8.30	307	0.00314	J
BG-10	4	4	2.62	158	0.140	J	12.5	8.45	12,200	8.56	358	0.00545	
BG-11	4	1	2.58	166	0.242	J	11.4	8.89	11,000	9.50	384	0.00662	
BG-11	4	5	2.59	127	0.184	J	10.4	7.47	9,580	8.09	386	0.00537	
BG-12	4	1	4.04	179	0.465		20.1	12.1	18,300	12.4	445	0.00707	
BG-12	4	5	1.80	152	0.114	J	9.25	5.44	8,810	5.53	301	0.00108	J

Notes:

Area: The designated background soil area in which the boring was advanced.

mg/kg: Milligrams per kilogram.

J: Estimated value; the constituent was detected at a concentration between the method detection limit and the reporting limit.

U: Non-detection; the constituent was not detected above the method detection limit, the value shown on this table. One half the method detection limit was the value used in the statistical calculations.



Table 1. Data from Background Soil Borings
Navajo Refining Company, Artesia Refinery, New Mexico

		Depth	Nickel	Selenium	Silver	Vanadium	Zinc	Chloride	Fluoride	Sulfate			
Boring	Area	feet	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg			
BG-01	1	1	3.60	0.351	J	0.483	U	6.57	10.0	47.6	0.816	J	164
BG-01	1	5	9.51	0.394	J	0.457	U	13.6	22.0	1120	4.33		972
BG-02	1	1	5.02	0.170	U	0.468	U	8.72	15.0	14.7	0.388	J	87.8
BG-02	1	5	12.7	0.485		0.440	U	20.4	33.3	3550	3.43		2560
BG-03	1	1	10.5	0.354	J	0.456	U	17.0	26.7	5760	4.10		4390
BG-03	1	6	13.5	0.433	J	0.467	U	23.9	38.9	1720	1.40		1910
BG-04	2	1	12.8	0.576		0.433	U	19.8	36.9	2480	1.75		4890
BG-04	2	3	5.83	0.192	J	0.425	U	14.2	16.1	860	11.0		7830
BG-05	2	1	8.22	0.399	J	0.262	J	12.1	31.9	45.1	2.56		18.2
BG-05	2	4	7.95	0.394	J	0.488	U	27.6	23.8	1950	20.7		13500
BG-06	2	1	10.8	0.451		0.419	U	15.1	28.1	993	2.21		1080
BG-06	2	4	7.64	0.316	J	0.456	U	16.7	20.8	865	12.1		10600
BG-07	3	1	3.64	0.168	J	0.431	U	6.68	9.94	607	3.34		56.5
BG-07	3	5	6.82	0.270	J	0.472	U	10.9	17.1	3260	3.04		2960
BG-08	3	1	8.46	0.467	J	0.468	U	13.2	21.7	4150	11.1		1130
BG-08	3	4	8.51	0.381	J	0.438	U	13.2	21.3	3810	3.78		4260
BG-09	3	1	9.91	0.287	J	0.443	U	14.9	24.0	1180	6.6		834
BG-09	3	4	5.85	0.222	J	0.453	U	10.2	15.0	2080	3.38		960
BG-10	4	1	11.3	0.394	J	0.425	U	17.9	29.5	2530	2.14		198
BG-10	4	4	11.5	0.468	J	0.484	U	19.0	30.3	2280	3.16		1520
BG-11	4	1	11.6	0.509		0.462	U	16.3	30.8	955	5.03		364
BG-11	4	5	10.3	0.495		0.425	U	14.3	28.3	2960	1.01		1080
BG-12	4	1	15.2	0.654		0.438	U	26.9	49.0	1680	1.64		90.4
BG-12	4	5	8.48	0.330	J	0.388	U	14.6	22.5	1950	1.87		1480

Notes:

Area: The designated background soil area in which the boring was advanced.

mg/kg: Milligrams per kilogram.

J: Estimated value; the constituent was detected at a concentration between the method detection limit and the reporting limit.

U: Non-detection; the constituent was not detected above the method detection limit, the value shown on this table. One half the method detection limit was the value used in the statistical calculations.



**Table 2. Background Concentrations of Key Constituents in Soil
Navajo Refining Company, Artesia Refinery, New Mexico**

Constituent	Lithology	UTL mg/kg	Mean mg/kg	Distribution
Arsenic	All	3.92	2.18	Normal
Barium	Sandy silt	252	158	Normal
Barium	Silty clay	227	130	Normal
Cadmium	All	0.339	0.139	Lognormal
Chromium	All	18.8	10.0	Normal
Copper	All	12.4	6.62	Normal
Iron	All	17,344	9,242	Normal
Lead	All	12.1	6.66	Normal
Manganese	All	488	305	Normal
Mercury	All	0.0302	0.00210	Lognormal
Nickel	All	16.2	9.15	Normal
Selenium	All	0.682	0.378	Normal
Vanadium	All	28.3	15.6	Normal
Zinc	All	46.6	25.1	Normal
Chloride	All	5,264	1,952	Normal
Fluoride	All	17.9	3.56	Cube root
Sulfate	Sandy silt	9,336	533	Cube root
Sulfate	Silty clay	21,620	3,113	Cube root

Notes:

UTL: Upper tolerance limit, with 95% coverage and 95% confidence.

mg/kg: Milligrams per kilogram.

Mean: Not necessarily the arithmetic mean, but the mean computed according to the distribution indicated on this table and back-transformed. See text.

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Tuesday, April 21, 2015 9:36 AM
To: 'Combs, Robert'
Cc: Tsinnajinnie, Leona, NMENV; Griswold, Jim, EMNRD
Subject: RE: Initial C-141 report - Effluent Pipeline Leak 2015-04-12

Robert:

Received. OCD wants to make sure this properly cleaned up.

This is high Chloride and Sulfate containing fluids with other parameters of concern. Please note the depth to GW and make sure in your CA that the release is properly investigated (i.e., characterization 500 mg/kg Chloride to delineate horiz./vertical extent of release) and OCD expects to receive a remediation plan for final CA.

Thank you.

Carl J. Chavez, CHMM

New Mexico Energy, Minerals & Natural Resources Department
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Drive, Santa Fe, New Mexico 87505
O: (505) 476-3490

E-mail: CarlJ.Chavez@State.NM.US

Web: <http://www.emnrd.state.nm.us/ocd/>

“Why Not Prevent Pollution; Minimize Waste; Reduce the Cost of Operations; & Move Forward With the Rest of the Nation?” To see how, please go to: “Pollution Prevention & Waste Minimization” at <http://www.emnrd.state.nm.us/ocd/environmental.htm#environmental>



From: Combs, Robert [<mailto:Robert.Combs@HollyFrontier.com>]
Sent: Friday, April 17, 2015 2:22 PM
To: Chavez, Carl J, EMNRD; Tsinnajinnie, Leona, NMENV
Cc: Denton, Scott; Schultz, Michele; Strange, Aaron
Subject: Initial C-141 report - Effluent Pipeline Leak 2015-04-12

Carl and Leona,

Please see the attached C-141 form regarding the effluent pipeline leak on 4/12/15. A Final C-141 form will be prepared once all field activities are complete.

Please contact me for any questions.

Thanks,
Robert

Robert Combs

Environmental Specialist
The HollyFrontier Companies
P.O. Box 159
Artesia, NM 88211-0159
office: 575-746-5382
cell: 575-308-2718
fax: 575-746-5451
Robert.Combs@hollyfrontier.com

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20-Nov-2013

Robert Combs
Navajo Refining Company
PO Box 1490
Artesia, NM 88211-1490

Tel: (575) 746-5382
Fax: (575) 746-5421

Re: WWTP Spill

Work Order: **1309450**

Dear Robert,

ALS Environmental received 1 sample on 11-Sep-2013 09:30 AM for the analyses presented in the following report.

This is a REVISED REPORT. Please see the Case Narrative for discussion concerning this revision.

The total number of pages in this revised report is **GF**.

Regards,

A handwritten signature in black ink that reads "Sonia West".

Electronically approved by: Sonia West

Sonia West
Project Manager



Certificate No: T104704231-13-12

ADDRESS 10450 Stancliff Rd, Suite 210 Houston, Texas 77099-4338 | PHONE (281) 530-5656 | FAX (281) 530-5887

ALS GROUP USA, CORP. Part of the ALS Group An ALS Limited Company

Environmental

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RIGHT SOLUTIONS RIGHT PARTNER

Client: Navajo Refining Company
Project: WWTP Spill
Work Order: 1309450

Work Order Sample Summary

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
1309450-01	API Excavation	Liquid		9/3/2013 16:58	9/11/2013 09:30	<input type="checkbox"/>

Client: Navajo Refining Company
Project: WWTP Spill
Work Order: 1309450

Case Narrative

As per the clients request via phone conversation on November 15, 2013, this report has been revised to include Chrysene by method 8270.

Sample API Excavation was received in an unpreserved 1 Liter glass container. The sample was received outside of the recommended analytical holding time for water sample for Volatile Organics Method 8260 and Semivolatile Organics Method 8270; the data has been qualified with an "H".

Batch 73195, Total Metals Method 6020, Sample 1309616-01: MS/MSD performed on an unrelated sample.

Batch 73050, Semivolatile Organics Method 8270, Sample API Excavation was analyzed at 10X due to sample matrix and had initial vol of 200mL and final volume of 1.5mL.

Batch 73050, Semivolatile Organics Method 8270, Insufficient sample volume for MS/MSD. An LCS/LCSD pair provided as batch quality control.

Batch 73050, Semivolatile Organics Method 8270, Two surrogates did not meet the RPD limit in the LCS/LCSD pair; however, the individual percent recoveries were within control limits

ALS Environmental

Date: 20-Nov-13

Client: Navajo Refining Company

Project: WWTP Spill

Work Order: 1309450

Sample ID: API Excavation

Lab ID: 1309450-01

Collection Date: 9/3/2013 04:58 PM

Matrix: LIQUID

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Prep	Date Analyzed
MERCURY-SW7470A			SW7470		SW7470	Analyst: OFO	
Mercury	0.00205		0.000800	mg/L	1	9/18/2013	9/18/2013 04:02 PM
METALS			SW6020		SW3010A	Analyst: SKS	
Aluminum	1.86		0.100	mg/L	1	9/19/2013	9/19/2013 04:40 PM
Arsenic	0.130		0.0500	mg/L	1	9/19/2013	9/19/2013 04:40 PM
Barium	0.0656		0.0500	mg/L	1	9/19/2013	9/19/2013 04:40 PM
Boron	1.21		0.500	mg/L	1	9/19/2013	9/19/2013 04:40 PM
Cadmium	U		0.0200	mg/L	1	9/19/2013	9/19/2013 04:40 PM
Chromium	U		0.0500	mg/L	1	9/19/2013	9/19/2013 04:40 PM
Cobalt	0.00872	J	0.0500	mg/L	1	9/19/2013	9/19/2013 04:40 PM
Copper	0.0456	J	0.0500	mg/L	1	9/19/2013	9/19/2013 04:40 PM
Iron	6.90		2.00	mg/L	1	9/19/2013	9/19/2013 04:40 PM
Lead	0.0164	J	0.0500	mg/L	1	9/19/2013	9/19/2013 04:40 PM
Manganese	0.0780		0.0500	mg/L	1	9/19/2013	9/19/2013 04:40 PM
Molybdenum	0.0894		0.0500	mg/L	1	9/19/2013	9/19/2013 04:40 PM
Nickel	0.0771		0.0500	mg/L	1	9/19/2013	9/19/2013 04:40 PM
Selenium	0.742		0.0500	mg/L	1	9/19/2013	9/19/2013 04:40 PM
Silver	U		0.0500	mg/L	1	9/19/2013	9/19/2013 04:40 PM
Uranium	U		0.0500	mg/L	1	9/19/2013	9/19/2013 04:40 PM
Zinc	0.365		0.0500	mg/L	1	9/19/2013	9/19/2013 04:40 PM
SEMIVOLATILES - SW8270D			SW8270		SW3510	Analyst: ACN	
1-Methylnaphthalene	370	JH	380	µg/L	10	9/13/2013	9/20/2013 03:06 PM
2-Methylnaphthalene	500	H	380	µg/L	10	9/13/2013	9/20/2013 03:06 PM
Benzo(a)pyrene	U	H	380	µg/L	10	9/13/2013	9/20/2013 03:06 PM
Chrysene	U	H	380	µg/L	10	9/13/2013	9/20/2013 03:06 PM
Naphthalene	370	JH	380	µg/L	10	9/13/2013	9/20/2013 03:06 PM
Surr: 2,4,6-Tribromophenol	69.0	J	42-124	%REC	10	9/13/2013	9/20/2013 03:06 PM
Surr: 2-Fluorobiphenyl	64.5	J	48-120	%REC	10	9/13/2013	9/20/2013 03:06 PM
Surr: 2-Fluorophenol	48.0	J	20-120	%REC	10	9/13/2013	9/20/2013 03:06 PM
Surr: 4-Terphenyl-d14	81.8		51-135	%REC	10	9/13/2013	9/20/2013 03:06 PM
Surr: Nitrobenzene-d5	72.2	J	41-120	%REC	10	9/13/2013	9/20/2013 03:06 PM
Surr: Phenol-d6	63.4	J	20-120	%REC	10	9/13/2013	9/20/2013 03:06 PM
VOLATILES - SW8260C			SW8260			Analyst: PC	
1,1,1-Trichloroethane	U	H	0.25	mg/L	50		9/12/2013 04:02 PM
1,1,2,2-Tetrachloroethane	U	H	0.25	mg/L	50		9/12/2013 04:02 PM
1,1,2-Trichloroethane	U	H	0.25	mg/L	50		9/12/2013 04:02 PM
1,1-Dichloroethane	U	H	0.25	mg/L	50		9/12/2013 04:02 PM
1,1-Dichloroethene	U	H	0.25	mg/L	50		9/12/2013 04:02 PM

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Environmental

Date: 20-Nov-13

Client: Navajo Refining Company

Project: WWTP Spill

Work Order: 1309450

Sample ID: API Excavation

Lab ID: 1309450-01

Collection Date: 9/3/2013 04:58 PM

Matrix: LIQUID

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Prep	Date Analyzed
1,2-Dibromoethane	U	H	0.25	mg/L	50		9/12/2013 04:02 PM
1,2-Dichloroethane	U	H	0.25	mg/L	50		9/12/2013 04:02 PM
Benzene	2.4	H	0.25	mg/L	50		9/12/2013 04:02 PM
Carbon tetrachloride	U	H	0.25	mg/L	50		9/12/2013 04:02 PM
Chloroform	U	H	0.25	mg/L	50		9/12/2013 04:02 PM
Ethylbenzene	2.4	H	0.25	mg/L	50		9/12/2013 04:02 PM
Methylene chloride	U	H	0.50	mg/L	50		9/12/2013 04:02 PM
Tetrachloroethene	U	H	0.25	mg/L	50		9/12/2013 04:02 PM
Toluene	3.8	H	0.25	mg/L	50		9/12/2013 04:02 PM
Trichloroethene	U	H	0.25	mg/L	50		9/12/2013 04:02 PM
Vinyl chloride	U	H	0.10	mg/L	50		9/12/2013 04:02 PM
Xylenes, Total	5.3	H	0.75	mg/L	50		9/12/2013 04:02 PM
Surr: 1,2-Dichloroethane-d4	93.5		70-125	%REC	50		9/12/2013 04:02 PM
Surr: 4-Bromofluorobenzene	97.1		72-125	%REC	50		9/12/2013 04:02 PM
Surr: Dibromofluoromethane	96.7		71-125	%REC	50		9/12/2013 04:02 PM
Surr: Toluene-d8	93.1		75-125	%REC	50		9/12/2013 04:02 PM

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Work Order: 1309450
Client: Navajo Refining Company
Project: WWTP Spill

DATES REPORT

Sample ID	Client Sample ID	Matrix	Collection Date	TCLP Date	Prep Date	Analysis Date
<u>Batch ID</u> 73050 <u>Test Name:</u> Semivolatiles - SW8270D						
1309450-01A	API Excavation	Liquid	9/3/2013 4:58:00 PM		9/13/2013 09:15 AM	9/20/2013 03:06 PM
<u>Batch ID</u> 73162 <u>Test Name:</u> Mercury-SW7470A						
1309450-01A	API Excavation	Liquid	9/3/2013 4:58:00 PM		9/18/2013 11:40 AM	9/18/2013 04:02 PM
<u>Batch ID</u> 73195 <u>Test Name:</u> Metals						
1309450-01A	API Excavation	Liquid	9/3/2013 4:58:00 PM		9/19/2013 10:00 AM	9/19/2013 04:40 PM
<u>Batch ID</u> R153657 <u>Test Name:</u> Volatiles - SW8260C						
1309450-01A	API Excavation	Liquid	9/3/2013 4:58:00 PM			9/12/2013 04:02 PM

ALS Environmental

Date: 20-Nov-13

Client: Navajo Refining Company
Work Order: 1309450
Project: WWTP Spill

QC BATCH REPORT

Batch ID: **73162** Instrument ID **HG03** Method: **SW7470**

MBLK	Sample ID: GBLKW1-091813-73162				Units: mg/L		Analysis Date: 9/18/2013 03:41 PM			
Client ID:	Run ID: HG03_130918A				SeqNo: 3360508		Prep Date: 9/18/2013		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.000200								

LCS	Sample ID: GLCSW1-091813-73162				Units: mg/L		Analysis Date: 9/18/2013 03:42 PM			
Client ID:	Run ID: HG03_130918A				SeqNo: 3360509		Prep Date: 9/18/2013		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00505	0.000200	0.005	0	101	85-115				

MS	Sample ID: 1309402-01DMS				Units: mg/L		Analysis Date: 9/18/2013 03:50 PM			
Client ID:	Run ID: HG03_130918A				SeqNo: 3360512		Prep Date: 9/18/2013		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00511	0.000200	0.005	-0.000025	103	85-115				

MSD	Sample ID: 1309402-01DMSD				Units: mg/L		Analysis Date: 9/18/2013 03:51 PM			
Client ID:	Run ID: HG03_130918A				SeqNo: 3360513		Prep Date: 9/18/2013		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00492	0.000200	0.005	-0.000025	98.9	85-115	0.00511	3.79	20	

DUP	Sample ID: 1309402-01DDUP				Units: mg/L		Analysis Date: 9/18/2013 03:46 PM			
Client ID:	Run ID: HG03_130918A				SeqNo: 3360511		Prep Date: 9/18/2013		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.000200					-0.000025	0	20	

The following samples were analyzed in this batch:

1309450-01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC Page: 1 of 11

Client: Navajo Refining Company
Work Order: 1309450
Project: WWTP Spill

QC BATCH REPORT

Batch ID: **73195** Instrument ID **ICPMS05** Method: **SW6020**

MBLK	Sample ID: MBLKW3-091913-73195				Units: mg/L		Analysis Date: 9/20/2013 12:08 PM			
Client ID:	Run ID: ICPMS05_130920A				SeqNo: 3363548		Prep Date: 9/19/2013		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	U	0.0100								
Arsenic	U	0.00500								
Barium	U	0.00500								
Boron	U	0.0500								
Cadmium	U	0.00200								
Chromium	U	0.00500								
Cobalt	U	0.00500								
Copper	U	0.00500								
Iron	U	0.200								
Lead	U	0.00500								
Manganese	U	0.00500								
Molybdenum	U	0.00500								
Nickel	U	0.00500								
Selenium	U	0.00500								
Silver	U	0.00500								
Uranium	U	0.00500								
Zinc	U	0.00500								

LCS	Sample ID: MLCSW3-091913-73195				Units: mg/L		Analysis Date: 9/19/2013 04:07 PM			
Client ID:	Run ID: ICPMS05_130919A				SeqNo: 3362300		Prep Date: 9/19/2013		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	0.05273	0.00500	0.05	0	105	80-120				
Barium	0.05382	0.00500	0.05	0	108	80-120				
Boron	0.4791	0.0500	0.5	0	95.8	80-120				
Cadmium	0.05023	0.00200	0.05	0	100	80-120				
Chromium	0.05218	0.00500	0.05	0	104	80-120				
Cobalt	0.0522	0.00500	0.05	0	104	80-120				
Copper	0.05123	0.00500	0.05	0	102	80-120				
Iron	5.33	0.200	5	0	107	80-120				
Lead	0.05107	0.00500	0.05	0	102	80-120				
Manganese	0.05274	0.00500	0.05	0	105	80-120				
Molybdenum	0.04933	0.00500	0.05	0	98.7	80-120				
Nickel	0.0511	0.00500	0.05	0	102	80-120				
Selenium	0.05262	0.00500	0.05	0	105	80-120				
Silver	0.05091	0.00500	0.05	0	102	80-120				
Uranium	0.09508	0.00500	0.1	0	95.1	80-120				
Zinc	0.05587	0.00500	0.05	0	112	80-120				

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Navajo Refining Company
Work Order: 1309450
Project: WWTP Spill

QC BATCH REPORT

Batch ID: **73195** Instrument ID **ICPMS05** Method: **SW6020**

LCS	Sample ID: MLCSW3-091913-73195				Units: mg/L		Analysis Date: 9/20/2013 12:10 PM			
Client ID:	Run ID: ICPMS05_130920A				SeqNo: 3363549		Prep Date: 9/19/2013		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	0.1065	0.0100	0.1	0	107	80-120				

MS	Sample ID: 1309616-01DMS				Units: mg/L		Analysis Date: 9/19/2013 04:21 PM			
Client ID:	Run ID: ICPMS05_130919A				SeqNo: 3362305		Prep Date: 9/19/2013		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	2.837	0.0100	0.1	2.969	-132	80-120				SEO
Arsenic	0.05759	0.00500	0.05	0.00563	104	80-120				
Barium	0.1532	0.00500	0.05	0.1134	79.6	80-120				S
Boron	1.091	0.0500	0.5	0.6631	85.6	80-120				
Cadmium	0.0527	0.00200	0.05	0.000053	105	80-120				
Chromium	0.06385	0.00500	0.05	0.01307	102	80-120				
Cobalt	0.05086	0.00500	0.05	0.001394	98.9	80-120				
Copper	0.05476	0.00500	0.05	0.005046	99.4	80-120				
Iron	29.93	0.200	5	26.15	75.6	80-120				SO
Lead	0.0539	0.00500	0.05	0.002549	103	80-120				
Manganese	0.2507	0.00500	0.05	0.211	79.5	80-120				SO
Molybdenum	0.05565	0.00500	0.05	0.00842	94.5	80-120				
Nickel	0.05403	0.00500	0.05	0.004901	98.3	80-120				
Selenium	0.0584	0.00500	0.05	0.005257	106	80-120				
Silver	0.04873	0.00500	0.05	0.00001	97.4	80-120				
Uranium	0.1061	0.00500	0.1	0.008033	98.1	80-120				
Zinc	0.08035	0.00500	0.05	0.02509	111	80-120				

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Navajo Refining Company
Work Order: 1309450
Project: WWTP Spill

QC BATCH REPORT

Batch ID: **73195** Instrument ID **ICPMS05** Method: **SW6020**

MSD		Sample ID: 1309616-01DMSD				Units: mg/L		Analysis Date: 9/19/2013 04:23 PM		
Client ID:		Run ID: ICPMS05_130919A				SeqNo: 3362306		Prep Date: 9/19/2013		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	2.716	0.0100	0.1	2.969	-253	80-120	2.837	4.37	15	SEO
Arsenic	0.05978	0.00500	0.05	0.00563	108	80-120	0.05759	3.73	15	
Barium	0.1575	0.00500	0.05	0.1134	88.3	80-120	0.1532	2.79	15	
Boron	1.103	0.0500	0.5	0.6631	87.9	80-120	1.091	1.06	15	
Cadmium	0.05355	0.00200	0.05	0.000053	107	80-120	0.0527	1.6	15	
Chromium	0.06485	0.00500	0.05	0.01307	104	80-120	0.06385	1.55	15	
Cobalt	0.05328	0.00500	0.05	0.001394	104	80-120	0.05086	4.64	15	
Copper	0.05661	0.00500	0.05	0.005046	103	80-120	0.05476	3.32	15	
Iron	30.81	0.200	5	26.15	93.3	80-120	29.93	2.91	15	O
Lead	0.05453	0.00500	0.05	0.002549	104	80-120	0.0539	1.15	15	
Manganese	0.2572	0.00500	0.05	0.211	92.5	80-120	0.2507	2.56	15	O
Molybdenum	0.05767	0.00500	0.05	0.00842	98.5	80-120	0.05565	3.56	15	
Nickel	0.05706	0.00500	0.05	0.004901	104	80-120	0.05403	5.45	15	
Selenium	0.0605	0.00500	0.05	0.005257	110	80-120	0.0584	3.53	15	
Silver	0.04981	0.00500	0.05	0.00001	99.6	80-120	0.04873	2.19	15	
Uranium	0.1081	0.00500	0.1	0.008033	100	80-120	0.1061	1.89	15	
Zinc	0.07989	0.00500	0.05	0.02509	110	80-120	0.08035	0.578	15	

DUP		Sample ID: 1309616-01DDUP				Units: mg/L		Analysis Date: 9/19/2013 04:18 PM		
Client ID:		Run ID: ICPMS05_130919A				SeqNo: 3362304		Prep Date: 9/19/2013		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	0.006299	0.00500					0.00563	11.2	25	
Barium	0.1128	0.00500					0.1134	0.471	25	
Boron	0.6726	0.0500					0.6631	1.43	25	
Cadmium	U	0.00200					0.000053	0	25	
Chromium	0.01436	0.00500					0.01307	9.42	25	
Cobalt	0.001703	0.00500					0.001394	0	25	J
Copper	0.005504	0.00500					0.005046	8.68	25	
Iron	28.46	0.200					26.15	8.48	25	
Lead	0.002397	0.00500					0.002549	0	25	J
Manganese	0.2288	0.00500					0.211	8.11	25	
Molybdenum	0.009001	0.00500					0.00842	6.67	25	
Nickel	0.005295	0.00500					0.004901	7.73	25	
Selenium	0.006381	0.00500					0.005257	19.3	25	
Silver	U	0.00500					0.00001	0	25	
Uranium	0.008277	0.00500					0.008033	2.99	25	
Zinc	0.02722	0.00500					0.02509	8.15	25	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Navajo Refining Company
Work Order: 1309450
Project: WWTP Spill

QC BATCH REPORT

Batch ID: **73195** Instrument ID **ICPMS05** Method: **SW6020**

DUP Sample ID: **1309616-01DDUP** Units: **mg/L** Analysis Date: **9/20/2013 12:15 PM**

Client ID: Run ID: **ICPMS05_130920A** SeqNo: **3363551** Prep Date: **9/19/2013** DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	2.192	0.100					2.31	5.24	25	

The following samples were analyzed in this batch:

1309450-01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Navajo Refining Company
Work Order: 1309450
Project: WWTP Spill

QC BATCH REPORT

Batch ID: **73050** Instrument ID **SV-3** Method: **SW8270**

MBLK	Sample ID: SBLKW1-130913-73050				Units: µg/L		Analysis Date: 9/16/2013 06:21 PM			
Client ID:	Run ID: SV-3_130916B				SeqNo: 3358240		Prep Date: 9/13/2013		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	U	5.0								
2-Methylnaphthalene	U	5.0								
Benzo(a)pyrene	U	5.0								
Chrysene	U	5.0								
Naphthalene	U	5.0								
Surr: 2,4,6-Tribromophenol	93.53	5.0	100	0	93.5	42-124	0			
Surr: 2-Fluorobiphenyl	77.17	5.0	100	0	77.2	48-120	0			
Surr: 2-Fluorophenol	67.1	5.0	100	0	67.1	20-120	0			
Surr: 4-Terphenyl-d14	87.53	5.0	100	0	87.5	51-135	0			
Surr: Nitrobenzene-d5	71.14	5.0	100	0	71.1	41-120	0			
Surr: Phenol-d6	69.12	5.0	100	0	69.1	20-120	0			

LCS	Sample ID: SLCSW1-130913-73050				Units: µg/L		Analysis Date: 9/16/2013 05:35 PM			
Client ID:	Run ID: SV-3_130916B				SeqNo: 3358239		Prep Date: 9/13/2013		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	41.26	5.0	50	0	82.5	55-120				
2-Methylnaphthalene	42.44	5.0	50	0	84.9	55-120				
Benzo(a)pyrene	40.43	5.0	50	0	80.9	55-120				
Chrysene	41.67	5.0	50	0	83.3	55-120				
Naphthalene	39.6	5.0	50	0	79.2	55-120				
Surr: 2,4,6-Tribromophenol	79.62	5.0	100	0	79.6	42-124	0			
Surr: 2-Fluorobiphenyl	69.61	5.0	100	0	69.6	48-120	0			
Surr: 2-Fluorophenol	98.92	5.0	100	0	98.9	20-120	0			
Surr: 4-Terphenyl-d14	89.45	5.0	100	0	89.4	51-135	0			
Surr: Nitrobenzene-d5	69.5	5.0	100	0	69.5	41-120	0			
Surr: Phenol-d6	83.36	5.0	100	0	83.4	20-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Navajo Refining Company
Work Order: 1309450
Project: WWTP Spill

QC BATCH REPORT

Batch ID: **73050** Instrument ID **SV-3** Method: **SW8270**

LCSD		Sample ID: SLCSDW1-130913-73050				Units: µg/L		Analysis Date: 9/17/2013 11:47 AM		
Client ID:		Run ID: SV-3_130916B				SeqNo: 3358244		Prep Date: 9/13/2013		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1-Methylnaphthalene	38.91	5.0	50	0	77.8	55-120	41.26	5.86	20	
2-Methylnaphthalene	41.44	5.0	50	0	82.9	55-120	42.44	2.39	20	
Benzo(a)pyrene	41.04	5.0	50	0	82.1	55-120	40.43	1.51	20	
Chrysene	41.56	5.0	50	0	83.1	55-120	41.67	0.283	20	
Naphthalene	39.98	5.0	50	0	80	55-120	39.6	0.95	20	
<i>Surr: 2,4,6-Tribromophenol</i>	87.43	5.0	100	0	87.4	42-124	79.62	9.35	20	
<i>Surr: 2-Fluorobiphenyl</i>	73.19	5.0	100	0	73.2	48-120	69.61	5.01	20	
<i>Surr: 2-Fluorophenol</i>	75.18	5.0	100	0	75.2	20-120	98.92	27.3	20	R
<i>Surr: 4-Terphenyl-d14</i>	77.31	5.0	100	0	77.3	51-135	89.45	14.6	20	
<i>Surr: Nitrobenzene-d5</i>	76.3	5.0	100	0	76.3	41-120	69.5	9.32	20	
<i>Surr: Phenol-d6</i>	66.91	5.0	100	0	66.9	20-120	83.36	21.9	20	R

The following samples were analyzed in this batch:

1309450-01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Navajo Refining Company
Work Order: 1309450
Project: WWTP Spill

QC BATCH REPORT

Batch ID: **R153657** Instrument ID **VOA1** Method: **SW8260**

MBLK Sample ID: **VBLKW-130912-R153657** Units: **µg/L** Analysis Date: **9/12/2013 02:46 PM**

Client ID: Run ID: **VOA1_130912A** SeqNo: **3354011** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	U	5.0								
1,1,2,2-Tetrachloroethane	U	5.0								
1,1,2-Trichloroethane	U	5.0								
1,1-Dichloroethane	U	5.0								
1,1-Dichloroethene	U	5.0								
1,2-Dibromoethane	U	5.0								
1,2-Dichloroethane	U	5.0								
Benzene	U	5.0								
Carbon tetrachloride	U	5.0								
Chloroform	U	5.0								
Ethylbenzene	U	5.0								
Methylene chloride	U	10								
Tetrachloroethene	U	5.0								
Toluene	U	5.0								
Trichloroethene	U	5.0								
Vinyl chloride	U	2.0								
Xylenes, Total	U	15								
<i>Surr: 1,2-Dichloroethane-d4</i>	49	5.0	50	0	98	70-125	0			
<i>Surr: 4-Bromofluorobenzene</i>	51.26	5.0	50	0	103	72-125	0			
<i>Surr: Dibromofluoromethane</i>	47.84	5.0	50	0	95.7	71-125	0			
<i>Surr: Toluene-d8</i>	45.14	5.0	50	0	90.3	75-125	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Navajo Refining Company
Work Order: 1309450
Project: WWTP Spill

QC BATCH REPORT

Batch ID: **R153657** Instrument ID **VOA1** Method: **SW8260**

LCS		Sample ID: VLCSW-130912-R153657				Units: µg/L		Analysis Date: 9/12/2013 01:14 PM		
Client ID:		Run ID: VOA1_130912A				SeqNo: 3354010		Prep Date:		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	51.59	5.0	50	0	103	80-120				
1,1,2,2-Tetrachloroethane	43.8	5.0	50	0	87.6	72-120				
1,1,2-Trichloroethane	48.85	5.0	50	0	97.7	80-120				
1,1-Dichloroethane	55.72	5.0	50	0	111	76-120				
1,1-Dichloroethene	57.77	5.0	50	0	116	73-124				
1,2-Dibromoethane	49.91	5.0	50	0	99.8	80-120				
1,2-Dichloroethane	52.43	5.0	50	0	105	78-120				
Benzene	54.11	5.0	50	0	108	73-121				
Carbon tetrachloride	48.43	5.0	50	0	96.9	75-125				
Chloroform	52.59	5.0	50	0	105	70-130				
Ethylbenzene	48.86	5.0	50	0	97.7	80-120				
Methylene chloride	51.52	10	50	0	103	65-133				
Tetrachloroethene	47.65	5.0	50	0	95.3	79-120				
Toluene	47.62	5.0	50	0	95.2	80-120				
Trichloroethene	53.45	5.0	50	0	107	80-120				
Vinyl chloride	60.26	2.0	50	0	121	70-127				
Xylenes, Total	149.3	15	150	0	99.6	80-120				
<i>Surr: 1,2-Dichloroethane-d4</i>	48.87	5.0	50	0	97.7	70-125		0		
<i>Surr: 4-Bromofluorobenzene</i>	52.18	5.0	50	0	104	72-125		0		
<i>Surr: Dibromofluoromethane</i>	50.3	5.0	50	0	101	71-125		0		
<i>Surr: Toluene-d8</i>	47.56	5.0	50	0	95.1	75-125		0		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Navajo Refining Company
Work Order: 1309450
Project: WWTP Spill

QC BATCH REPORT

Batch ID: **R153657** Instrument ID **VOA1** Method: **SW8260**

MS		Sample ID: 1309436-05AMS				Units: µg/L		Analysis Date: 9/12/2013 04:28 PM		
Client ID:		Run ID: VOA1_130912A				SeqNo: 3354015		Prep Date:		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	47.54	5.0	50	0	95.1	80-120				
1,1,2,2-Tetrachloroethane	52.72	5.0	50	0	105	72-120				
1,1,2-Trichloroethane	51.89	5.0	50	0	104	80-120				
1,1-Dichloroethane	53	5.0	50	0	106	76-120				
1,1-Dichloroethene	48.61	5.0	50	0	97.2	73-124				
1,2-Dibromoethane	51.94	5.0	50	0	104	80-120				
1,2-Dichloroethane	48.5	5.0	50	0	97	78-120				
Benzene	44.39	5.0	50	0	88.8	73-121				
Carbon tetrachloride	44.48	5.0	50	0	89	75-125				
Chloroform	50.02	5.0	50	0	100	70-130				
Ethylbenzene	46.39	5.0	50	0	92.8	80-120				
Methylene chloride	50.26	10	50	0	101	65-133				
Tetrachloroethene	41.87	5.0	50	0	83.7	79-120				
Toluene	46.75	5.0	50	0	93.5	80-120				
Trichloroethene	45.58	5.0	50	0	91.2	80-120				
Vinyl chloride	40.53	2.0	50	0	81.1	70-127				
Xylenes, Total	145.5	15	150	0	97	80-120				
Surr: 1,2-Dichloroethane-d4	48.39	5.0	50	0	96.8	70-125		0		
Surr: 4-Bromofluorobenzene	51.28	5.0	50	0	103	72-125		0		
Surr: Dibromofluoromethane	50.54	5.0	50	0	101	71-125		0		
Surr: Toluene-d8	50.23	5.0	50	0	100	75-125		0		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Navajo Refining Company
Work Order: 1309450
Project: WWTP Spill

QC BATCH REPORT

Batch ID: **R153657** Instrument ID **VOA1** Method: **SW8260**

MSD		Sample ID: 1309436-05AMSD				Units: µg/L		Analysis Date: 9/12/2013 04:53 PM		
Client ID:		Run ID: VOA1_130912A				SeqNo: 3354016		Prep Date:		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	47.16	5.0	50	0	94.3	80-120	47.54	0.797	20	
1,1,2,2-Tetrachloroethane	50.78	5.0	50	0	102	72-120	52.72	3.75	20	
1,1,2-Trichloroethane	50.25	5.0	50	0	100	80-120	51.89	3.22	20	
1,1-Dichloroethane	52.51	5.0	50	0	105	76-120	53	0.937	20	
1,1-Dichloroethene	51.28	5.0	50	0	103	73-124	48.61	5.35	20	
1,2-Dibromoethane	50.19	5.0	50	0	100	80-120	51.94	3.42	20	
1,2-Dichloroethane	49.25	5.0	50	0	98.5	78-120	48.5	1.55	20	
Benzene	47.99	5.0	50	0	96	73-121	44.39	7.78	20	
Carbon tetrachloride	48.08	5.0	50	0	96.2	75-125	44.48	7.79	20	
Chloroform	49.8	5.0	50	0	99.6	70-130	50.02	0.454	20	
Ethylbenzene	43.63	5.0	50	0	87.3	80-120	46.39	6.13	20	
Methylene chloride	50.01	10	50	0	100	65-133	50.26	0.49	20	
Tetrachloroethene	45.56	5.0	50	0	91.1	79-120	41.87	8.44	20	
Toluene	48.55	5.0	50	0	97.1	80-120	46.75	3.78	20	
Trichloroethene	48.97	5.0	50	0	97.9	80-120	45.58	7.17	20	
Vinyl chloride	48.68	2.0	50	0	97.4	70-127	40.53	18.3	20	
Xylenes, Total	147.3	15	150	0	98.2	78-121	145.5	1.2	20	
Surr: 1,2-Dichloroethane-d4	48.01	5.0	50	0	96	70-125	48.39	0.789	20	
Surr: 4-Bromofluorobenzene	49.03	5.0	50	0	98.1	72-125	51.28	4.49	20	
Surr: Dibromofluoromethane	48.77	5.0	50	0	97.5	71-125	50.54	3.57	20	
Surr: Toluene-d8	47.38	5.0	50	0	94.8	75-125	50.23	5.84	20	

The following samples were analyzed in this batch:

1309450-01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Navajo Refining Company
Project: WWTP Spill
WorkOrder: 1309450

QUALIFIERS, ACRONYMS, UNITS

<u>Qualifier</u>	<u>Description</u>
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

<u>Acronym</u>	<u>Description</u>
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitation Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

<u>Units Reported</u>	<u>Description</u>
µg/L	Micrograms per Liter
mg/L	Milligrams per Liter

Sample Receipt Checklist

Client Name: **NAVAJO REFINING**

Date/Time Received: **11-Sep-13 09:30**

Work Order: **1309450**

Received by: **JBA**

Checklist completed by Parash M. Ciga 12-Sep-13
eSignature Date

Reviewed by: Sonia West 13-Sep-13
eSignature Date

Matrices: Liquid

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on shipping container/cooler?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Samples in proper container/bottle?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
All samples received within holding time?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Container/Temp Blank temperature in compliance?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Temperature(s)/Thermometer(s):	<u>1.0c/1.0c C/U</u> <u>IR1</u>		
Cooler(s)/Kit(s):	<u>2988</u>		
Date/Time sample(s) sent to storage:	<u>9/12/13 09:17</u>		
Water - VOA vials have zero headspace?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	No VOA vials submitted <input checked="" type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>
pH adjusted?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
pH adjusted by:	<u>-</u>		

Login Notes: Sample received in 1 Liter W/M Glass container. Water Sample - non preserved - volatiles and semivolatiles have 7 day holding time; sample received outside of holding time. Jsrb.

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:



☒ ALS Laboratory Group
10450 Stancliff Rd. #210
Houston, Texas 77099
(Tel) 281.530.5656
(Fax) 281.530.5887

Chain of Custody Form

Page 1 of 1

1309450

NAVAJO REFINING: Navajo Refining Company

Project: WWTP Spill



ALS Project Manager: Sonia West

Customer Information				Project Information				Parameter/Method Request for Analysis											
Purchase Order		Project Name	WWTP Spill	A	Volatiles (Totals)														
Work Order		Project Number		B	Semi-Volatiles (Totals)														
Company Name	Navajo Refining Company	Bill To Company	Navajo Refining Company	C	Metals (Totals)														
Send Report To	Robert Combs	Invoice Attn	Aaron Strange	D															
Address	P. O. Box 159	Address	501 East Main	E															
				F															
City/State/Zip	Artesia, New Mexico 88211-0159	City/State/Zip	Artesia, New Mexico 88210	G															
Phone	(575) 748-3311	Phone	(575) 748-3311	H															
Fax	(575) 746-5451	Fax	(575) 746-5451	I															
e-Mail Address	Aaron.Strange@hollyfrontier.com	e-Mail Address	Aaron.Strange@hollyfrontier.com	J															
No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold		
1	API Excavation	9/3/13	16:58	Liquid	None	1	X	X	X										
2	Temperature Blank			Liquid		1													
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
Sampler(s): Please Print & Sign		Shipment Method:		Required Turnaround Time:				Results Due Date:											
Aaron Strange		FedEx		<input checked="" type="checkbox"/> STD 10 Wk Days <input type="checkbox"/> 5 Wk Days <input type="checkbox"/> 2 Wk Days <input type="checkbox"/> 24 Hour															
Relinquished by:		Date:	Time:	Received by:		Notes:													
<i>Aaron Strange</i>		9/3/2013	16:15	<i>[Signature]</i>															
Relinquished by:		Date:	Time:	Received by (Laboratory):		Cooler Temp.		QC Package: (Check Box Below)											
<i>[Signature]</i>		9/4/13	0930	<i>[Signature]</i>				<input type="checkbox"/> Level II: Standard QC <input type="checkbox"/> TRRP-Checklist											
Logged by (Laboratory):		Date:	Time:	Checked by (Laboratory):				<input type="checkbox"/> Level III: Std QC + Raw Data <input type="checkbox"/> TRRP Level IV											
								<input type="checkbox"/> Level IV: SW846 CLP-Like											
Preservative Key:		Other: _____																	
1-HCL 2-HNO3 3-H2SO4 4-NaOH 5-Na2S2O3 6-NaHSO4 7-Other 8-4 degrees C 9-5035																			

Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS Laboratory Group.

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ORIGIN ID: ROWA (575) 748-3311

NAVAJO ARTESIA
501 E MAIN

ARTESIA, NM 882109440
UNITED STATES US

SHIP DATE: 09SEP13
ACTWGT: 25.0 LB MAN
CAD: 634483/CAFE2608

BILL RECIPIENT

SONIA WEST
ALS LABORATORY GROUP
10450 STANCLIFF RD., SUITE 210

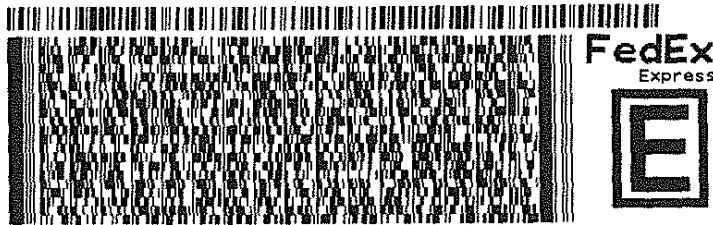
HOUSTON TX 77099

(281) 530-5656

INV:
PO:

REF:

DEPT:

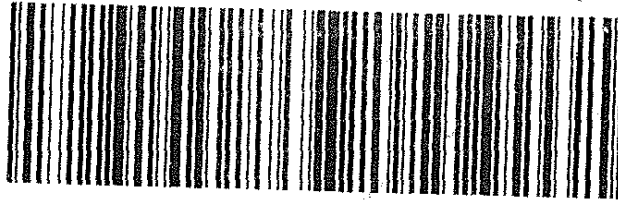


FedEx
TRK# 5614 5589 2050
0201

WED - 11 SEP 10:30A
PRIORITY OVERNIGHT

AB SGRA

77099
TX-US
IAH



Emp# 091856 18SEP13 ROWA 519C1/9256/93AB



ALS Environmental

10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

2988

CUSTODY SEAL

ate: 9-9-13 Time: 10:13
Name: Aracela S. Stuenkel
Company: Navajo Retaining Co.

Seal Broken By:

Signature and date: 9/9/13



06-Nov-2013

Aaron Strange
Navajo Refining Company
PO Box 1490
Artesia, NM 88211-1490

Tel: (575) 748-6733
Fax: (575) 746-5421

Re: Wastewater Spill-Artesia

Work Order: **1311143**

Dear Aaron,

ALS Environmental received 1 sample on 25-Sep-2013 09:25 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 20.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

A handwritten signature in cursive script that reads "Sonia West".

Electronically approved by: Dayna.Fisher

Sonia West
Project Manager



Certificate No: T104704231-13-12

ADDRESS 10450 Stancliff Rd, Suite 210 Houston, Texas 77099-4338 | PHONE (281) 530-5656 | FAX (281) 530-5887

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Environmental

www.alsglobal.com

RIGHT SOLUTIONS RIGHT PARTNER

Client: Navajo Refining Company
Project: Wastewater Spill-Artesia
Work Order: 1311143

Work Order Sample Summary

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
1311143-01	Wastewater Spill at Lift Station Excavation	Solid	13091139	9/24/2013 14:07	9/25/2013 09:25	<input type="checkbox"/>

Client: Navajo Refining Company
Project: Wastewater Spill-Artesia
Work Order: 1311143

Case Narrative

This report contains additional analyses per your request on November 4, 2013 via email. The laboratory analyzed your sample Wastewater Spill at Lift Station Excavation for RCI. The sample was originally reported as ALS Workorder Number 13091139.

The analyses for Reactive Cyanide and Reactive Sulfide were subcontracted to ALS Environmental in Holland, MI.

ALS Environmental**Date:** 06-Nov-13**Client:** Navajo Refining Company**Project:** Wastewater Spill-Artesia**Work Order:** 1311143**Sample ID:** Wastewater Spill at Lift Station Excavation**Lab ID:** 1311143-01**Collection Date:** 9/24/2013 02:07 PM**Matrix:** SOLID

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
REACTIVE CYANIDE			SW-846			Analyst: HN
Reactive Cyanide	U	H	0.100	mg/Kg	1	11/6/2013
REACTIVE SULFIDE			SW-846			Analyst: HN
Reactive Sulfide	242	H	40.0	mg/Kg	1	11/5/2013 02:00 PM
IGNITABILITY			SW1030			Analyst: KAH
Ignitability, Solid	Negative	H		Burn Rate, mm/sec	1	11/5/2013 04:20 PM
PH - SOIL - SW9045D			SW9045B			Analyst: KL
pH	7.61	H	0.100	pH Units	1	11/5/2013 01:00 PM

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Work Order: 1311143
Client: Navajo Refining Company
Project: Wastewater Spill-Artesia

DATES REPORT

Sample ID	Client Sample ID	Matrix	Collection Date	TCLP Date	Prep Date	Analysis Date
<u>Batch ID</u> R156646 <u>Test Name:</u> Ignitability						
1311143-01A	Wastewater Spill at Lift Station Excavation	Solid	9/24/2013 2:07:00 PM			11/5/2013 04:20 PM
<u>Batch ID</u> R156658 <u>Test Name:</u> pH - Soil - SW9045D						
1311143-01A	Wastewater Spill at Lift Station Excavation	Solid	9/24/2013 2:07:00 PM			11/5/2013 01:00 PM
<u>Batch ID</u> R156680 <u>Test Name:</u> Reactive Cyanide						
1311143-01B	Wastewater Spill at Lift Station Excavation	Solid	9/24/2013 2:07:00 PM			11/6/2013
						11/5/2013 02:00 PM

Client: Navajo Refining Company

Work Order: 1311143

Project: Wastewater Spill-Artesia

QC BATCH REPORT

Batch ID: **R156646** Instrument ID **WetChem** Method: **SW1030** **(Dissolve)**

DUP Sample ID: **1311030-01ADUP** Units: **Burn Rate, mm/se** Analysis Date: **11/5/2013 04:20 PM**

Client ID: Run ID: **WETCHEM_131105E** SeqNo: **3421081** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Ignitability, Solid	U	0					0	0	25	

The following samples were analyzed in this batch:

1311143-01A

Client: Navajo Refining Company
Work Order: 1311143
Project: Wastewater Spill-Artesia

QC BATCH REPORT

Batch ID: **R156658** Instrument ID **WetChem** Method: **SW9045B (Dissolve)**

LCS Sample ID: **WLCSS1-131105-R156658** Units: **pH Units** Analysis Date: **11/5/2013 01:00 PM**

Client ID: Run ID: **WETCHEM_131105H** SeqNo: **3421408** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	6.01	0.100	6	0	100	98-102				

DUP Sample ID: **1311030-01ADUP** Units: **pH Units** Analysis Date: **11/5/2013 01:00 PM**

Client ID: Run ID: **WETCHEM_131105H** SeqNo: **3421419** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH	5.45	0.100					5.5	0.913	10	H

The following samples were analyzed in this batch:

1311143-01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Navajo Refining Company
Project: Wastewater Spill-Artesia
WorkOrder: 1311143

QUALIFIERS, ACRONYMS, UNITS

<u>Qualifier</u>	<u>Description</u>
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

<u>Acronym</u>	<u>Description</u>
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitation Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

<u>Units Reported</u>	<u>Description</u>
Burn Rate, mm/sec	
mg/Kg	Milligrams per Kilogram
pH Units	

Sample Receipt Checklist

Client Name: **NAVAJO REFINING**

Date/Time Received: **25-Sep-13 09:25**

Work Order: **13091139**

Received by: **WTJ**

Checklist completed by *Parash M. Ciga*
eSignature

25-Sep-13
Date

Reviewed by:

eSignature

Date

Matrices: **Solid**

Carrier name: **FedEx**

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on shipping container/cooler?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Samples in proper container/bottle?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
All samples received within holding time?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Container/Temp Blank temperature in compliance?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Temperature(s)/Thermometer(s):	<u>3.3c/3.3c C/U</u> <u>IR1</u>		
Cooler(s)/Kit(s):	<u>5119</u>		
Date/Time sample(s) sent to storage:	<u>9/25/13 16:10</u>		
Water - VOA vials have zero headspace?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	No VOA vials submitted <input checked="" type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
pH adjusted?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
pH adjusted by:	<u>-</u>		
Login Notes:			

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

CorrectiveAction:



ALS Laboratory Group
10450 Stancliff Rd. #210
Houston, Texas 77099
(Tel) 281.530.5656
(Fax) 281.530.5887

Chain of Custody Form

Page 1 of 1

1311143

NAVAJO REFINING: Navajo Refining Company

Project: Wastewater Spill-Artesia



ALS Project Manager: Sonia West

Customer Information			Project Information																
Purchase Order		Project Name	Wastewater Spill - Artesia				A	TCLP Volatiles											
Work Order		Project Number					B	TCLP Semi-Volatiles											
Company Name	Navajo Refining Company		Bill To Company	Navajo Refining Company				C	TCLP Metals										
Send Report To	Aaron Strange		Invoice Attn.	Aaron Strange				D											
Address	P. O. Box 159		Address	501 East Main				E											
								F											
City/State/Zip	Artesia, New Mexico 88211-0159		City/State/Zip	Artesia, New Mexico 88210				G											
Phone	(575) 748-3311		Phone	(575) 748-3311				H											
Fax	(575) 748-5451		Fax	(575) 748-5451				I											
e-Mail Address	A.Strange@hollyfrontier.com		e-Mail Address	A.Strange@hollyfrontier.com				J											
No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold		
1	Wastewater Spill at Lift Station Excavation	9/24/13	14:07	Solid	Chill	1	X	X	X										
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
Sampler(s): Please Print & Sign Glen Rhodes			Shipment Method: Federal Express		Required Turnaround Time: <input checked="" type="checkbox"/> STD 10 Wk Days <input type="checkbox"/> 5 Wk Days <input type="checkbox"/> 2 Wk Days <input type="checkbox"/> 24 Hour				Other: _____				Results Due Date:						
Relinquished by: Glen Rhodes		Date: 9/24/13	Time: 1500	Received by:			Notes:												
Relinquished by: Aaron Strange		Date: 9/24/13	Time: 16:15	Received by (Laboratory): B. J. [Signature]			9/25/13 0930												
Logged by (Laboratory):		Date:	Time:	Checked by (Laboratory):			Cooler Temp: 33												
Preservative Key: 1-HCL 2-HNO3 3-H2SO4 4-NaOH 5-Na2S2O3 6-NaHSO4 7-Other 8-4 degrees C 9-5035							QC Package: (Check Box Below)												
							<input type="checkbox"/> Level II: Standard QC <input type="checkbox"/> TRRP-Checklist												
							<input type="checkbox"/> Level III: Std QC + Raw Data <input type="checkbox"/> TRRP Level IV												
							<input type="checkbox"/> Level IV: SW846 CLP-Like												
							Other: _____												

Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS Laboratory Group.

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ALS Environmental

10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

Date: 9-24-93
Name: A.
Company: 4

CUSTODY SEAL

24-93 Time: 16:15
EKEN S. F. M. G. G. C.
Varajit Retaining Co.

Seal Broken B

Date:

ORIGIN ID: ROUR (5/5) 748-3311

NAVAJO ARTESIA
5011 S. MAINARTESIA NM 882109440
UNITED STATES USSHIP DATE: 24SEP13
ACTWT: 32.0 LB MAN
CRD: 634483/CRFE2704

BILL RECIPIENT

SONIA WEST

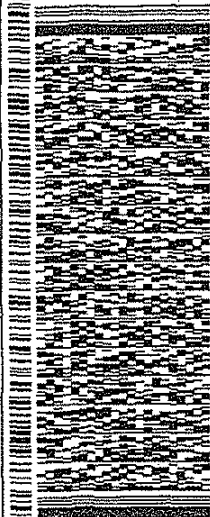
ALS LABORATORY GROUP
10450 STANCLIFF RD., SUITE 210

HOUSTON TX 77099

(281) 530-5656
INV. PO.

REF:

DEPT:

FedEx
Express

J1311305230126

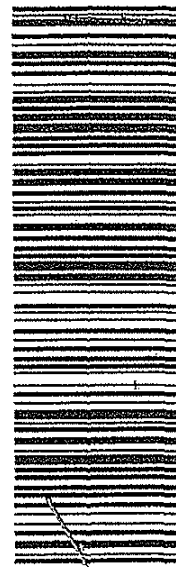
TRK#

5614 5589 2304

0281

WED - 25 SEP 10:30A
PRIORITY OVERNIGHT

AB SGRA

77099
TX-US IAH

Part # 156148-434 RIT 08/12

Client: ALS Environmental
Project: 1311143
Work Order: 1311181**Work Order Sample Summary**

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
1311181-01	1311143-01B	Solid		9/24/2013 14:07	11/5/2013 09:30	<input type="checkbox"/>

Client: ALS Environmental
Project: 1311143
WorkOrder: 1311181

**QUALIFIERS,
ACRONYMS, UNITS**

<u>Qualifier</u>	<u>Description</u>
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

<u>Acronym</u>	<u>Description</u>
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

<u>Units Reported</u>	<u>Description</u>
mg/Kg	Milligrams per Kilogram

Client: ALS Environmental**Project:** 1311143**Work Order:** 1311181**Case Narrative**

Batch R129921, Method SR_7.3.4.2_WST, Sample 1311181-01A: Sample was analyzed outside of the holding time at the request of the client. Results should be considered estimated.

Batch R129963, Method CNR_7.3.3.2_WST, Sample 1311181-01A: Sample was analyzed outside of the holding time at the request of the client. Results should be considered estimated.

ALS Group USA, Corp

Date: 06-Nov-13

Client: ALS Environmental

Project: 1311143

Work Order: 1311181

Sample ID: 1311143-01B

Lab ID: 1311181-01

Collection Date: 9/24/2013 02:07 PM

Matrix: SOLID

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
CYANIDE, REACTIVE			SW7.3.3.2			Analyst: ND
Cyanide, Reactive	ND	H	100	mg/Kg	1	11/6/2013
SULFIDE, REACTIVE			SW7.3.4.2			Analyst: ND
Sulfide, Reactive	240	H	100	mg/Kg	1	11/5/2013 02:00 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: ALS Environmental
Work Order: 1311181
Project: 1311143

QC BATCH REPORT

Batch ID: **R129921** Instrument ID **WETCHEM** Method: **SW7.3.4.2**

MBLK		Sample ID: MB-R129921-R129921				Units: mg/Kg		Analysis Date: 11/5/2013 02:00 PM		
Client ID:		Run ID: WETCHEM_131105M				SeqNo: 2523666		Prep Date:		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Sulfide, Reactive ND 100

LCS		Sample ID: LCS-R129921-R129921				Units: mg/Kg		Analysis Date: 11/5/2013 02:00 PM		
Client ID:		Run ID: WETCHEM_131105M				SeqNo: 2523667		Prep Date:		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Sulfide, Reactive 1638 100 2149 0 76.2 60-120 0

The following samples were analyzed in this batch:

1311181-01A

Client: ALS Environmental
 Work Order: 1311181
 Project: 1311143

QC BATCH REPORT

Batch ID: **R129963** Instrument ID **WETCHEM** Method: **SW7.3.3.2**

MBLK		Sample ID: MB-R129963-R129963				Units: mg/Kg		Analysis Date: 11/6/2013		
Client ID:		Run ID: WETCHEM_131106B				SeqNo: 2524712		Prep Date:		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Cyanide, Reactive ND 100

LCS		Sample ID: LCS-R129963-R129963				Units: mg/Kg		Analysis Date: 11/6/2013		
Client ID:		Run ID: WETCHEM_131106B				SeqNo: 2524713		Prep Date:		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Cyanide, Reactive 117.4 100 125 0 94 75-125 0

MS		Sample ID: 13101619-02A MS				Units: mg/Kg		Analysis Date: 11/6/2013		
Client ID:		Run ID: WETCHEM_131106B				SeqNo: 2524716		Prep Date:		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Cyanide, Reactive 235 100 250 0 94 50-150 0

MSD		Sample ID: 13101619-02A MSD				Units: mg/Kg		Analysis Date: 11/6/2013		
Client ID:		Run ID: WETCHEM_131106B				SeqNo: 2524717		Prep Date:		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual

Cyanide, Reactive 235.1 100 250 0 94 50-150 235 0.0383 35

The following samples were analyzed in this batch:

1311181-01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.



Subcontractor:
ALS Laboratory Group
3352 128th Ave.
Holland, MI 49424

TEL: (616) 399-6070
FAX: (616) 399-6185
Acct #:

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

1311181
Date: 04-Nov-13
COC ID: 15242
Due Date 07-Nov-13

Salesperson: Houston House Acct

Customer Information		Project Information		Parameter/Method Request for Analysis												
Purchase Order		Project Name	1311143	A	Reactive Cyanide (SW-846)											
Work Order		Project Number		B	Reactive Sulfide (SW-846)											
Company Name	ALS Group USA, Corp.	Bill To Company	ALS Group USA, Corp.	C												
Send Report To	Sonia West	Inv Attn	Accounts Payable	D												
Address	10450 Stancliff Rd, Suite 210	Address	10450 Stancliff Rd, Suite 210	E												
				F												
City/State/Zip	Houston, Texas 77099-4338	City/State/Zip	Houston, Texas 77099-4338	G												
Phone	(281) 530-5656	Phone	(281) 530-5656	H												
Fax	(281) 530-5887	Fax	(281) 530-5887	I												
eMail Address	Sonia.West@alsglobal.com	eMail CC		J												
Sample ID	Matrix	Collection Date 24hr	Bottle	A	B	C	D	E	F	G	H	I	J			
1311143-01B (Wastewater Spill at Lift Station Excavation)	Solid	24/Sep/2013 14:07	(1) 4OZGNEAT	X	X											

RUSH

Comments:

RUSH !! Please analyze for reactive cyanide & Reactive sulfide. Due on 11/7/13. send report to sonia.west@alsglobal.com & cc : results to jumoke.lawal@alsglobal.com

3.0%

Relinquished by: [Signature] Date/Time: 11/4/13 1800

Received by: [Signature] Date/Time: 11/5/13 0930

Cooler IDs

Report/QC Level
Std

Sample Receipt Checklist

Client Name: **ALS - HOUSTON**

Date/Time Received: **05-Nov-13 09:30**

Work Order: **1311181**

Received by: **DS**

Checklist completed by <u><i>Diane Shaw</i></u>	05-Nov-13	Reviewed by: <u><i>Bill Carey</i></u>	06-Nov-13
eSignature	Date	eSignature	Date

Matrices: **Solid**

Carrier name: **FedEx**

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on shipping container/cooler?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Samples in proper container/bottle?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
All samples received within holding time?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Container/Temp Blank temperature in compliance?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample(s) received on ice?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Temperature(s)/Thermometer(s):	<u>3.0 c</u>		
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	<u>11/5/2013 10:21:13 AM</u>		
Water - VOA vials have zero headspace?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	No VOA vials submitted <input checked="" type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
pH adjusted?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
pH adjusted by:			

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

281 530-5656
GROUP
BUENOS AIRES
ARGENTINA
UNITED STATES

SHIP DATE: 04NOV13
ACTWGT: 8.3 LB
CAD: 300130/CAFE2704
DIMS: 14x11x10 IN

BILL SENDER

TO **LES ARNOLD**
ALS ENVIRONMENTAL
3352 128TH AVE.

HOLLAND MI 49424

(810) 399-6070
DEPT: ENVIRONMENTAL

REF: VARIJBARE

FedEx
Express



TRK# 5813 7984 6389
0201

NA GRRA

TUE - 05 NOV 10:30A
PRIORITY OVERNIGHT

49424
MI-US GRR



1561 48-434 RIT2 04/13



04-Oct-2013

Aaron Strange
Navajo Refining Company
PO Box 159
Artesia, NM 88211

Tel: (575) 748-6733
Fax: (575) 746-5421

Re: Wastewater Spill - Artesia

Work Order: **13091139**

Dear Aaron,

ALS Environmental received 1 sample on 25-Sep-2013 09:25 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 19.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

A handwritten signature in cursive script that reads "Sonia West".

Electronically approved by: Jumoke M. Lawal

Sonia West
Project Manager



Certificate No: T104704231-13-12

ADDRESS 10450 Stancliff Rd, Suite 210 Houston, Texas 77099-4338 | PHONE (281) 530-5656 | FAX (281) 530-5887

ALS GROUP USA, CORP. Part of the ALS Group An ALS Limited Company

Environmental

www.alsglobal.com

RIGHT SOLUTIONS RIGHT PARTNER

Client: Navajo Refining Company
Project: Wastewater Spill - Artesia
Work Order: 13091139

Work Order Sample Summary

<u>Lab Samp ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Tag Number</u>	<u>Collection Date</u>	<u>Date Received</u>	<u>Hold</u>
13091139-01	Wastewater Spill at Lift Station Excavation	Solid		9/24/2013 14:07	9/25/2013 09:25	<input type="checkbox"/>

Client: Navajo Refining Company
Project: Wastewater Spill - Artesia
Work Order: 13091139

Case Narrative

Batch 73408, VÔŠÚÀ{ ã[|æĀÁ! * ə æ• ĀHFFĐ Ĝ ĒŨæ] |^ÀŠÔÛÖVGĚHEJĜ Ķ@/ŠÔÛÖ
 ŮŮÖÁ æĀ~ • ã^Ā Ā@/Æ } ġ[|Ā ã• Ā |Ā^} æ&@[|] @ } [|Æ ģÁ[æĀŮ!^• [|•ĒV@/ŠÔÛÆ ģ ģ
 ŠÔÛÖÁ^& ġ^! ģ• Ā ^!^Ā ã& Ā@/Æ } ġ[|Ā ã• Ē

ALS Environmental

Date: 04-Oct-13

Client: Navajo Refining Company
Project: Wastewater Spill - Artesia
Sample ID: Wastewater Spill at Lift Station Excavation
Collection Date: 9/24/2013 02:07 PM

Work Order: 13091139
Lab ID: 13091139-01
Matrix: SOLID

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TCLP MERCURY						
Mercury	U		SW7470 0.000200	mg/L	Prep Date: 9/30/2013 1	Analyst: OFO 9/30/2013 06:14 PM
TCLP METALS						
Arsenic	U		SW1311/6020 0.0500	mg/L	Prep Date: 9/27/2013 10	Analyst: SKS 9/27/2013 03:40 PM
Barium	0.137		0.0500	mg/L	10	9/27/2013 03:40 PM
Cadmium	U		0.0200	mg/L	10	9/27/2013 03:40 PM
Chromium	U		0.0500	mg/L	10	9/27/2013 03:40 PM
Lead	U		0.0500	mg/L	10	9/27/2013 03:40 PM
Selenium	U		0.0500	mg/L	10	9/27/2013 03:40 PM
Silver	U		0.0500	mg/L	10	9/27/2013 03:40 PM
TCLP SEMIVOLATILES						
			SW1311/8270		Prep Date: 9/27/2013	Analyst: JLJ
2,4,5-Trichlorophenol	U		0.0050	mg/L	1	10/2/2013 04:04 PM
2,4,6-Trichlorophenol	U		0.0050	mg/L	1	10/2/2013 04:04 PM
2,4-Dinitrotoluene	U		0.0050	mg/L	1	10/2/2013 04:04 PM
Cresols, Total	U		0.015	mg/L	1	10/2/2013 04:04 PM
Hexachlorobenzene	U		0.0050	mg/L	1	10/2/2013 04:04 PM
Hexachlorobutadiene	U		0.0050	mg/L	1	10/2/2013 04:04 PM
Hexachloroethane	U		0.0050	mg/L	1	10/2/2013 04:04 PM
Nitrobenzene	U		0.0050	mg/L	1	10/2/2013 04:04 PM
Pentachlorophenol	U		0.0050	mg/L	1	10/2/2013 04:04 PM
Pyridine	U		0.0050	mg/L	1	10/2/2013 04:04 PM
Surr: 2,4,6-Tribromophenol	79.4		36-126	%REC	1	10/2/2013 04:04 PM
Surr: 2-Fluorobiphenyl	72.7		43-125	%REC	1	10/2/2013 04:04 PM
Surr: 2-Fluorophenol	74.5		37-125	%REC	1	10/2/2013 04:04 PM
Surr: 4-Terphenyl-d14	84.4		32-125	%REC	1	10/2/2013 04:04 PM
Surr: Nitrobenzene-d5	88.3		37-125	%REC	1	10/2/2013 04:04 PM
Surr: Phenol-d6	86.7		40-125	%REC	1	10/2/2013 04:04 PM
TCLP VOLATILES						
			SW1311/8260B		Prep Date: 9/27/2013	Analyst: PC
1,1-Dichloroethene	U		0.10	mg/L	20	10/1/2013 05:00 AM
1,2-Dichloroethane	U		0.10	mg/L	20	10/1/2013 05:00 AM
1,4-Dichlorobenzene	U		0.10	mg/L	20	10/1/2013 05:00 AM
2-Butanone	U		0.20	mg/L	20	10/1/2013 05:00 AM
Benzene	U		0.10	mg/L	20	10/1/2013 05:00 AM
Carbon tetrachloride	U		0.10	mg/L	20	10/1/2013 05:00 AM
Chlorobenzene	U		0.10	mg/L	20	10/1/2013 05:00 AM
Chloroform	U		0.10	mg/L	20	10/1/2013 05:00 AM
Tetrachloroethene	U		0.10	mg/L	20	10/1/2013 05:00 AM
Trichloroethene	U		0.10	mg/L	20	10/1/2013 05:00 AM

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Environmental

Date: 04-Oct-13

Client: Navajo Refining Company

Project: Wastewater Spill - Artesia

Work Order: 13091139

Sample ID: Wastewater Spill at Lift Station Excavation

Lab ID: 13091139-01

Collection Date: 9/24/2013 02:07 PM

Matrix: SOLID

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Vinyl chloride	U		0.10	mg/L	20	10/1/2013 05:00 AM
Surr: 1,2-Dichloroethane-d4	102		70-125	%REC	20	10/1/2013 05:00 AM
Surr: 4-Bromofluorobenzene	97.0		72-125	%REC	20	10/1/2013 05:00 AM
Surr: Dibromofluoromethane	106		71-125	%REC	20	10/1/2013 05:00 AM
Surr: Toluene-d8	96.9		75-125	%REC	20	10/1/2013 05:00 AM

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Work Order: 13091139
Client: Navajo Refining Company
Project: Wastewater Spill - Artesia

DATES REPORT

Sample ID	Client Sample ID	Matrix	Collection Date	TCLP Date	Prep Date	Analysis Date
<u>Batch ID</u> 73408 <u>Test Name:</u> TCLP Semivolatiles						
13091139-01 ^	Wastewater Spill at Lift Station Excavation	Solid	9/24/2013 2:07:00 PM	9/27/2013 3:09:09 PM	9/27/2013 10:17 AM	10/2/2013 04:04 PM
<u>Batch ID</u> 73416 <u>Test Name:</u> TCLP Metals						
13091139-01 ^	Wastewater Spill at Lift Station Excavation	Solid	9/24/2013 2:07:00 PM	9/27/2013 8:00:00 AM	9/27/2013 10:00 AM	9/27/2013 03:40 PM
<u>Batch ID</u> 73461 <u>Test Name:</u> TCLP Mercury						
13091139-01 ^	Wastewater Spill at Lift Station Excavation	Solid	9/24/2013 2:07:00 PM	9/27/2013 8:00:00 AM	9/30/2013 11:02 AM	9/30/2013 06:14 PM
<u>Batch ID</u> R154586 <u>Test Name:</u> TCLP Volatiles						
13091139-01 ^	Wastewater Spill at Lift Station Excavation	Solid	9/24/2013 2:07:00 PM	9/28/2013 9:00:00 AM	9/27/2013 05:00 PM	10/1/2013 05:00 AM

ALS Environmental

Date: 04-Oct-13

Client: Navajo Refining Company
Work Order: 13091139
Project: Wastewater Spill - Artesia

QC BATCH REPORT

Batch ID: **73416** Instrument ID **ICPMS05** Method: **SW1311/6020**

MBLK	Sample ID: MBLKT1-092613-73416				Units: mg/L		Analysis Date: 9/27/2013 03:28 PM			
Client ID:	Run ID: ICPMS05_130927A				SeqNo: 3372767		Prep Date: 9/27/2013		DF: 10	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	U	0.0500								
Barium	0.04562	0.0500								J
Cadmium	U	0.0200								
Chromium	U	0.0500								
Lead	U	0.0500								
Selenium	0.01023	0.0500								J
Silver	U	0.0500								

MBLK	Sample ID: MBLKW3-092713-73416				Units: mg/L		Analysis Date: 9/27/2013 03:31 PM			
Client ID:	Run ID: ICPMS05_130927A				SeqNo: 3372768		Prep Date: 9/27/2013		DF: 10	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	U	0.0500								
Barium	U	0.0500								
Cadmium	U	0.0200								
Chromium	U	0.0500								
Lead	U	0.0500								
Selenium	U	0.0500								
Silver	U	0.0500								

LCS	Sample ID: MLCSW3-092713-73416				Units: mg/L		Analysis Date: 9/27/2013 03:33 PM			
Client ID:	Run ID: ICPMS05_130927A				SeqNo: 3372769		Prep Date: 9/27/2013		DF: 10	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	0.4864	0.0500	0.5	0	97.3	80-120				
Barium	0.486	0.0500	0.5	0	97.2	80-120				
Cadmium	0.4791	0.0200	0.5	0	95.8	80-120				
Chromium	0.4922	0.0500	0.5	0	98.4	80-120				
Lead	0.4826	0.0500	0.5	0	96.5	80-120				
Selenium	0.5094	0.0500	0.5	0	102	80-120				
Silver	0.4932	0.0500	0.5	0	98.6	80-120				

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Navajo Refining Company
Work Order: 13091139
Project: Wastewater Spill - Artesia

QC BATCH REPORT

Batch ID: **73416** Instrument ID **ICPMS05** Method: **SW1311/6020**

MS		Sample ID: 1309685-01AMS				Units: mg/L		Analysis Date: 9/27/2013 03:54 PM		
Client ID:		Run ID: ICPMS05_130927A				SeqNo: 3372779		Prep Date: 9/27/2013		DF: 10
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	0.4908	0.0500	0.5	0.000654	98	75-125				
Barium	1.866	0.0500	0.5	1.363	101	75-125				
Cadmium	0.4825	0.0200	0.5	0.003663	95.8	75-125				
Chromium	0.4944	0.0500	0.5	0.007794	97.3	75-125				
Lead	0.5033	0.0500	0.5	0.02031	96.6	75-125				
Selenium	0.5265	0.0500	0.5	0.01452	102	75-125				
Silver	0.4746	0.0500	0.5	0.000548	94.8	75-125				

MSD		Sample ID: 1309685-01AMSD				Units: mg/L		Analysis Date: 9/27/2013 03:57 PM		
Client ID:		Run ID: ICPMS05_130927A				SeqNo: 3372780		Prep Date: 9/27/2013		DF: 10
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	0.4823	0.0500	0.5	0.000654	96.3	75-125	0.4908	1.76	20	
Barium	1.789	0.0500	0.5	1.363	85.4	75-125	1.866	4.21	20	
Cadmium	0.4702	0.0200	0.5	0.003663	93.3	75-125	0.4825	2.59	20	
Chromium	0.4836	0.0500	0.5	0.007794	95.2	75-125	0.4944	2.22	20	
Lead	0.4826	0.0500	0.5	0.02031	92.5	75-125	0.5033	4.19	20	
Selenium	0.5019	0.0500	0.5	0.01452	97.5	75-125	0.5265	4.79	20	
Silver	0.4627	0.0500	0.5	0.000548	92.4	75-125	0.4746	2.55	20	

DUP		Sample ID: 1309685-01ADUP				Units: mg/L		Analysis Date: 9/27/2013 03:52 PM		
Client ID:		Run ID: ICPMS05_130927A				SeqNo: 3372778		Prep Date: 9/27/2013		DF: 10
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	U	0.0500					0.000654	0	25	
Barium	1.34	0.0500					1.363	1.67	25	
Cadmium	U	0.0200					0.003663	0	25	
Chromium	U	0.0500					0.007794	0	25	
Lead	0.01903	0.0500					0.02031	0	25	J
Selenium	0.01275	0.0500					0.01452	0	25	J
Silver	U	0.0500					0.000548	0	25	

The following samples were analyzed in this batch:

13091139-01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Navajo Refining Company
Work Order: 13091139
Project: Wastewater Spill - Artesia

QC BATCH REPORT

Batch ID: **73461** Instrument ID **HG03** Method: **SW7470**

MBLK	Sample ID: GBLKW4-093013-73461				Units: mg/L		Analysis Date: 9/30/2013 05:51 PM			
Client ID:	Run ID: HG03_130930A				SeqNo: 3375908		Prep Date: 9/30/2013		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.000200								

MBLK	Sample ID: GBLKT1-092813-73461				Units: mg/L		Analysis Date: 9/30/2013 06:01 PM			
Client ID:	Run ID: HG03_130930A				SeqNo: 3375914		Prep Date: 9/30/2013		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.000200								

LCS	Sample ID: GLCSW4-093013-73461				Units: mg/L		Analysis Date: 9/30/2013 05:52 PM			
Client ID:	Run ID: HG03_130930A				SeqNo: 3375909		Prep Date: 9/30/2013		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.0048	0.000200	0.005		0	96	80-120			

MS	Sample ID: 13091157-01CMS				Units: mg/L		Analysis Date: 9/30/2013 05:57 PM			
Client ID:	Run ID: HG03_130930A				SeqNo: 3375912		Prep Date: 9/30/2013		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00496	0.000200	0.005	-0.000038	100	75-125				

MSD	Sample ID: 13091157-01CMSD				Units: mg/L		Analysis Date: 9/30/2013 05:59 PM			
Client ID:	Run ID: HG03_130930A				SeqNo: 3375913		Prep Date: 9/30/2013		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.0048	0.000200	0.005	-0.000038	96.8	75-125	0.00496	3.28	20	

DUP	Sample ID: 13091157-01CDUP				Units: mg/L		Analysis Date: 9/30/2013 05:56 PM			
Client ID:	Run ID: HG03_130930A				SeqNo: 3375911		Prep Date: 9/30/2013		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	U	0.000200					-0.000038	0	20	

The following samples were analyzed in this batch:

13091139-01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Navajo Refining Company
Work Order: 13091139
Project: Wastewater Spill - Artesia

QC BATCH REPORT

Batch ID: **73408** Instrument ID **SV-5** Method: **SW1311/8270**

MBLK		Sample ID: SBLKT2-130927-73408				Units: µg/L		Analysis Date: 10/2/2013 06:43 PM		
Client ID:		Run ID: SV-5_131003A				SeqNo: 3380068		Prep Date: 9/27/2013		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2,4,5-Trichlorophenol	U	5.0								
2,4,6-Trichlorophenol	U	5.0								
2,4-Dinitrotoluene	U	5.0								
Cresols, Total	U	15								
Hexachlorobenzene	U	5.0								
Hexachlorobutadiene	U	5.0								
Hexachloroethane	U	5.0								
Nitrobenzene	U	5.0								
Pentachlorophenol	U	5.0								
Pyridine	U	5.0								
<i>Surr: 2,4,6-Tribromophenol</i>	91.8	5.0	100	0	91.8	36-126	0			
<i>Surr: 2-Fluorobiphenyl</i>	78.43	5.0	100	0	78.4	43-125	0			
<i>Surr: 2-Fluorophenol</i>	73.56	5.0	100	0	73.6	37-125	0			
<i>Surr: 4-Terphenyl-d14</i>	100.1	5.0	100	0	100	32-125	0			
<i>Surr: Nitrobenzene-d5</i>	68.75	5.0	100	0	68.8	37-125	0			
<i>Surr: Phenol-d6</i>	67.93	5.0	100	0	67.9	40-125	0			

LCS		Sample ID: SLCST2-130927-73408				Units: µg/L		Analysis Date: 10/3/2013 02:47 PM		
Client ID:		Run ID: SV-5_131003A				SeqNo: 3380072		Prep Date: 9/27/2013		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2,4,5-Trichlorophenol	84.69	5.0	100	0	84.7	55-120				
2,4,6-Trichlorophenol	82.97	5.0	100	0	83	55-120				
2,4-Dinitrotoluene	45.63	5.0	50	0	91.3	55-125				
Cresols, Total	219.3	15	250	0	87.7	40-120				
Hexachlorobenzene	44.72	5.0	50	0	89.4	55-120				
Hexachlorobutadiene	42.43	5.0	50	0	84.9	55-120				
Hexachloroethane	36.85	5.0	50	0	73.7	55-120				
Nitrobenzene	34.58	5.0	50	0	69.2	55-120				
Pentachlorophenol	85.09	5.0	100	0	85.1	50-135				
Pyridine	22.82	5.0	50	0	45.6	30-120				
<i>Surr: 2,4,6-Tribromophenol</i>	106.5	5.0	100	0	106	36-126	0			
<i>Surr: 2-Fluorobiphenyl</i>	72.92	5.0	100	0	72.9	43-125	0			
<i>Surr: 2-Fluorophenol</i>	82.36	5.0	100	0	82.4	37-125	0			
<i>Surr: 4-Terphenyl-d14</i>	103.6	5.0	100	0	104	32-125	0			
<i>Surr: Nitrobenzene-d5</i>	66.12	5.0	100	0	66.1	37-125	0			
<i>Surr: Phenol-d6</i>	85.66	5.0	100	0	85.7	40-125	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Navajo Refining Company
Work Order: 13091139
Project: Wastewater Spill - Artesia

QC BATCH REPORT

Batch ID: **73408** Instrument ID **SV-5** Method: **SW1311/8270**

LCSD		Sample ID: SLCSDT2-130927-73408				Units: µg/L		Analysis Date: 10/2/2013 07:27 PM		
Client ID:		Run ID: SV-5_131003A				SeqNo: 3380070		Prep Date: 9/27/2013		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2,4,5-Trichlorophenol	82.14	5.0	100	0	82.1	55-120	84.69	3.05	25	
2,4,6-Trichlorophenol	80.22	5.0	100	0	80.2	55-120	82.97	3.37	25	
2,4-Dinitrotoluene	40.98	5.0	50	0	82	55-125	45.63	10.8	25	
Cresols, Total	170.3	15	250	0	68.1	40-120	219.3	25.2	25	R
Hexachlorobenzene	44.56	5.0	50	0	89.1	55-120	44.72	0.37	25	
Hexachlorobutadiene	47.1	5.0	50	0	94.2	55-120	42.43	10.4	25	
Hexachloroethane	36.41	5.0	50	0	72.8	55-120	36.85	1.18	25	
Nitrobenzene	33.67	5.0	50	0	67.3	55-120	34.58	2.66	25	
Pentachlorophenol	63.88	5.0	100	0	63.9	50-135	85.09	28.5	25	R
Pyridine	25.09	5.0	50	0	50.2	30-120	22.82	9.48	25	
<i>Surr: 2,4,6-Tribromophenol</i>	95.85	5.0	100	0	95.8	36-126	106.5	10.5	25	
<i>Surr: 2-Fluorobiphenyl</i>	76.93	5.0	100	0	76.9	43-125	72.92	5.36	25	
<i>Surr: 2-Fluorophenol</i>	76.63	5.0	100	0	76.6	37-125	82.36	7.21	25	
<i>Surr: 4-Terphenyl-d14</i>	92.69	5.0	100	0	92.7	32-125	103.6	11.1	25	
<i>Surr: Nitrobenzene-d5</i>	64.27	5.0	100	0	64.3	37-125	66.12	2.85	25	
<i>Surr: Phenol-d6</i>	68.76	5.0	100	0	68.8	40-125	85.66	21.9	25	

MS		Sample ID: 13091139-01AMS				Units: µg/L		Analysis Date: 10/3/2013 03:54 PM		
Client ID: Wastewater Spill at Lift Station Excavation		Run ID: SV-5_131003A				SeqNo: 3380184		Prep Date: 9/27/2013		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
2,4,5-Trichlorophenol	84.55	5.0	100	0	84.6	55-120				
2,4,6-Trichlorophenol	77.79	5.0	100	0	77.8	55-120				
2,4-Dinitrotoluene	46.14	5.0	50	0	92.3	55-125				
Cresols, Total	174.5	15	250	0	69.8	40-120				
Hexachlorobenzene	43.86	5.0	50	0	87.7	55-120				
Hexachlorobutadiene	44.35	5.0	50	0	88.7	55-120				
Hexachloroethane	38.8	5.0	50	0	77.6	55-120				
Nitrobenzene	33.42	5.0	50	0	66.8	55-120				
Pentachlorophenol	82.56	5.0	100	0	82.6	50-135				
Pyridine	26.93	5.0	50	0	53.9	30-120				
<i>Surr: 2,4,6-Tribromophenol</i>	102.3	5.0	100	0	102	36-126	0			
<i>Surr: 2-Fluorobiphenyl</i>	74.81	5.0	100	0	74.8	43-125	0			
<i>Surr: 2-Fluorophenol</i>	72.74	5.0	100	0	72.7	37-125	0			
<i>Surr: 4-Terphenyl-d14</i>	93.41	5.0	100	0	93.4	32-125	0			
<i>Surr: Nitrobenzene-d5</i>	63.02	5.0	100	0	63	37-125	0			
<i>Surr: Phenol-d6</i>	69.75	5.0	100	0	69.8	40-125	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Navajo Refining Company
Work Order: 13091139
Project: Wastewater Spill - Artesia

QC BATCH REPORT

Batch ID: **73408**

Instrument ID **SV-5**

Method: **SW1311/8270**

The following samples were analyzed in this batch:

13091139- 01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Navajo Refining Company
Work Order: 13091139
Project: Wastewater Spill - Artesia

QC BATCH REPORT

Batch ID: **R154586** Instrument ID **VOA1** Method: **SW1311/8260B**

MBLK	Sample ID: VBLKW-130930-R154586				Units: µg/L		Analysis Date: 9/30/2013 11:32 PM			
Client ID:	Run ID: VOA1_130930E				SeqNo: 3376306		Prep Date:		DF: 1	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1-Dichloroethene	U	5.0								
1,2-Dichloroethane	U	5.0								
1,4-Dichlorobenzene	U	5.0								
2-Butanone	U	10								
Benzene	U	5.0								
Carbon tetrachloride	U	5.0								
Chlorobenzene	U	5.0								
Chloroform	U	5.0								
Tetrachloroethene	U	5.0								
Trichloroethene	U	5.0								
Vinyl chloride	U	2.0								
<hr/>										
<i>Surr: 1,2-Dichloroethane-d4</i>	50.94	5.0	50	0	102	70-125	0			
<i>Surr: 4-Bromofluorobenzene</i>	49.99	5.0	50	0	100	72.4-125	0			
<hr/>										
<i>Surr: Dibromofluoromethane</i>	50.52	5.0	50	0	101	71.2-125	0			
<i>Surr: Toluene-d8</i>	51.39	5.0	50	0	103	75-125	0			

MBLK	Sample ID: MBLKV1-130927-R154586				Units: µg/L		Analysis Date: 10/1/2013 04:10 AM			
Client ID:	Run ID: VOA1_130930E				SeqNo: 3376310		Prep Date: 9/27/2013		DF: 20	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1-Dichloroethene	U	100								
1,2-Dichloroethane	U	100								
1,4-Dichlorobenzene	U	100								
2-Butanone	U	200								
Benzene	U	100								
Carbon tetrachloride	U	100								
Chlorobenzene	U	100								
Chloroform	U	100								
Tetrachloroethene	U	100								
Trichloroethene	U	100								
Vinyl chloride	U	40								
<hr/>										
<i>Surr: 1,2-Dichloroethane-d4</i>	957.2	100	1000	0	95.7	70-125	0			
<i>Surr: 4-Bromofluorobenzene</i>	941.5	100	1000	0	94.1	72.4-125	0			
<hr/>										
<i>Surr: Dibromofluoromethane</i>	1043	100	1000	0	104	71.2-125	0			
<i>Surr: Toluene-d8</i>	997.9	100	1000	0	99.8	75-125	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Navajo Refining Company
Work Order: 13091139
Project: Wastewater Spill - Artesia

QC BATCH REPORT

Batch ID: **R154586** Instrument ID **VOA1** Method: **SW1311/8260B**

LCS		Sample ID: VLCSW-130930-R154586				Units: µg/L		Analysis Date: 9/30/2013 10:41 PM		
Client ID:		Run ID: VOA1_130930E				SeqNo: 3376305		Prep Date:		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1-Dichloroethene	51.11	5.0	50	0	102	73-124				
1,2-Dichloroethane	52.15	5.0	50	0	104	76-120				
1,4-Dichlorobenzene	50.27	5.0	50	0	101	70-130				
2-Butanone	104.2	10	100	0	104	70-130				
Benzene	52.56	5.0	50	0	105	70-128				
Carbon tetrachloride	51.09	5.0	50	0	102	70-130				
Chlorobenzene	47.61	5.0	50	0	95.2	72-127				
Chloroform	51.55	5.0	50	0	103	70-130				
Tetrachloroethene	50.16	5.0	50	0	100	70-130				
Trichloroethene	53.99	5.0	50	0	108	72-129				
Vinyl chloride	54.23	2.0	50	0	108	70-130				
<i>Surr: 1,2-Dichloroethane-d4</i>	50.76	5.0	50	0	102	70-125		0		
<i>Surr: 4-Bromofluorobenzene</i>	49.56	5.0	50	0	99.1	72-125		0		
<i>Surr: Dibromofluoromethane</i>	51.66	5.0	50	0	103	71-125		0		
<i>Surr: Toluene-d8</i>	50.87	5.0	50	0	102	75-125		0		

MS		Sample ID: 13091337-01AMS				Units: µg/L		Analysis Date: 10/1/2013 02:29 AM		
Client ID:		Run ID: VOA1_130930E				SeqNo: 3376308		Prep Date:		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1-Dichloroethene	47.41	5.0	50	0	94.8	73-124				
1,2-Dichloroethane	49.26	5.0	50	0	98.5	76-120				
1,4-Dichlorobenzene	46.02	5.0	50	0	92	70-130				
2-Butanone	104	10	100	0	104	70-130				
Benzene	49.85	5.0	50	0	99.7	70-128				
Carbon tetrachloride	45.47	5.0	50	0	90.9	70-130				
Chlorobenzene	48.98	5.0	50	0	98	72-127				
Chloroform	109.1	5.0	50	71.57	75	70-130				
Tetrachloroethene	46.17	5.0	50	0	92.3	70-130				
Trichloroethene	47.04	5.0	50	0	94.1	72-129				
Vinyl chloride	49.16	2.0	50	0	98.3	70-130				
<i>Surr: 1,2-Dichloroethane-d4</i>	51.18	5.0	50	0	102	70-125		0		
<i>Surr: 4-Bromofluorobenzene</i>	52.97	5.0	50	0	106	72-125		0		
<i>Surr: Dibromofluoromethane</i>	51.09	5.0	50	0	102	71-125		0		
<i>Surr: Toluene-d8</i>	51.35	5.0	50	0	103	75-125		0		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Navajo Refining Company
Work Order: 13091139
Project: Wastewater Spill - Artesia

QC BATCH REPORT

Batch ID: **R154586** Instrument ID **VOA1** Method: **SW1311/8260B**

MSD		Sample ID: 13091337-01AMSD				Units: µg/L		Analysis Date: 10/1/2013 02:54 AM		
Client ID:		Run ID: VOA1_130930E				SeqNo: 3376309		Prep Date:		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1-Dichloroethene	43.36	5.0	50	0	86.7	73-124	47.41	8.94	20	
1,2-Dichloroethane	48.03	5.0	50	0	96.1	76-120	49.26	2.53	20	
1,4-Dichlorobenzene	48.44	5.0	50	0	96.9	70-130	46.02	5.13	20	
2-Butanone	96.22	10	100	0	96.2	70-130	104	7.76	20	
Benzene	45.94	5.0	50	0	91.9	70-128	49.85	8.16	20	
Carbon tetrachloride	43.75	5.0	50	0	87.5	70-130	45.47	3.85	20	
Chlorobenzene	49.06	5.0	50	0	98.1	72-127	48.98	0.157	20	
Chloroform	108	5.0	50	71.57	72.8	70-130	109.1	1.03	20	
Tetrachloroethene	45.61	5.0	50	0	91.2	70-130	46.17	1.23	20	
Trichloroethene	46.76	5.0	50	0	93.5	72-129	47.04	0.582	20	
Vinyl chloride	45.31	2.0	50	0	90.6	70-130	49.16	8.16	20	
<i>Surr: 1,2-Dichloroethane-d4</i>	48.41	5.0	50	0	96.8	70-125	51.18	5.56	20	
<i>Surr: 4-Bromofluorobenzene</i>	52.85	5.0	50	0	106	72-125	52.97	0.235	20	
<i>Surr: Dibromofluoromethane</i>	47.58	5.0	50	0	95.2	71-125	51.09	7.11	20	
<i>Surr: Toluene-d8</i>	51.26	5.0	50	0	103	75-125	51.35	0.185	20	

The following samples were analyzed in this batch:

13091139-01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Navajo Refining Company
Project: Wastewater Spill - Artesia
WorkOrder: 13091139

QUALIFIERS, ACRONYMS, UNITS

<u>Qualifier</u>	<u>Description</u>
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

<u>Acronym</u>	<u>Description</u>
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitation Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

<u>Units Reported</u>	<u>Description</u>
mg/L	Milligrams per Liter

Sample Receipt Checklist

Client Name: **NAVAJO REFINING**

Date/Time Received: **25-Sep-13 09:25**

Work Order: **13091139**

Received by: **WTJ**

Checklist completed by *Parash M. Ciga*
eSignature

25-Sep-13
Date

Reviewed by:

eSignature

Date

Matrices: Solid

Carrier name: FedEx

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on shipping container/cooler?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Samples in proper container/bottle?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
All samples received within holding time?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Container/Temp Blank temperature in compliance?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Temperature(s)/Thermometer(s):	<u>3.3c/3.3c C/U</u> <u>IR1</u>		
Cooler(s)/Kit(s):	<u>5119</u>		
Date/Time sample(s) sent to storage:	<u>9/25/13 16:10</u>		
Water - VOA vials have zero headspace?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	No VOA vials submitted <input checked="" type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
pH adjusted?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
pH adjusted by:	<u>-</u>		
Login Notes:			

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

CorrectiveAction:

Chavez, Carl J, EMNRD

From: Combs, Robert <Robert.Combs@hollyfrontier.com>
Sent: Thursday, May 31, 2012 10:24 PM
To: Chavez, Carl J, EMNRD; Dade, Randy, EMNRD; Horowitz, Ruth, NMENV; Cobrain, Dave, NMENV
Cc: Lackey, Johnny; Holder, Mike; Strange, Aaron; Schultz, Michele
Subject: C-141 initial report--2012-05-24 Effluent pipeline leaks
Attachments: C-141 2012-05-24 Effluent pipeline leak--initial report.pdf; Effluent Pipeline Spill Locations 052412.pdf

Please see the attached initial C-141 report for the treated waste water leaks that occurred on 5/24/12. Also attached is a GoogleEarth image indicating the approximate locations.

If there are any questions, please contact me at 575-746-5382.

Thanks,
Robert

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1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised August 8, 2011

Submit 1 Copy to appropriate District Office in
accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company	Navajo Refining Company, L.L.C.	Contact	Robert Combs
Address	501 E. Main St, Artesia, NM 88210	Telephone No.	575-746-5382
Facility Name	Artesia Refinery	Facility Type	Petroleum Refinery
Surface Owner	Mineral Owner	API No.	

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
-------------	---------	----------	-------	---------------	------------------	---------------	----------------	--------

Latitude 32° 50' 46.10" N Longitude 104° 20' 22.89" W

Latitude 32° 47' 48.13" N Longitude 104° 15' 50.50" W

NATURE OF RELEASE

Type of Release	Treated Waste Water	Volume of Release	~350 bbl	Volume Recovered	Unknown
Source of Release	Effluent pipeline junction	Date and Hour of Occurrence	5/24/12 ~10:00	Date and Hour of Discovery	5/24/12 ~10:30
Was Immediate Notice Given?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required	If YES, To Whom? OCD—Artesia (575-748-1283); left voicemail message for Randy Dade OCD—Santa Fe (505-476-3490); spoke with Carl Chavez NMED—Santa Fe (505-476-6000); left voicemail message for Ruth Horowitz			
By Whom?	Robert Combs	Date and Hour 5/24/12 ~14:20			
Was a Watercourse Reached?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse.			

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.*

At ~10:40 on 5/24/2012, the FCC Division Control Room notified Environmental that a leak had occurred along the treated waste water effluent pipeline to the injection wells. The operators noticed that the pipeline pressure indication dropped to 0 psig. The operators shut down the effluent pipeline pumps and a contract employee was dispatched to inspect the pipeline. It was discovered that the waste water fiberglass pipeline had separated in two locations (see approximate locations listed above). Once the locations were known, the spill was reported to the agencies listed.

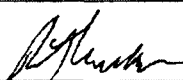
Describe Area Affected and Cleanup Action Taken.*

Both leak locations were outside of Refinery property in unpopulated areas. Vacuum trucks were dispatched to recover the freestanding water released; the volume recovered has not yet been reported. At both spill locations, the pipeline separated at a threaded junction. The breaches were repaired and the pipeline was returned to service.

At this time, the holes where repairs were made remain open and barricaded, and no further cleanup activities have been pursued. Since the locations are outside of Refinery, the landowners are being contacted for access to be granted for spill cleanup.

A final C-141 report will be submitted and will include all analytical reports, photos, and any associated disposal records.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: 	OIL CONSERVATION DIVISION	
Printed Name: Robert Combs	Approved by Environmental Specialist:	
Title: Environmental Specialist	Approval Date:	Expiration Date:

E-mail Address: robert.combs@hollyfrontier.com	Conditions of Approval:	Attached <input type="checkbox"/>
Date: 5/31/12 Phone: 575-308-2718		

* Attach Additional Sheets If Necessary



Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Thursday, May 24, 2012 2:29 PM
To: CarlJ.Chavez@state.nm.us
Cc: VonGonten, Glenn, EMNRD; Dade, Randy, EMNRD
Subject: Navajo Artesia Refinery (GW-028) Effluent Line Release Notification to OCD
***** Note to File*****

FYI:

I received a call today at about 14:10 from Mr. Robert Combs related to a release along the effluent line to the 3 UIC Class I (NH) Disposal Wells (about 3 miles from the Pecos River or ¾ mile west and upgradient from the Gaines Disposal Well. Mr. Combs indicated that a pressure drop was realized at about 10:00 today and the line was shut-in within 20 minutes. Since the flow rate was about 750 gpm over a 20 minute time-frame, the estimated volume of the release is about 350 bbls. of effluent from the refinery. A C-141 will be submitted next week.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Department
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Drive, Santa Fe, New Mexico 87505
Office: (505) 476-3490
E-mail: CarlJ.Chavez@State.NM.US
Website: <http://www.emnrd.state.nm.us/ocd/>
“Why Not Prevent Pollution; Minimize Waste; Reduce the Cost of Operations; & Move Forward With the Rest of the Nation?” To see how, please go to: “Pollution Prevention & Waste Minimization” at <http://www.emnrd.state.nm.us/ocd/environmental.htm#environmental>

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State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised August 8, 2011

Submit 1 Copy to appropriate District Office in
accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company	Navajo Refining Company, L.L.C.	Contact	Robert Combs
Address	501 E. Main St, Artesia, NM 88210	Telephone No.	575-746-5382
Facility Name	Artesia Refinery	Facility Type	Petroleum Refinery
Surface Owner	Mineral Owner	API No.	

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County

Latitude _____ Longitude _____

NATURE OF RELEASE

Type of Release	FCC Scrubber water	Volume of Release	<25 bbl	Volume Recovered	15 bbl
Source of Release	Effluent pipeline junction	Date and Hour of Occurrence	01/31/12 ~03:00	Date and Hour of Discovery	01/31/12 ~03:00
Was Immediate Notice Given?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not Required				
By Whom?	If YES, To Whom?				
Was a Watercourse Reached?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				
Date and Hour					
If YES, Volume Impacting the Watercourse.					

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.*

At ~03:30 on 01/31/2012, the FCC Division Control Room notified the Environmental Department that a hose connection had failed on a transfer pump and released an estimated 15-20 bbl of water from the FCC flue gas scrubber.


Describe Area Affected and Cleanup Action Taken.*

The connection was repaired and fastened to prevent a recurrence. Vacuum trucks were dispatched to the area to recover the remaining liquid. The wet soil will be removed, sampled and disposed at an appropriate disposal site.

A final C-141, analytical results, and photos will follow with all other supporting documentation and incident details.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

OIL CONSERVATION DIVISION

Signature: 	Approved by Environmental Specialist:		
Printed Name: Robert Combs	Approval Date:		
Title: Environmental Specialist	Expiration Date:		Attached <input type="checkbox"/>
E-mail Address: robert.combs@hollyfrontier.com	Conditions of Approval:		
Date: 01/31/2012	Phone: 575-308-2718		

* Attach Additional Sheets If Necessary

Chavez, Carl J, EMNRD

From: Strange, Aaron [Aaron.Strange@hollyfrontier.com]
Sent: Wednesday, December 14, 2011 8:47 AM
To: Chavez, Carl J, EMNRD; Cobrain, Dave, NMENV; Tsinnajinnie, Leona, NMENV
Cc: Moore, Darrell; Lackey, Johnny; Combs, Robert
Subject: C-141 Final - Flash fire at the SRU-2
Attachments: C-141--fire at SRU-2.pdf

Carl, Randy, Dave, and Leona,

Please see the attached C-141 for flash fire at the SRU-2.

Please let me know if you have any questions regarding these events.

Thanks,
Aaron

Aaron Strange
Environmental Technician, Senior
Environmental Department
Navajo Refining Co, LLC
Artesia NM
Off: (575) 746-5468
Cell: (575) 703-5057

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GW-28

C – 141

(3)

06/11/2015 - 06/11/2017

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Friday, June 16, 2017 1:51 PM
To: 'Combs, Robert'
Cc: Griswold, Jim, EMNRD; Denton, Scott; Sahba, Arsin M.; Dade, Lewis (Randy); Podany, Raymond, EMNRD; Tsinnajinnie, Leona, NMENV
Subject: HollyFrontier Navajo Refining LLC Artesia Refinery (GW-28) Pipeline Release C-141s Due Today!
Attachments: OCD Environmental CharacterizationGuidelines.pdf; Pipeline Release 2016 Update.pdf

Robert, et al.:

The New Mexico Oil Conservation Division (OCD) has completed its review of the 2016 wastewater effluent release. OCD hereby **approves** the corrective action with the conditions of approval outlined below.

OCD observations are:

- 1) Based on the high variability in environmental analytical laboratory soil quality data results for Chloride and Sulfate, this appears to be indicative of a historical release(s) at or in the vicinity of the pipeline release location (please refer to the attached “update” document).
- 2) Historical wastewater effluent quality in the pipeline has generally exceeded WQCC water quality standards for Cl, F, Fe, SO₄, and TDS.
- 3) The release location is approximately 1,500 ft. east of the Pecos River within the floodplain.
- 4) All releases within the floodplain and/or “waters of the state” are considered to be “major releases” by OCD; thus, are reportable and the Permittee should act expediently to address spills/releases therein to protect water resources.
- 5) The Permittee followed its proposed work plan; however, backfilling excavations before proper sampling of the base and sidewalls of the excavation and lack of environmental analytical laboratory data quality results before backfilling is not acceptable to OCD.

OCD conditions of approval are:

- 1) The Permittee shall follow the attached corrective action guidelines for releases at all times.
- 2) The Permittee shall specify to OCD in its release report **any** reoccurring release locations along the effluent pipeline by indicating the number of historical releases at a given pipeline release location.
- 3) The Permittee **shall submit** a diagram(s) of the effluent pipeline to scale with all historical releases (any release in the flood plain or near “waters of the state”) depicted along the pipeline over the past 10-years within 60 days of today’s date or by COB on Wednesday, August 16, 2017.

Please contact me if you have questions. Thank you.

Mr. Carl J. Chavez, CHMM (#13099)
New Mexico Oil Conservation Division
Energy Minerals and Natural Resources Department
1220 South St Francis Drive
Santa Fe, New Mexico 87505
Ph. (505) 476-3490
E-mail: CarlJ.Chavez@state.nm.us

“Why not prevent pollution, minimize waste to reduce operating costs, reuse or recycle, and move forward with the rest of the Nation?” (To see how, go to: <http://www.emnrd.state.nm.us/OCD> and see “Publications”)

From: Combs, Robert [mailto:Robert.Combs@HollyFrontier.com]
Sent: Wednesday, May 24, 2017 3:32 PM
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Cc: Griswold, Jim, EMNRD <Jim.Griswold@state.nm.us>; Denton, Scott <Scott.Denton@HollyFrontier.com>; Sahba, Arsin M. <Arsin.Sahba@HollyFrontier.com>; Dade, Lewis (Randy) <Lewis.Dade@HollyFrontier.com>
Subject: RE: GW-28 Pipeline Release C-141s Due Today!

Carl,
Please find the attached Final C-141 form and Release Report for the 2016-08-09 Artesia WW effluent release.
Please let us know if you would like to discuss.
Thanks,
Robert

From: Chavez, Carl J, EMNRD [mailto:CarlJ.Chavez@state.nm.us]
Sent: Thursday, May 11, 2017 1:21 PM
To: Combs, Robert
Cc: Griswold, Jim, EMNRD; Denton, Scott
Subject: RE: GW-28 Pipeline Release C-141s Due Today!

Robert:

End of May 2017 is fine.

Thank you.

From: Combs, Robert [mailto:Robert.Combs@HollyFrontier.com]
Sent: Wednesday, May 10, 2017 9:30 AM
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Cc: Griswold, Jim, EMNRD <Jim.Griswold@state.nm.us>; Denton, Scott <Scott.Denton@HollyFrontier.com>
Subject: RE: GW-28 Pipeline Release C-141s Due Today!

Hi Carl; on our last phone conversation on 4/21 we agreed to the end of May to provide the updates for the two events. We have the sample results and the consultants are currently preparing the write-ups. I can check with them on their status and possibly move them quicker if needed – please let me know.

Thanks,
Robert

From: Chavez, Carl J, EMNRD [mailto:CarlJ.Chavez@state.nm.us]
Sent: Wednesday, May 10, 2017 8:23 AM
To: Combs, Robert
Cc: Griswold, Jim, EMNRD
Subject: FW: GW-28 Pipeline Release C-141s Due Today!

Robert:

The New Mexico Oil Conservation Division (OCD) has not received the updates on the pipeline releases that occurred in 2015 and 2016.

OCD had requested updates on the releases on or before May 5, 2017.

Thank you.

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Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Wednesday, June 7, 2017 4:57 PM
To: 'Combs, Robert'
Cc: Griswold, Jim, EMNRD; Denton, Scott; Tsinnajinnie, Leona, NMENV
Subject: RE: GW-28 Pipeline Release C-141s Due Today!
Attachments: Pipeline Release 2015 Update.pdf; Figures.pdf

Robert:

The New Mexico Oil Conservation Division (OCD) has completed its review of the 2015 Effluent Pipeline Release.

OCD regards the excavated soils to be impacted soils from the leaking pipeline. Therefore, OCD has determined the following:

- 1) HollyFrontier shall backfill the excavation with clean fill, and properly dispose of the excavated soils.
- 2) HollyFrontier shall provide final photos of the backfilled excavation and waste disposition documentation for the excavated soils to the OCD within 60 days of today's date on/or before COB on August 7, 2017.

Please contact me if you have questions. Thank you.

Mr. Carl J. Chavez, CHMM (#13099)
New Mexico Oil Conservation Division
Energy Minerals and Natural Resources Department
1220 South St Francis Drive
Santa Fe, New Mexico 87505
Ph. (505) 476-3490
E-mail: CarlJ.Chavez@state.nm.us

“Why not prevent pollution, minimize waste to reduce operating costs, reuse or recycle, and move forward with the rest of the Nation?” (To see how, go to: <http://www.emnrd.state.nm.us/OCD> and see “Publications”)

From: Combs, Robert [mailto:Robert.Combs@HollyFrontier.com]
Sent: Friday, May 19, 2017 12:26 PM
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Cc: Griswold, Jim, EMNRD <Jim.Griswold@state.nm.us>; Denton, Scott <Scott.Denton@HollyFrontier.com>
Subject: RE: GW-28 Pipeline Release C-141s Due Today!

Carl,

Please see attached for the 2015 effluent pipeline release (April 12, 2015) follow-up report. The 2016 release (August 9, 2016) Final C-141 and report will follow next week.

Please let me know if you have any questions or would like to discuss.

Thanks and have a good weekend,

Robert

Robert Combs

Environmental Specialist
The HollyFrontier Companies
P.O. Box 159
Artesia, NM 88211-0159
office: 575-746-5382
cell: 575-308-2718
fax: 575-746-5451
Robert.Combs@hollyfrontier.com

From: Chavez, Carl J, EMNRD [<mailto:CarlJ.Chavez@state.nm.us>]
Sent: Thursday, May 11, 2017 1:21 PM
To: Combs, Robert
Cc: Griswold, Jim, EMNRD; Denton, Scott
Subject: RE: GW-28 Pipeline Release C-141s Due Today!

Robert:

End of May 2017 is fine.

Thank you.

From: Combs, Robert [<mailto:Robert.Combs@HollyFrontier.com>]
Sent: Wednesday, May 10, 2017 9:30 AM
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Cc: Griswold, Jim, EMNRD <Jim.Griswold@state.nm.us>; Denton, Scott <Scott.Denton@HollyFrontier.com>
Subject: RE: GW-28 Pipeline Release C-141s Due Today!

Hi Carl; on our last phone conversation on 4/21 we agreed to the end of May to provide the updates for the two events. We have the sample results and the consultants are currently preparing the write-ups. I can check with them on their status and possibly move them quicker if needed – please let me know.

Thanks,
Robert

From: Chavez, Carl J, EMNRD [<mailto:CarlJ.Chavez@state.nm.us>]
Sent: Wednesday, May 10, 2017 8:23 AM
To: Combs, Robert
Cc: Griswold, Jim, EMNRD
Subject: FW: GW-28 Pipeline Release C-141s Due Today!

Robert:

The New Mexico Oil Conservation Division (OCD) has not received the updates on the pipeline releases that occurred in 2015 and 2016.

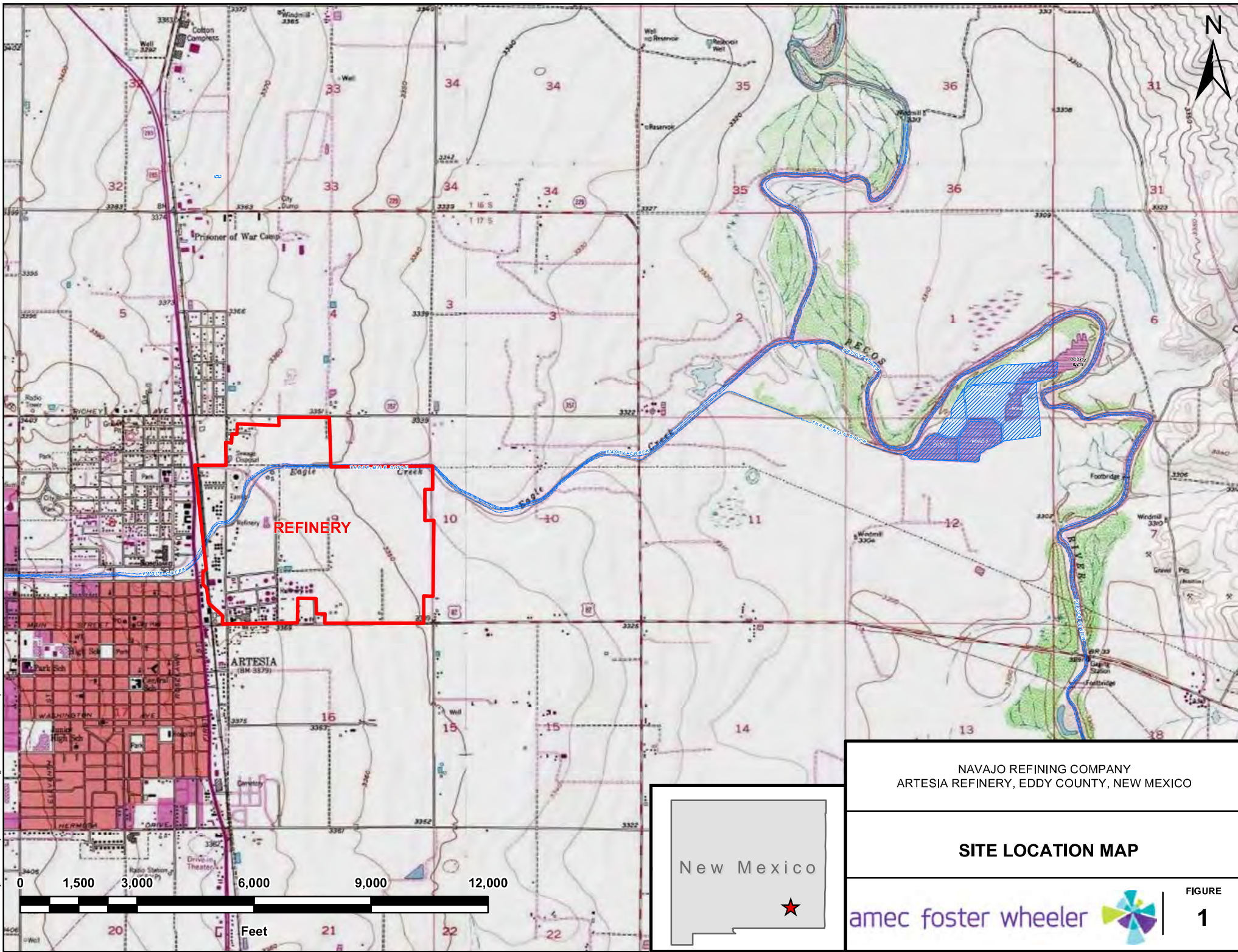
OCD had requested updates on the releases on or before May 5, 2017.

Thank you.

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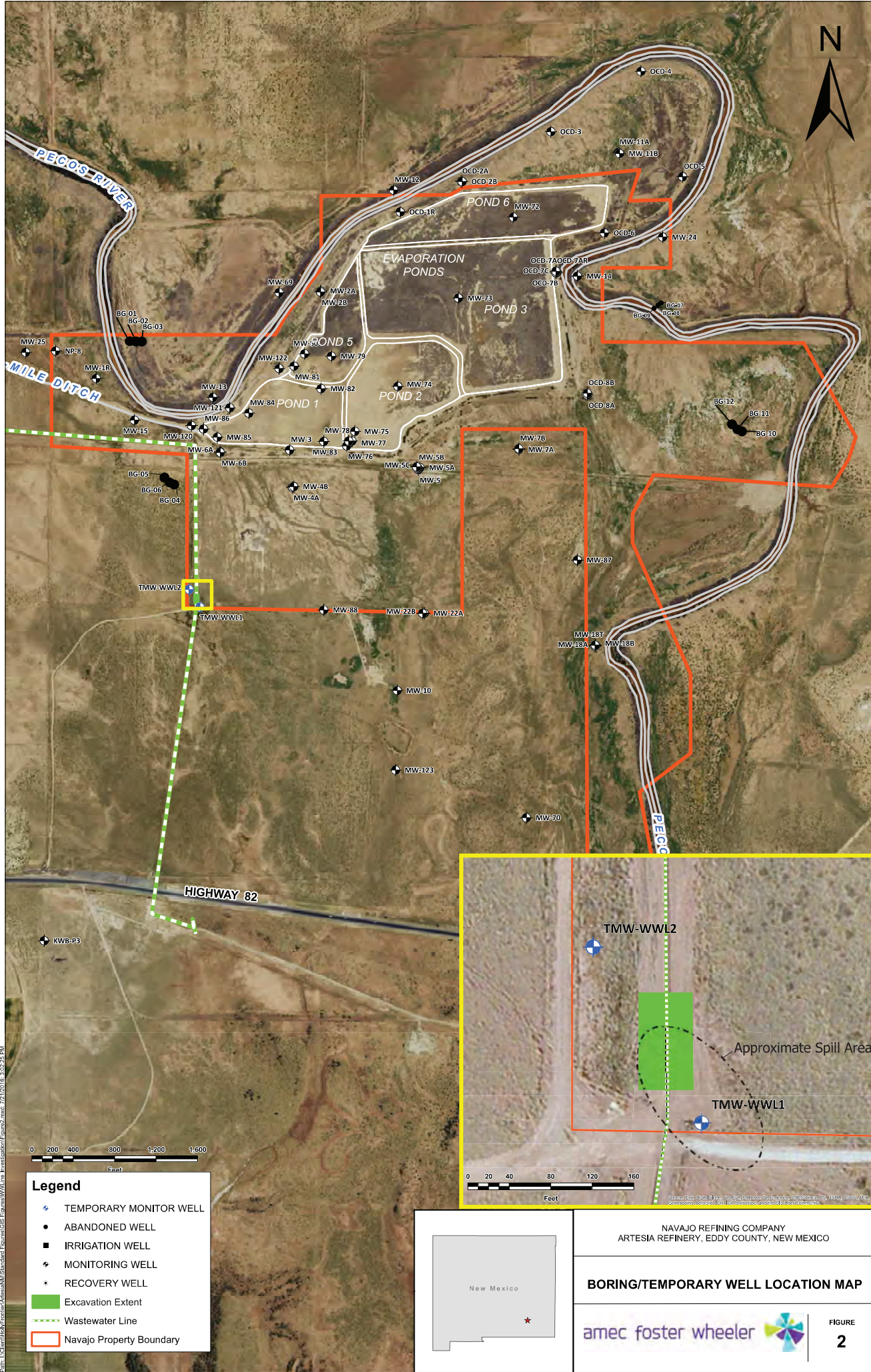
CONFIDENTIALITY NOTICE: This e-mail, and any attachments, may contain information that is privileged and confidential. If you received this message in error, please advise the sender immediately by reply e-mail and do not retain any paper or electronic copies of this message or any attachments. Unless expressly stated, nothing contained in this message should be construed as a digital or electronic signature or a commitment to a binding agreement.

DB: C RICHARDS PM: P KRUEGER Project (Project #) 6703160002
Path: I:\Client\HollyFrontier\Projects\HF Artesia\Figures\SiteLocationMap.mxd: 6/9/2016: 8:02:49 AM



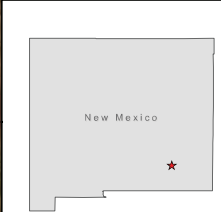
NAVAJO REFINING COMPANY
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

SITE LOCATION MAP



Legend

- ◆ TEMPORARY MONITOR WELL
- ABANDONED WELL
- IRRIGATION WELL
- ◆ MONITORING WELL
- RECOVERY WELL
- Excavation Extent
- Wastewater Line
- Navajo Property Boundary



NAVAJO REFINING COMPANY
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

BORING/TEMPORARY WELL LOCATION MAP

amec foster wheeler

FIGURE
2

DR. C. RICHARDS, PM, P. AQUILERA, Project Engineer, Project # 0001-000002, Navajo Refining Company, Artesia Refinery, Eddy County, New Mexico, Investigation Figure 2, dated 7/21/2018, 3:02:25 PM.

Chavez, Carl J, EMNRD

From: Combs, Robert <Robert.Combs@HollyFrontier.com>
Sent: Friday, May 19, 2017 12:26 PM
To: Chavez, Carl J, EMNRD
Cc: Griswold, Jim, EMNRD; Denton, Scott
Subject: RE: GW-28 Pipeline Release C-141s Due Today!
Attachments: 2017-05-18 Follow up report for 2015 WW Effluent Release.pdf

Carl,

Please see attached for the 2015 effluent pipeline release (April 12, 2015) follow-up report. The 2016 release (August 9, 2016) Final C-141 and report will follow next week.
Please let me know if you have any questions or would like to discuss.

Thanks and have a good weekend,

Robert

Robert Combs

Environmental Specialist
The HollyFrontier Companies
P.O. Box 159
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Cc: Griswold, Jim, EMNRD
Subject: FW: GW-28 Pipeline Release C-141s Due Today!

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OCD had requested updates on the releases on or before May 5, 2017.

Thank you.

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May 18, 2017

Robert Combs
Arsin Sahba
HollyFrontier Navajo Refining LLC
510 East Main Street
Artesia, New Mexico 88210

Soil Pile Sampling
April 12, 2015 Wastewater Pipeline Break near the Former
Evaporation Ponds Area
HollyFrontier Navajo Refining LLC – Artesia, New Mexico
Discharge Permit GW-028

Dear Robert:

Amec Foster Wheeler prepared a release response report that described investigation of the soil and shallow groundwater near a wastewater pipeline break that occurred near the former evaporation ponds located east of the HollyFrontier Navajo Refining LLC (Navajo) Refinery in Artesia, New Mexico. This investigation was performed according to the revised work plan submitted to the New Mexico Energy, Minerals and Natural Resources Department Oil Conservation Division (OCD) in October 2015. The release response report was submitted to OCD on July 28, 2016.

In November 2016, OCD requested that the soil that was excavated from the pipeline break area to allow repairs of the pipeline be sampled and analyzed. The request stated that three discrete (grab) soil samples be collected to be analyzed for the following:

- ▶ Volatile Organic Compounds (VOCs) by Method 8260
- ▶ Total Petroleum Hydrocarbons (TPH) by Method 8015 (extended range)
- ▶ Iron and Manganese by Method 6010
- ▶ Chloride, Fluoride, and Sulfate by Method 300

Three discrete soil samples were collected on April 25, 2017 from the stockpiled, excavated soil. The samples were submitted to Hall Environmental Analysis Laboratory, Inc. (Hall) for the requested analyses. Following initial review of the data, the three samples were additionally analyzed for iron using the synthetic precipitation leaching procedure (SPLP). A copy of the full laboratory report, including quality control data, is provided as Attachment A to this letter.

The analytical results from the soil pile samples are provided in Table 1 along with the results of the soil samples collected during the initial investigation of the release area performed in May 2016. The analytical results presented in Table 1 were compared to the following standards:

- ▶ OCD Spill Guidance standards for TPH and benzene
- ▶ New Mexico Environment Department (NMED) soil screening levels (SSLs):
 - Cancer and Non-cancer residential exposure scenarios
 - Soil leaching to groundwater exposure scenarios, both risk-based and drinking water standard based, using a dilution attenuation factor (DAF) of 20
- ▶ Background threshold values (BTVs) calculated for soils in the vicinity of the nearby former evaporation ponds, approved by the NMED
- ▶ Water Quality Control Commission (WQCC) domestic water supply standard for iron (SPLP samples only)

The following is a summary of the comparison of the soil analytical results to the various screening standards:

- ▶ TPH was not detected in any of the soil pile samples. Samples collected during the 2016 investigation were either not detected or contained low concentrations of TPH well below the screening standards.
- ▶ VOCs were not detected in any of the soil pile samples nor the samples collected during the 2016 investigation.
- ▶ Anions (Chloride, Fluoride, and Sulfate) were detected in both the soil pile samples and the samples collected during the 2016 investigation. All reported concentrations of anions were below all of the screening standards.
- ▶ Iron was detected in the soil pile samples at concentrations above the BTV and above the DAF 20 SSL, but below the Residential SSL. The SPLP results indicated that potential leachate from the soil pile would not contain detectable iron, with a detection limit two orders of magnitude below the WQCC standard. The iron concentrations reported in the samples collected during the 2016 investigation ranged from below all of the screening standards to above the DAF 20 SSL but below both the BTV and the Residential SSL.
- ▶ Manganese was detected in the soil pile samples and the samples collected during the 2016 investigation at concentrations below all of the screening standards.

Thus, iron is the only constituent of concern that exceeds any of the screening standards. It should be noted that groundwater samples collected during the 2016 investigation contained iron

at a concentration well below the screening standard for “domestic water supply” for iron, as listed in the WQCC regulations (New Mexico Administrative Code 20.6.2.3103.b). This empirical data and the SPLP results indicate that iron does not pose a threat to the shallow groundwater.

We believe that the iron detected in the soil pile does not present a human health risk if left in place.

If you have any questions or comments, please feel free to contact me at 713-929-5674 or 713-249-8548.

Sincerely,
Amec Foster Wheeler Environment & Infrastructure, Inc.



Pamela R. Krueger
Senior Associate

Enclosures:

Table 1 – Soil Analytical Results – 2015 Wastewater Line Break
Attachment A – Analytical Report for Soil Pile Samples

TABLE 1

Table 1 - Soil Analytical Results - 2015 Wastewater Line Break
HollyFrontier Navajo Refining, LLC - Artesia, New Mexico

								Location:	South Pile (Sample 1)	Center Pile (Sample 2)	North Pile (Sample 3)	TMW-WWL1			TMW-WWL2			
								Sample Depth (ft bgs):	-	-	-	1	5	12	1	5	12	12 (Duplicate)
								Sample Date:	4/25/2017	4/25/2017	4/25/2017	05/10/2016	05/10/2016	05/10/2016	05/10/2016	05/10/2016	05/10/2016	05/10/2016
Analyte	OCD Spill Guidance	Former EP BTV	Res SSL, Cancer	Res SSL, Non-Cancer	DAF 20 SSL, Risk-Based	DAF 20 SSL, MCL-Based	WQCC Domestic											
TPH (mg/kg)																		
Gasoline Range Organics	1.00E+02	---	---	1.00E+03	---	---	---	<4.0	<4.4	<3.6	< 0.108	< 0.108	< 0.108	0.255	< 0.108	< 0.108	< 0.108	< 0.108
Diesel Range Organics	1.00E+02	---	---	1.00E+03	---	2.0E+04	---	<9.6	<9.8	<9.6	7.31	< 1.61	< 1.61	< 1.61	< 1.61	< 1.61	< 1.61	< 1.61
Motor Oil Range Organic	1.00E+02	---	---	1.00E+03	---	2.0E+04	---	<48	<49	<48	3.15	< 0.274	< 0.274	0.687	< 0.274	< 0.274	< 0.274	< 0.274
Metals (mg/kg)																		
Iron	---	1.73E+04	---	5.48E+04	6.96E+03	---	---	18,000	18,000	19,000	12,200	7,850	2,710	10,500	5,580	2,880	3,950	
Manganese	---	4.88E+02	---	1.05E+04	2.63E+03	---	---	430	360	440	388	162	65	344	71	80	95	
Metals by SPLP (mg/L)																		
Iron	---	---	---	---	---	---	1.00E+00	< 0.05	< 0.05	< 0.05	--	--	--	--	--	--	--	--
Anions (mg/kg)																		
Chloride	---	5.26E+03	---	1.88E+07	---	---	---	1,200	1,200	330	1,730	1,070	1,690	113	712	712	899	
Fluoride	---	1.79E+01	---	4.69E+03	---	---	---	8.9	11	11	5.61	16.1	11.8	4.56	15.8	8.01	11.2	
Sulfate	---	2.16E+04	---	---	---	---	---	8,200	8,100	7,000	7,580	18,300	18,300	2,590	18,300	17,200	18,200	
VOCs (mg/kg)																		
Benzene	1.00E+01	---	1.77E+01	1.14E+02	3.80E-02	4.18E-02	---	<0.020	<0.022	<0.018	< 0.00135	< 0.00135	< 0.00135	< 0.00135	< 0.00135	< 0.00135	< 0.00135	< 0.00135
Toluene	---	---	---	5.22E+03	1.21E+01	1.11E+01	---	<0.040	<0.044	<0.036	< 0.00217	< 0.00217	< 0.00217	< 0.00217	< 0.00217	< 0.00217	< 0.00217	< 0.00148
Ethylbenzene	---	---	7.45E+01	3.92E+03	2.64E-01	1.23E+01	---	<0.040	<0.044	<0.036	< 0.00148	< 0.00148	< 0.00148	< 0.00148	< 0.00148	< 0.00148	< 0.00148	< 0.00148
1,2-Dichloroethane	---	---	8.25E+00	5.52E+01	8.14E-03	2.38E-02	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
1,2-Dibromoethane	---	---	6.68E-01	1.34E+02	3.52E-04	2.36E-04	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
Carbon Disulfide	---	---	---	1.54E+03	4.42E+00	---	---	<0.40	<0.44	<0.36	--	--	--	--	--	--	--	--
Chloroform	---	---	5.85E+00	3.04E+02	1.09E-02	---	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
1,1-Dichloroethane	---	---	7.79E+01	1.56E+04	1.36E-01	---	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
1,1-Dichloroethene	---	---	---	4.36E+02	1.95E+00	4.79E-02	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
Methylene chloride	---	---	7.66E+02	4.09E+02	4.71E-01	2.21E-02	---	<0.12	<0.13	<0.11	--	--	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	---	---	7.93E+00	1.56E+03	4.81E-03	---	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
Tetrachloroethene	---	---	3.35E+02	1.10E+02	3.21E-01	3.98E-02	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
1,1,1-Trichloroethane	---	---	---	1.43E+04	5.11E+01	1.28E+00	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
1,1,2-Trichloroethane	---	---	1.86E+01	2.59E+00	2.23E-03	2.68E-02	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
Trichloroethene	---	---	1.54E+01	6.72E+00	1.61E-02	3.10E-02	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
Vinyl chloride	---	---	7.41E-01	1.13E+02	2.17E-03	1.34E-02	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
Xylene, total	---	---	---	8.63E+02	2.98E+00	1.54E+02	---	<0.080	<0.087	<0.073	< 0.00349	< 0.00349	< 0.00349	< 0.00349	< 0.00349	< 0.00349	< 0.00349	< 0.00349

Notes:

< X = result not detected with a detection limit of X
Values shown in italics with green highlight exceed the BTV and DAF 20 SSL but are below the Res SSL
Values shown in regular font with blue highlight exceed the DAF 20 SSL but are below the Res SSL and BTV

Definitions

- = sample depth does not apply
- = sample was not analyzed for this constituent
- = no standard available from this source or for this pathway
- BTV = Background Threshold Value
- DAF 20 = Soil Leaching to Groundwater Exposure Scenario, with Dilution Attenuation Factor = 20
- EP = Evaporation Ponds
- ft bgs = feet below ground surface
- MCL = Maximum Contaminant Level for drinking water

Definitions (continued)

- mg/kg = milligrams per kilogram
- mg/L = milligrams per Liter
- NMAC = New Mexico Administrative Code
- NMED = New Mexico Environment Department
- OCD = Oil Conservation Division
- Res = Residential exposure scenario
- SSL = Soil Screening Level from NMED risk assessment guidance, March 2017
- TPH = Total Petroleum Hydrocarbons
- WQCC Domestic = Water Quality Control Commission limit for domestic water supply (NMAC 20.6.2.3103.B)



ATTACHMENT A



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

May 17, 2017

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

RE: 2015 Effluent PL Release

OrderNo.: 1704B58

Dear Robert Combs:

Hall Environmental Analysis Laboratory received 6 sample(s) on 5/12/2017 for the analyses presented in the following report.

This report is a revised report and it replaces the original report issued April 28, 2017.

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. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. All samples are reported as received unless otherwise indicated.

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1704B58**

Date Reported: **5/17/2017**

CLIENT: Navajo Refining Company

Client Sample ID: South Pile Sample 1

Project: 2015 Effluent PL Release

Collection Date: 4/25/2017 11:20:00 AM

Lab ID: 1704B58-001

Matrix: SOIL

Received Date: 5/12/2017 8:40:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: TOM
Diesel Range Organics (DRO)	ND	9.6		mg/Kg	1	4/26/2017 2:07:57 PM
Motor Oil Range Organics (MRO)	ND	48		mg/Kg	1	4/26/2017 2:07:57 PM
Surr: DNOP	104	70-130		%Rec	1	4/26/2017 2:07:57 PM
EPA METHOD 300.0: ANIONS						Analyst: MRA
Fluoride	8.9	0.30		mg/Kg	1	4/26/2017 1:21:41 PM
Chloride	1200	150		mg/Kg	100	4/26/2017 2:36:09 PM
Sulfate	8200	150		mg/Kg	100	4/26/2017 2:36:09 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	18000	250		mg/Kg	100	4/27/2017 10:06:50 AM
Manganese	430	0.51		mg/Kg	5	4/27/2017 10:08:11 AM
EPA METHOD 8260B: VOLATILES						Analyst: AG
Benzene	ND	0.020		mg/Kg	1	4/26/2017 11:34:00 AM
Toluene	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
Ethylbenzene	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
1,2-Dichloroethane (EDC)	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
1,2-Dibromoethane (EDB)	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
Carbon disulfide	ND	0.40		mg/Kg	1	4/26/2017 11:34:00 AM
Chloroform	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
1,1-Dichloroethane	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
1,1-Dichloroethene	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
Methylene chloride	ND	0.12		mg/Kg	1	4/26/2017 11:34:00 AM
1,1,2,2-Tetrachloroethane	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
Tetrachloroethene (PCE)	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
1,1,1-Trichloroethane	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
1,1,2-Trichloroethane	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
Trichloroethene (TCE)	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
Vinyl chloride	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
Xylenes, Total	ND	0.080		mg/Kg	1	4/26/2017 11:34:00 AM
Surr: Dibromofluoromethane	98.1	70-130		%Rec	1	4/26/2017 11:34:00 AM
Surr: 1,2-Dichloroethane-d4	91.0	70-130		%Rec	1	4/26/2017 11:34:00 AM
Surr: Toluene-d8	108	70-130		%Rec	1	4/26/2017 11:34:00 AM
Surr: 4-Bromofluorobenzene	110	70-130		%Rec	1	4/26/2017 11:34:00 AM
EPA METHOD 8015D MOD: GASOLINE RANGE						Analyst: AG
Gasoline Range Organics (GRO)	ND	4.0		mg/Kg	1	4/26/2017 11:34:00 AM
Surr: BFB	94.7	70-130		%Rec	1	4/26/2017 11:34:00 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1704B58**

Date Reported: **5/17/2017**

CLIENT: Navajo Refining Company

Client Sample ID: Center Pile Sample 2

Project: 2015 Effluent PL Release

Collection Date: 4/25/2017 11:25:00 AM

Lab ID: 1704B58-002

Matrix: SOIL

Received Date: 5/12/2017 8:40:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: TOM
Diesel Range Organics (DRO)	ND	9.8		mg/Kg	1	4/26/2017 2:30:04 PM
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	4/26/2017 2:30:04 PM
Surr: DNOP	99.0	70-130		%Rec	1	4/26/2017 2:30:04 PM
EPA METHOD 300.0: ANIONS						Analyst: MRA
Fluoride	11	0.30		mg/Kg	1	4/26/2017 1:46:30 PM
Chloride	1200	150		mg/Kg	100	4/26/2017 2:48:34 PM
Sulfate	8100	150		mg/Kg	100	4/26/2017 2:48:34 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	18000	250		mg/Kg	100	4/27/2017 10:09:33 AM
Manganese	360	0.50		mg/Kg	5	4/27/2017 10:10:54 AM
EPA METHOD 8260B: VOLATILES						Analyst: AG
Benzene	ND	0.022		mg/Kg	1	4/26/2017 12:03:19 PM
Toluene	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
Ethylbenzene	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
1,2-Dichloroethane (EDC)	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
1,2-Dibromoethane (EDB)	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
Carbon disulfide	ND	0.44		mg/Kg	1	4/26/2017 12:03:19 PM
Chloroform	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
1,1-Dichloroethane	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
1,1-Dichloroethene	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
Methylene chloride	ND	0.13		mg/Kg	1	4/26/2017 12:03:19 PM
1,1,2,2-Tetrachloroethane	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
Tetrachloroethene (PCE)	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
1,1,1-Trichloroethane	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
1,1,2-Trichloroethane	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
Trichloroethene (TCE)	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
Vinyl chloride	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
Xylenes, Total	ND	0.087		mg/Kg	1	4/26/2017 12:03:19 PM
Surr: Dibromofluoromethane	100	70-130		%Rec	1	4/26/2017 12:03:19 PM
Surr: 1,2-Dichloroethane-d4	85.3	70-130		%Rec	1	4/26/2017 12:03:19 PM
Surr: Toluene-d8	108	70-130		%Rec	1	4/26/2017 12:03:19 PM
Surr: 4-Bromofluorobenzene	107	70-130		%Rec	1	4/26/2017 12:03:19 PM
EPA METHOD 8015D MOD: GASOLINE RANGE						Analyst: AG
Gasoline Range Organics (GRO)	ND	4.4		mg/Kg	1	4/26/2017 12:03:19 PM
Surr: BFB	94.4	70-130		%Rec	1	4/26/2017 12:03:19 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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1704B58

Date Reported: 5/17/2017

CLIENT: Navajo Refining Company

Client Sample ID: North Pile Sample 3

Project: 2015 Effluent PL Release

Collection Date: 4/25/2017 11:30:00 AM

Lab ID: 1704B58-003

Matrix: SOIL

Received Date: 5/12/2017 8:40:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: TOM
Diesel Range Organics (DRO)	ND	9.6		mg/Kg	1	4/26/2017 2:52:19 PM
Motor Oil Range Organics (MRO)	ND	48		mg/Kg	1	4/26/2017 2:52:19 PM
Surr: DNOP	100	70-130		%Rec	1	4/26/2017 2:52:19 PM
EPA METHOD 300.0: ANIONS						Analyst: MRA
Fluoride	11	0.30		mg/Kg	1	4/26/2017 2:11:20 PM
Chloride	330	30		mg/Kg	20	4/26/2017 2:23:44 PM
Sulfate	7000	150		mg/Kg	100	4/26/2017 3:25:47 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	19000	250		mg/Kg	100	4/27/2017 10:12:16 AM
Manganese	440	0.50		mg/Kg	5	4/27/2017 10:13:38 AM
EPA METHOD 8260B: VOLATILES						Analyst: AG
Benzene	ND	0.018		mg/Kg	1	4/26/2017 12:32:58 PM
Toluene	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
Ethylbenzene	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
1,2-Dichloroethane (EDC)	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
1,2-Dibromoethane (EDB)	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
Carbon disulfide	ND	0.36		mg/Kg	1	4/26/2017 12:32:58 PM
Chloroform	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
1,1-Dichloroethane	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
1,1-Dichloroethene	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
Methylene chloride	ND	0.11		mg/Kg	1	4/26/2017 12:32:58 PM
1,1,2,2-Tetrachloroethane	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
Tetrachloroethene (PCE)	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
1,1,1-Trichloroethane	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
1,1,2-Trichloroethane	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
Trichloroethene (TCE)	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
Vinyl chloride	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
Xylenes, Total	ND	0.073		mg/Kg	1	4/26/2017 12:32:58 PM
Surr: Dibromofluoromethane	101	70-130		%Rec	1	4/26/2017 12:32:58 PM
Surr: 1,2-Dichloroethane-d4	90.6	70-130		%Rec	1	4/26/2017 12:32:58 PM
Surr: Toluene-d8	108	70-130		%Rec	1	4/26/2017 12:32:58 PM
Surr: 4-Bromofluorobenzene	110	70-130		%Rec	1	4/26/2017 12:32:58 PM
EPA METHOD 8015D MOD: GASOLINE RANGE						Analyst: AG
Gasoline Range Organics (GRO)	ND	3.6		mg/Kg	1	4/26/2017 12:32:58 PM
Surr: BFB	95.0	70-130		%Rec	1	4/26/2017 12:32:58 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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1704B58**

Date Reported: **5/17/2017**

CLIENT: Navajo Refining Company

Client Sample ID: South Pile Sample 1

Project: 2015 Effluent PL Release

Collection Date: 5/12/2017 8:00:00 AM

Lab ID: 1704B58-004

Matrix: LEACHATE

Received Date: 5/12/2017 8:40:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 6010B: SPLP METALS						Analyst: MED
Iron	ND	0.050		mg/L	1	5/17/2017 8:35:53 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1704B58**

Date Reported: **5/17/2017**

CLIENT: Navajo Refining Company

Client Sample ID: Center Pile Sample 2

Project: 2015 Effluent PL Release

Collection Date: 5/12/2017 8:00:00 AM

Lab ID: 1704B58-005

Matrix: LEACHATE

Received Date: 5/12/2017 8:40:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 6010B: SPLP METALS						Analyst: MED
Iron	ND	0.050		mg/L	1	5/17/2017 8:41:45 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1704B58**

Date Reported: **5/17/2017**

CLIENT: Navajo Refining Company

Client Sample ID: North Pile Sample 3

Project: 2015 Effluent PL Release

Collection Date: 5/12/2017 8:00:00 AM

Lab ID: 1704B58-006

Matrix: LEACHATE

Received Date: 5/12/2017 8:40:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 6010B: SPLP METALS						Analyst: MED
Iron	ND	0.050		mg/L	1	5/17/2017 8:43:41 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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#: 1704B58

17-May-17

Client: Navajo Refining Company

Project: 2015 Effluent PL Release

Sample ID	MB-31441		SampType: mblk		TestCode: EPA Method 300.0: Anions					
Client ID:	PBS		Batch ID: 31441		RunNo: 42386					
Prep Date:	4/26/2017		Analysis Date: 4/26/2017		SeqNo: 1333287		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.30								
Chloride	ND	1.5								
Sulfate	ND	1.5								

Sample ID	LCS-31441		SampType: lcs		TestCode: EPA Method 300.0: Anions					
Client ID:	LCSS		Batch ID: 31441		RunNo: 42386					
Prep Date:	4/26/2017		Analysis Date: 4/26/2017		SeqNo: 1333288		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	1.5	0.30	1.500	0	100	90	110			
Chloride	15	1.5	15.00	0	97.7	90	110			
Sulfate	29	1.5	30.00	0	98.0	90	110			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1704B58

17-May-17

Client: Navajo Refining Company

Project: 2015 Effluent PL Release

Sample ID	LCS-31439		SampType: LCS		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	LCSS		Batch ID: 31439		RunNo: 42363					
Prep Date:	4/26/2017		Analysis Date: 4/26/2017		SeqNo: 1332305		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	42	10	50.00	0	83.8	63.8	116			
Surr: DNOP	4.3		5.000		86.0	70	130			

Sample ID	MB-31439	SampType: MBLK			TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	PBS	Batch ID: 31439			RunNo: 42363					
Prep Date:	4/26/2017	Analysis Date: 4/26/2017			SeqNo: 1332306		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	10								
Motor Oil Range Organics (MRO)	ND	50								
Surr: DNOP	8.1		10.00		80.6	70	130			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1704B58

17-May-17

Client: Navajo Refining Company

Project: 2015 Effluent PL Release

Sample ID	rb	SampType:	MBLK	TestCode:	EPA Method 8260B: Volatiles					
Client ID:	PBS	Batch ID:	R42377	RunNo:	42377					
Prep Date:		Analysis Date:	4/26/2017	SeqNo:	1332328	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	0.025								
Toluene	ND	0.050								
Ethylbenzene	ND	0.050								
1,2-Dichloroethane (EDC)	ND	0.050								
1,2-Dibromoethane (EDB)	ND	0.050								
Carbon disulfide	ND	0.50								
Chloroform	ND	0.050								
1,1-Dichloroethane	ND	0.050								
1,1-Dichloroethene	ND	0.050								
Methylene chloride	ND	0.15								
1,1,2,2-Tetrachloroethane	ND	0.050								
Tetrachloroethene (PCE)	ND	0.050								
1,1,1-Trichloroethane	ND	0.050								
1,1,2-Trichloroethane	ND	0.050								
Trichloroethene (TCE)	ND	0.050								
Vinyl chloride	ND	0.050								
Xylenes, Total	ND	0.10								
Surr: Dibromofluoromethane	0.53		0.5000		106	70	130			
Surr: 1,2-Dichloroethane-d4	0.49		0.5000		97.1	70	130			
Surr: Toluene-d8	0.50		0.5000		101	70	130			
Surr: 4-Bromofluorobenzene	0.54		0.5000		108	70	130			

Sample ID	100ng lcs	SampType:	LCS	TestCode:	EPA Method 8260B: Volatiles					
Client ID:	LCSS	Batch ID:	R42377	RunNo:	42377					
Prep Date:		Analysis Date:	4/26/2017	SeqNo:	1332329	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	1.2	0.025	1.000	0	119	70	130			
Toluene	1.1	0.050	1.000	0	114	70	130			
1,1-Dichloroethene	1.2	0.050	1.000	0	119	72	146			
Trichloroethene (TCE)	1.1	0.050	1.000	0	113	70	130			
Surr: Dibromofluoromethane	0.52		0.5000		103	70	130			
Surr: 1,2-Dichloroethane-d4	0.46		0.5000		91.9	70	130			
Surr: Toluene-d8	0.48		0.5000		96.3	70	130			
Surr: 4-Bromofluorobenzene	0.56		0.5000		113	70	130			

Qualifiers:

* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1704B58

17-May-17

Client: Navajo Refining Company

Project: 2015 Effluent PL Release

Sample ID	1704b58-002ams		SampType:	MS		TestCode:	EPA Method 8260B: Volatiles			
Client ID:	Center Pile Sample		Batch ID:	R42377		RunNo:	42377			
Prep Date:			Analysis Date:	4/26/2017		SeqNo:	1332784	Units:	mg/Kg	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.94	0.022	0.8726	0	108	61.9	146			
Toluene	1.1	0.044	0.8726	0.02386	120	70	130			
1,1-Dichloroethene	0.98	0.044	0.8726	0	113	37.1	170			
Trichloroethene (TCE)	0.87	0.044	0.8726	0	99.2	49.8	150			
Surr: Dibromofluoromethane	0.41		0.4363		95.1	70	130			
Surr: 1,2-Dichloroethane-d4	0.38		0.4363		87.4	70	130			
Surr: Toluene-d8	0.46		0.4363		105	70	130			
Surr: 4-Bromofluorobenzene	0.46		0.4363		106	70	130			

Sample ID	1704b58-002amsd		SampType:	MSD		TestCode:	EPA Method 8260B: Volatiles			
Client ID:	Center Pile Sample		Batch ID:	R42377		RunNo:	42377			
Prep Date:			Analysis Date:	4/26/2017		SeqNo:	1332785	Units:	mg/Kg	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.87	0.022	0.8726	0	99.7	61.9	146	7.73	20	
Toluene	0.99	0.044	0.8726	0.02386	111	70	130	7.09	20	
1,1-Dichloroethene	0.92	0.044	0.8726	0	105	37.1	170	6.93	20	
Trichloroethene (TCE)	0.85	0.044	0.8726	0	97.5	49.8	150	1.71	20	
Surr: Dibromofluoromethane	0.41		0.4363		93.8	70	130	0	0	
Surr: 1,2-Dichloroethane-d4	0.37		0.4363		85.8	70	130	0	0	
Surr: Toluene-d8	0.46		0.4363		105	70	130	0	0	
Surr: 4-Bromofluorobenzene	0.47		0.4363		108	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
R	RPD outside accepted recovery limits	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#: 1704B58

17-May-17

Client: Navajo Refining Company

Project: 2015 Effluent PL Release

Sample ID	MB-31451		SampType: MBLK		TestCode: EPA Method 6010B: Soil Metals					
Client ID:	PBS		Batch ID: 31451		RunNo: 42402					
Prep Date:	4/26/2017		Analysis Date: 4/27/2017		SeqNo: 1333071		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	ND	2.5								
Manganese	ND	0.10								

Sample ID	LCS-31451		SampType: LCS		TestCode: EPA Method 6010B: Soil Metals					
Client ID:	LCSS		Batch ID: 31451		RunNo: 42402					
Prep Date:	4/26/2017		Analysis Date: 4/27/2017		SeqNo: 1333072		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	26	2.5	25.00	0	105	80	120			
Manganese	25	0.10	25.00	0	101	80	120			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1704B58

17-May-17

Client: Navajo Refining Company

Project: 2015 Effluent PL Release

Sample ID	MB-31758		SampType:	MBLK		TestCode:	EPA Method 6010B: SPLP Metals				
Client ID:	PBW		Batch ID:	31758		RunNo:	42833				
Prep Date:	5/16/2017		Analysis Date:	5/17/2017		SeqNo:	1347165		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Iron	ND	0.050									

Sample ID	LCS-31758		SampType:	LCS		TestCode:	EPA Method 6010B: SPLP Metals				
Client ID:	LCSW		Batch ID:	31758		RunNo:	42833				
Prep Date:	5/16/2017		Analysis Date:	5/17/2017		SeqNo:	1347166		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Iron	0.53	0.050	0.5000	0	106	80	120				

Sample ID	1704B58-004AMS		SampType:	MS		TestCode:	EPA Method 6010B: SPLP Metals				
Client ID:	South Pile Sample 1		Batch ID:	31758		RunNo:	42833				
Prep Date:	5/16/2017		Analysis Date:	5/17/2017		SeqNo:	1347168		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Iron	0.53	0.050	0.5000	0	106	75	125				

Sample ID	1704B58-004AMSD		SampType:	MSD		TestCode:	EPA Method 6010B: SPLP Metals				
Client ID:	South Pile Sample 1		Batch ID:	31758		RunNo:	42833				
Prep Date:	5/16/2017		Analysis Date:	5/17/2017		SeqNo:	1347169		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Iron	0.52	0.050	0.5000	0	104	75	125	1.93	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 |
| R RPD outside accepted recovery limits | 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#: 1704B58

17-May-17

Client: Navajo Refining Company

Project: 2015 Effluent PL Release

Sample ID	1704b58-001ams	SampType:	MS	TestCode:	EPA Method 8015D Mod: Gasoline Range					
Client ID:	South Pile Sample 1	Batch ID:	A42377	RunNo:	42377					
Prep Date:		Analysis Date:	4/26/2017	SeqNo:	1332780	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	25	4.0	20.03	0	124	63.2	128			
Surr: BFB	370		400.6		93.1	70	130			

Sample ID	1704b58-001amsd	SampType:	MSD	TestCode:	EPA Method 8015D Mod: Gasoline Range					
Client ID:	South Pile Sample 1	Batch ID:	A42377	RunNo:	42377					
Prep Date:		Analysis Date:	4/26/2017	SeqNo:	1332781	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	23	4.0	20.03	0	116	63.2	128	6.14	20	
Surr: BFB	390		400.6		96.8	70	130	0	0	

Sample ID	2.5ug gro lcs	SampType:	LCS	TestCode:	EPA Method 8015D Mod: Gasoline Range					
Client ID:	LCSS	Batch ID:	A42377	RunNo:	42377					
Prep Date:		Analysis Date:	4/26/2017	SeqNo:	1332782	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	27	5.0	25.00	0	106	70	130			
Surr: BFB	520		500.0		104	70	130			

Sample ID	rb	SampType:	MBLK	TestCode:	EPA Method 8015D Mod: Gasoline Range					
Client ID:	PBS	Batch ID:	A42377	RunNo:	42377					
Prep Date:		Analysis Date:	4/26/2017	SeqNo:	1332783	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	ND	5.0								
Surr: BFB	500		500.0		100	70	130			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified



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: 1704B58

RcptNo: 1

Received By: Erin Melendrez

4/26/2017 9:35:00 AM

Completed By: Anne Thorne

4/26/2017 10:10:47 AM

Reviewed By:

04/26/17

Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☒
2. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
3. How was the sample delivered? Courier

Log In

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

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

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified:	_____	Date:	_____
By Whom:	_____	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	_____		
Client Instructions:	_____		

17. Additional remarks:

18. Cooler Information

Cooler No	Temp $^{\circ}\text{C}$	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	2.1	Good	Yes			



www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

Analysis Request

[illegible]

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.

Chavez, Carl J, EMNRD

From: Combs, Robert <Robert.Combs@HollyFrontier.com>
Sent: Wednesday, May 24, 2017 3:32 PM
To: Chavez, Carl J, EMNRD
Cc: Griswold, Jim, EMNRD; Denton, Scott; Sahba, Arsin M.; Dade, Lewis (Randy)
Subject: RE: GW-28 Pipeline Release C-141s Due Today!
Attachments: Artesia Aug2016 WW Effluent Release FINAL to Navajo 052417.pdf; 2017-05-24 Final C-141 2016 WW Effluent Release 2016-08-09.pdf

Carl,
Please find the attached Final C-141 form and Release Report for the 2016-08-09 Artesia WW effluent release.
Please let us know if you would like to discuss.
Thanks,
Robert

From: Chavez, Carl J, EMNRD [<mailto:CarlJ.Chavez@state.nm.us>]
Sent: Thursday, May 11, 2017 1:21 PM
To: Combs, Robert
Cc: Griswold, Jim, EMNRD; Denton, Scott
Subject: RE: GW-28 Pipeline Release C-141s Due Today!

Robert:

End of May 2017 is fine.

Thank you.

From: Combs, Robert [<mailto:Robert.Combs@HollyFrontier.com>]
Sent: Wednesday, May 10, 2017 9:30 AM
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Cc: Griswold, Jim, EMNRD <Jim.Griswold@state.nm.us>; Denton, Scott <Scott.Denton@HollyFrontier.com>
Subject: RE: GW-28 Pipeline Release C-141s Due Today!

Hi Carl; on our last phone conversation on 4/21 we agreed to the end of May to provide the updates for the two events. We have the sample results and the consultants are currently preparing the write-ups. I can check with them on their status and possibly move them quicker if needed – please let me know.

Thanks,
Robert

From: Chavez, Carl J, EMNRD [<mailto:CarlJ.Chavez@state.nm.us>]
Sent: Wednesday, May 10, 2017 8:23 AM
To: Combs, Robert
Cc: Griswold, Jim, EMNRD
Subject: FW: GW-28 Pipeline Release C-141s Due Today!

Robert:

The New Mexico Oil Conservation Division (OCD) has not received the updates on the pipeline releases that occurred in 2015 and 2016.

OCD had requested updates on the releases on or before May 5, 2017.

Thank you.

CONFIDENTIALITY NOTICE: This e-mail, and any attachments, may contain information that is privileged and confidential. If you received this message in error, please advise the sender immediately by reply e-mail and do not retain any paper or electronic copies of this message or any attachments. Unless expressly stated, nothing contained in this message should be construed as a digital or electronic signature or a commitment to a binding agreement.

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505 East Huntland Drive
Suite 250
Austin, TX 78752

512.329.6080 PHONE
512.329.8750 FAX

www.TRCsolutions.com

May 24, 2017

Mr. Robert Combs, Mr. Scott Denton, Mr. Arsin Sahba
HollyFrontier Navajo Refining LLC
PO Box 159
Artesia, New Mexico 88211

**Re: August 2016 Wastewater Effluent Pipeline Release Investigation Results and
Request for Closure
HollyFrontier Navajo Refining LLC, Artesia Refinery
Discharge Permit GW-028**

Dear Mr. Combs, et al.:

TRC Environmental Corporation (TRC) is pleased to provide HollyFrontier Navajo Refining LLC (Navajo) with this letter to document investigation results completed by Navajo related to the August 2016 wastewater effluent release that occurred approximately 5 miles east of Artesia, New Mexico. The release occurred from the Navajo pipeline that conveys treated wastewater from Navajo's Artesia Refinery (refinery) to injection wells for disposal in accordance with Discharge Permit GW-028 and Underground Injection Control (UIC) permits.

BACKGROUND

Wastewater effluent was released at 6:00 PM on August 9, 2016, due to a collar failure in the pipeline that conveys treated wastewater from the refinery to injection wells located approximately 15 miles southeast of the refinery. The refinery and release locations are shown on Figure 1. The pipeline release was discovered based on a sudden change in monitored pipeline flow and pressure. Navajo completed initial release response and abatement activities on August 9, 2016, immediately following the release. Wastewater effluent discharge pumps located at the refinery were shut down and in-line valves were blocked-in to minimize flow back. The initial Form C-141 documented a release of 10 barrels but the release was greater than the original estimate based on recovery of 40 barrels. Operations reported that 10 barrels were initially released to the surface. As the pipeline was further exposed for repairs, the section of pipeline between the nearest block valve and the line breach drained into the excavation, thus the additional volume recovered by the vacuum truck.

The recovered water was returned to the refinery waste water treatment unit for processing. The released water did not migrate from the release location or enter the Pecos River.

The pipeline was repaired and returned to service on August 10, 2016. The maintenance contractor performed the required repairs and backfilled the excavation with the excavated material due to an absence of obvious impacts. The soil investigation below addresses the entire release area including the material that was backfilled.

Navajo notified the New Mexico Oil Conservation Division (OCD), OCD Artesia District office, and the New Mexico Environment Department (NMED) Hazardous Waste Bureau within 24 hours of the release by telephone. An initial Form C-141 was submitted to the OCD on August 12, 2016, to document the release and initial response and abatement activities. The approximate aerial extent of the accumulated released wastewater is shown on Figure 2.

RELEASE INVESTIGATION

Navajo conducted wastewater and surface soil investigation related to the August 2016 wastewater effluent release. The investigation activities and results are discussed below.

Wastewater Investigation

Navajo collected a sample of wastewater from a pipeline pump on August 10, 2016; this sample is considered equivalent to the wastewater that was released. The wastewater sample was submitted to Hall Environmental Analysis Laboratory (Hall) in Albuquerque, New Mexico for analysis of the same analytical suite required for the quarterly effluent monitoring in the UIC permits. The analytical results are summarized and compared to applicable Water Quality Control Commission Groundwater Standards (WQCC Standards) in Table 1. The following parameters were detected in the wastewater effluent sample in exceedance of WQCC Standards: chloride (320 milligrams per liter [mg/L]), fluoride (13 mg/L), sulfate (1,500 mg/L), iron (2.40 mg/L), and total dissolved solids (TDS) (2,800 mg/L).

Soil Investigation

On October 10, 2016, Navajo collected four surface soil samples from within the release area (samples “Test 1” through “Test 4”) and four surface soil samples from non-release locations in the general vicinity of the release to provide data representative of background conditions (samples “Background 5” through “Background 8”). The sample locations are shown on Figure 2 and include two samples (Test 2 and Test 3) within the material used to backfill the excavation. The surface soil samples were submitted to Hall for laboratory analysis of chloride, fluoride, sulfate, and iron – consistent with the parameters detected in the wastewater effluent sample that exceeded the WQCC Standards. Surface soil analytical results are presented in Table 2 and Figure 2. Laboratory analytical reports are provided in Attachment A. Surface soil analytical results indicate each parameter is present at a highly variable distribution across the release and non-release areas as follows:

- Chloride: Concentrations ranged from 27 milligrams per kilogram (mg/kg) to 3,100 mg/kg in the release area; and 400 mg/kg to 7,600 mg/kg in the non-release areas. Chloride concentrations ranged by up to two orders of magnitude across the release and non-release areas, and were overall greater at locations outside the release area.
- Fluoride: Concentrations ranged from 0.65 mg/kg to 1.8 mg/kg in the release area; and 0.8 mg/kg to 3.2 mg/kg in the non-release areas. Overall fluoride concentrations were greater outside the release area.
- Sulfate: Concentrations ranged from 1,300 mg/kg to 5,200 mg/kg in the release area; and 370 mg/kg to 3,500 mg/kg in the non-release areas. Overall sulfate concentrations were greater within the release area.
- Iron: Concentrations ranged from 20,000 mg/kg to 27,000 mg/kg in the release area; and 14,000 mg/kg to 27,000 mg/kg in the non-release areas. Overall iron concentrations were similar within the release and non-release areas.

To assess the potential for chloride, fluoride, sulfate, and iron to leach from surface soil within the release area to groundwater, surface soil samples were collected on April 27, 2017 from the same four sample locations (“Test 1” through “Test 4”), and submitted to Hall for synthetic precipitation leaching procedure (SPLP) analysis for each of these parameters. The SPLP results are presented and compared to WQCC Standards in Table 2. The SPLP results indicate that chloride, fluoride, and sulfate do not have the potential to leach from surface soil to groundwater at concentrations greater than WQCC Standards. The SPLP iron results indicate that iron has the potential to leach from surface soil to groundwater at a concentration greater than the WQCC Standard at only one of the four sample locations (Test 3) within the release area. The presence of iron at this sample location (Test 3) is attributed to background conditions and not attributed to the August 2016 wastewater release based on the following:

- The iron concentration in soil at Test 3 (23,000 mg/kg) was less than or equal to three of the four samples collected from the non-release areas that are representative of background concentrations (which ranged from 14,000 mg/kg to 27,000 mg/kg).
- The SPLP iron concentration at Test 3 (3.2 mg/L) was greater than the iron concentration in the released wastewater effluent (2.4 mg/L), thus indicating there is additional background source of iron.

Request for Closure

TRC recommends Navajo request that no further action be required in regards to the August 2016 wastewater effluent release based on the following:

- A majority of the wastewater effluent released was recovered via vacuum truck immediately following the release.

- The parameters present in the wastewater effluent at concentrations above WQCC Standards (chloride, fluoride, sulfate, and iron) are present in background (non-release) soils at concentrations similar to or greater than concentrations in the release area. In addition, the distribution of these parameters is highly variable across the release and non-release areas. Therefore, the presence of these parameters in soil at the release location are attributed to background condition and not attributed to the August 2016 wastewater effluent release.
- Chloride, fluoride, and sulfate in soil does not have the potential to leach to groundwater at concentrations above WQCC Standards based on SPLP laboratory analysis. Iron has the potential to leach to groundwater at a concentration above the WQCC Standard at one of the four locations within the release area, but the presence of iron at this location is attributed to background conditions and not the August 2016 wastewater effluent release as described above.

If you have any questions or comments regarding this letter, please feel free to contact me at 512-684-3148.

Sincerely,



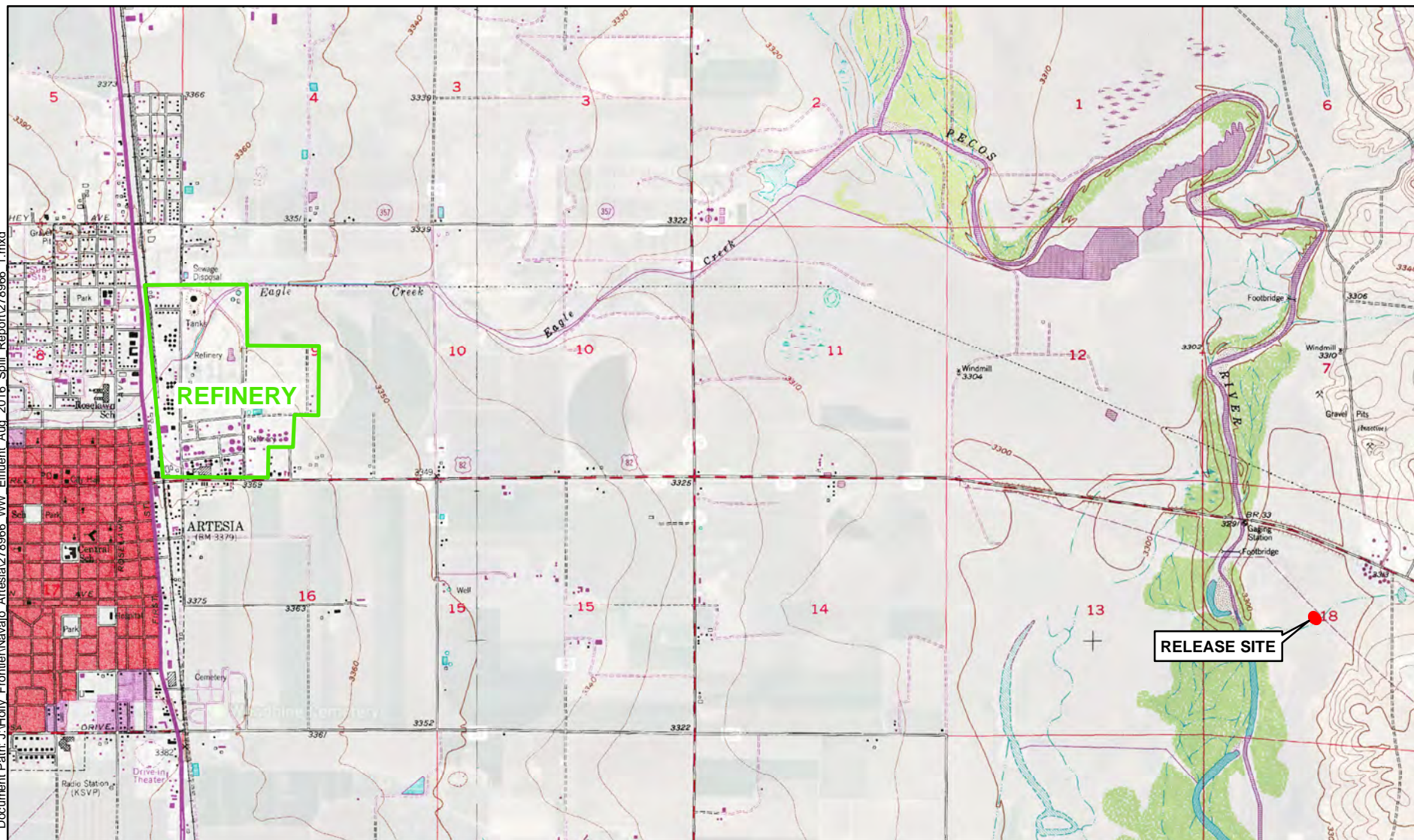
Julie Speer
Project Manager
TRC Environmental Corporation

cc: TRC: B. Gilbert, C. Smith

Attachments:

- Figure 1 – Site Location Map
- Figure 2 – Sample Location and Results Map
- Table 1 – Wastewater Effluent Analytical Results
- Table 2 – Soil Analytical Results
- Attachment A – Laboratory Analytical Reports

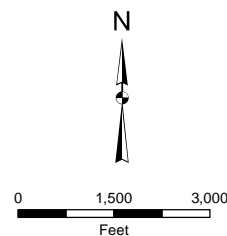
FIGURES



Legend

- RELEASE SITE
- REFINERY

SOURCE: BASE MAP USGS 7.5 MINUTE
SERIES QUADS, ARTESIA AND SPRINGLAKE
QUADRANGLES, 1955, PHOTOREVISED 1983.



SITE LOCATION MAP
AUGUST 2016 WASTEWATER EFFLUENT RELEASE
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

PROJECT NUMBER: 278966

FILE NAME: 278966_1

AUTHOR: MLOVELACE

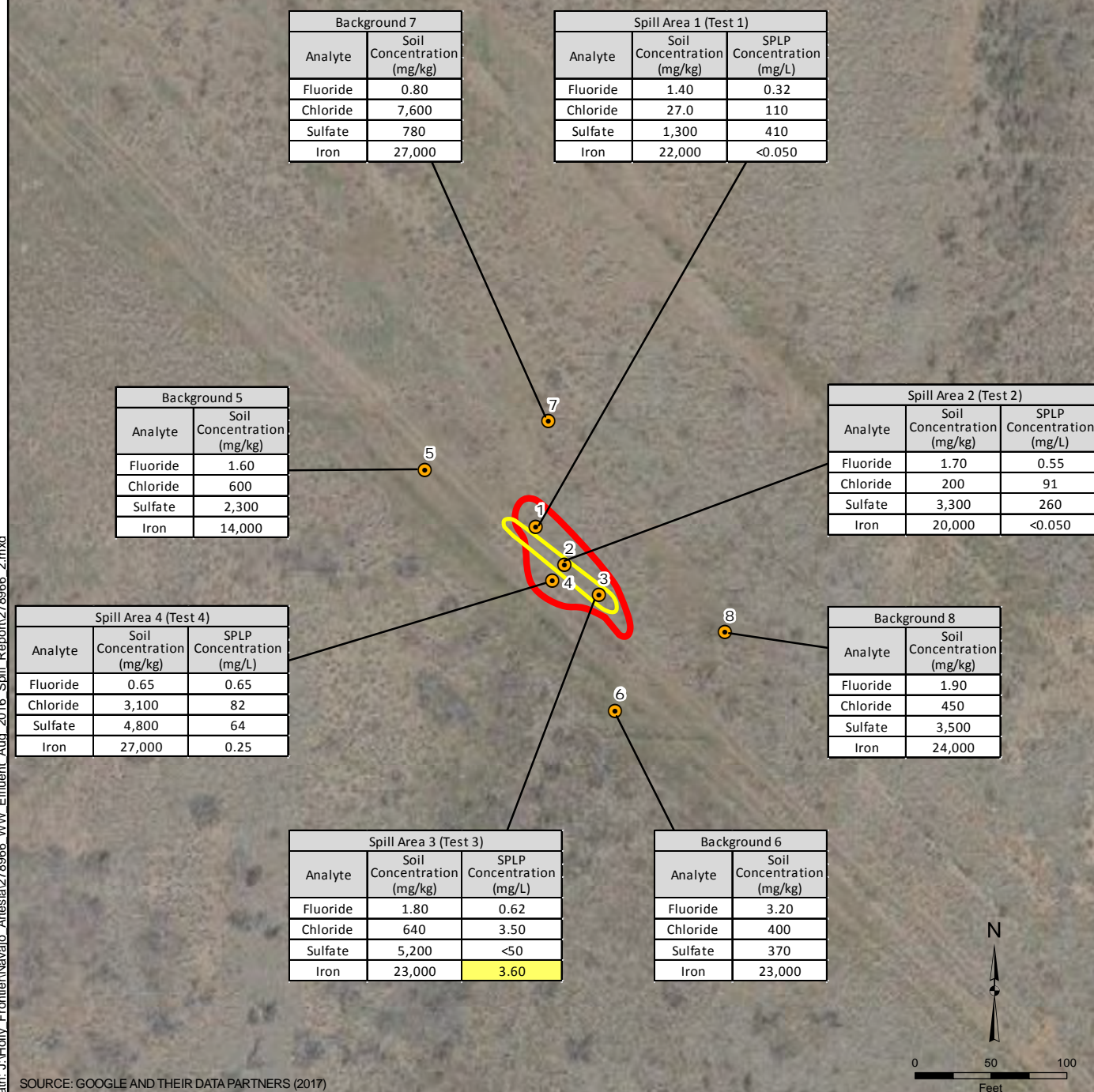
DATE: 5/16/2017



505 E. HUNTLAND DR.
SUITE 250
AUSTIN, TX 78752
PH:512-329-6080

FIGURE

1



LEGEND

- SOIL SAMPLE LOCATIONS
 - ▭ EXTENT OF EXCAVATION FOR PIPELINE REPAIR
 - ▭ EXTENT OF RELEASE
 - ▭ SPLP CONCENTRATION EXCEEDS WQCC STANDARD (WQCC STANDARDS: FLUORIDE, 1.6 mg/L, CHLORIDE = 250 mg/L, SULFATE = 600 mg/L, IRON = 1.0 mg/L)
- SPLP = SYNTHETIC PRECIPITATION LEACHING PROCEDURE
 mg/Kg = MILLIGRAMS PER KILOGRAM
 mg/L = MILLIGRAMS PER LITER
 WQCC STANDARD = WATER QUALITY CONTROL COMMISSION GROUNDWATER STANDARD FOR HUMAN HEALTH EXPOSURE (20.6.2 NMAC)

SAMPLE LOCATION AND RESULTS MAP

AUGUST 2016 WASTEWATER EFFLUENT RELEASE
 HOLLYFRONTIER NAVAJO REFINING LLC
 ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

PROJECT NUMBER: 278966

FILE NAME: 278966_2

AUTHOR: MLOVELACE

DATE: 5/23/2017



505 E. HUNTLAND DR.
 SUITE 250
 AUSTIN, TX 78752
 PH:512-329-6080

FIGURE

2

TABLES

Table 1. Wastewater Effluent Analytical Results
Wastewater Pipeline Release Approximately 5 Miles East of Artesia - August 9, 2016
HollyFrontier Navajo Refining, LLC, GW-028, Artesia, New Mexico

Sample ID: Date:				Wastewater Effluent 8/10/2016
Analyte	Units	WQCC Standard	Screening Standard	Result
VOCs				
1,1,1-Trichloroethane	mg/L	0.060	NMED GW Human Health	< 0.0025
1,1,2,2-Tetrachloroethane	mg/L	0.010	NMED GW Human Health	< 0.0025
1,1,2-Trichloroethane	mg/L	0.100	NMED GW Human Health	< 0.0025
1,1-Dichloroethane	mg/L	0.025	NMED GW Human Health	< 0.0025
1,1-Dichloroethene	mg/L	0.005	NMED GW Human Health	< 0.0025
1,2-Dichloroethane	mg/L	0.010	NMED GW Human Health	< 0.0025
Benzene	mg/L	0.010	NMED GW Human Health	< 0.0025
Carbon Tetrachloride	mg/L	0.010	NMED GW Human Health	< 0.0025
Chloroform	mg/L	0.100	NMED GW Human Health	< 0.0025
Ethylbenzene	mg/L	0.750	NMED GW Human Health	< 0.0025
Methylene Chloride	mg/L	0.100	NMED GW Human Health	< 0.012
Tetrachloroethene	mg/L	0.020	NMED GW Human Health	< 0.0025
Toluene	mg/L	0.750	NMED GW Human Health	0.012
Total Xylenes	mg/L	0.620	NMED GW Human Health	< 0.005
Trichloroethene	mg/L	0.100	NMED GW Human Health	< 0.0025
Vinyl Chloride	mg/L	0.001	NMED GW Human Health	< 0.0025
SVOCs				
1-Methylnaphthalene	mg/L	0.03	NMED GW Human Health	< 0.010
2-Methylnaphthalene	mg/L	0.03	NMED GW Human Health	< 0.010
Naphthalene	mg/L	0.03	NMED GW Human Health	< 0.010
Benzo(a)Pyrene	mg/L	0.0002	EPA MCL	< 0.0002
Total Metals (mg/L)				
Aluminum	mg/L	5.00	NMED GW Irrigation	0.260
Arsenic	mg/L	0.100	NMED GW Human Health	0.031
Barium	mg/L	1.00	NMED GW Human Health	< 0.020
Cadmium	mg/L	0.010	NMED GW Human Health	< 0.0020
Calcium	mg/L	--		130
Chromium	mg/L	0.050	NMED GW Human Health	< 0.0060
Cobalt	mg/L	0.050	NMED GW Irrigation	< 0.0060
Copper	mg/L	1.00	NMED GW Irrigation	< 0.0060
Iron	mg/L	1.00	NMED GW Irrigation	2.40
Lead	mg/L	0.050	NMED GW Human Health	< 0.0050
Manganese	mg/L	0.200	NMED GW Domestic	0.15
Mercury	mg/L	0.002	NMED GW Human Health	< 0.0002
Nickel	mg/L	0.200	NMED GW Irrigation	0.010
Potassium	mg/L	--		60.0
Selenium	mg/L	0.050	NMED GW Human Health	< 0.050
Silver	mg/L	0.050	NMED GW Human Health	< 0.0050
Sodium	mg/L	--		630
Zinc	mg/L	10.0	NMED GW Domestic	0.025
Anions				
Bromide	mg/L	--		1.60
Chloride	mg/L	250	NMED GW Domestic	320
Fluoride (F-, Anion)	mg/L	1.60	NMED GW Human Health	13.0
Nitrite (as N)	mg/L	1.00	NMED GW Human Health	0.96
Nitrate (as N)	mg/L	1.00	NMED GW Human Health	0.50
Sulfate	mg/L	600	NMED GW Domestic	1,500
Other Parameters				
Total Dissolved Solids	mg/L	1,000	NMED GW Domestic	2,800

Notes:

Yellow highlighted concentration exceeds applicable WQCC Standard

mg/L = milligrams per liter

NMED = New Mexico Environment Department

NMED GW Human Health = NMED groundwater standard for human health exposure, NMAC 20.6.2.3103.A

NMED GW Irrigation = NMED groundwater standard for irrigation exposure, NMAC 20.6.2.3103.C

NMED GW Domestic = NMED groundwater standard for domestic exposure, NMAC 20.6.2.3103.B

NMAC = New Mexico Administrative Code

WQCC = Water Quality Control Commission

Table 2. Soil Analytical Results
Wastewater Effluent Pipeline Release Approximately 5 Miles East of Artesia - August 9, 2016
HollyFrontier Navajo Refining, LLC, GW-028, Artesia, New Mexico

Sample Location:	Release Area Soil Samples ⁽¹⁾				Non-Release "Background" Samples ⁽¹⁾				Max Release Area	Max Background
	Test 1	Test 2	Test 3	Test 4	Background 5	Background 6	Background 7	Background 8		
Analyte	Concentration (mg/kg)									
Fluoride	1.40	1.70	1.80	0.65	1.60	3.20	0.80	1.90	1.80	3.20
Chloride	27.0	200	640	3,100	600	400	7,600	450	3,100	7,600
Sulfate	1,300	3,300	5,200	4,800	2,300	370	780	3,500	5,200	3,500
Iron	22,000	20,000	23,000	27,000	14,000	23,000	27,000	24,000	27,000	27,000

Sample Location:	Release Area Soil SPLP Samples ⁽²⁾				Wastewater Effluent ⁽³⁾	WQCC Standard ⁽⁴⁾
	Test 1	Test 2	Test 3	Test 4		
Analyte	Concentration (mg/L)					
Fluoride	0.32	0.55	0.62	0.65	13.0	1.6
Chloride	110	91	3.5	82	320	250
Sulfate	410	260	<50	64	1,500	600
Iron	<0.050	<0.050	3.6	0.25	2.40	1.0

Notes:

Yellow highlighted concentration exceeds applicable WQCC Standard

mg/kg = milligrams per kilogram

mg/L = milligrams per liter

Concentrations highlighted in yellow

⁽¹⁾ Soil samples were collected on October 10, 2016 and analyzed by Hall Environmental Analysis Laboratory in Albuquerque, New Mexico

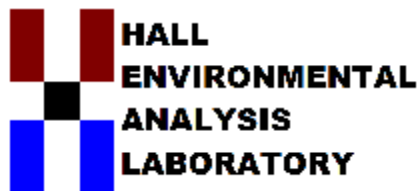
⁽²⁾ Soil samples were collected on April 27, 2017 and analyzed by Hall Environmental Analysis Laboratory in Albuquerque, New Mexico

⁽³⁾ Wastewater effluent sample was collected on August 10, 2016 and analyzed by Hall Environmental Analysis Laboratory in Albuquerque, New Mexico

⁽⁴⁾ Water Quality Control Commission Groundwater Standard for human health exposure (20.6.2 NMAC)

ATTACHMENT A

Laboratory Analytical Reports



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

December 05, 2016

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

RE: Effluent Release 8/10/16

OrderNo.: 1610723

Dear Robert Combs:

Hall Environmental Analysis Laboratory received 11 sample(s) on 10/14/2016 for the analyses presented in the following report.

This report is a revised report and it replaces the original report issued October 31, 2016.

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. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. All samples are reported as received unless otherwise indicated.

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

Sincerely,<<>>

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1610723**

Date Reported: **12/5/2016**

CLIENT: Navajo Refining Company

Client Sample ID: Test 1

Project: Effluent Release 8/10/16

Collection Date: 10/12/2016 8:27:00 AM

Lab ID: 1610723-001

Matrix: SOIL

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: LGT
Fluoride	1.4	0.30		mg/Kg	1	10/21/2016 2:58:57 PM
Chloride	27	1.5		mg/Kg	1	10/21/2016 2:58:57 PM
Sulfate	1300	30		mg/Kg	20	10/21/2016 3:36:12 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	22000	250		mg/Kg	100	10/18/2016 9:21:23 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1610723

Date Reported: 12/5/2016

CLIENT: Navajo Refining Company

Client Sample ID: Test 2

Project: Effluent Release 8/10/16

Collection Date: 10/12/2016 8:32:00 AM

Lab ID: 1610723-002

Matrix: SOIL

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: LGT
Fluoride	1.7	0.30		mg/Kg	1	10/21/2016 3:48:36 PM
Chloride	200	30		mg/Kg	20	10/21/2016 4:01:01 PM
Sulfate	3300	75		mg/Kg	50	10/25/2016 10:03:43 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	20000	240		mg/Kg	100	10/18/2016 9:22:56 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1610723

Date Reported: 12/5/2016

CLIENT: Navajo Refining Company

Client Sample ID: Test 3

Project: Effluent Release 8/10/16

Collection Date: 10/12/2016 8:37:00 AM

Lab ID: 1610723-003

Matrix: SOIL

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: LGT
Fluoride	1.8	0.30		mg/Kg	1	10/21/2016 4:13:25 PM
Chloride	640	30		mg/Kg	20	10/21/2016 4:25:50 PM
Sulfate	5200	75		mg/Kg	50	10/25/2016 10:16:08 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	23000	240		mg/Kg	100	10/18/2016 9:24:29 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1610723

Date Reported: 12/5/2016

CLIENT: Navajo Refining Company

Client Sample ID: Test 4

Project: Effluent Release 8/10/16

Collection Date: 10/12/2016 8:44:00 AM

Lab ID: 1610723-004

Matrix: SOIL

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: LGT
Fluoride	0.65	0.30		mg/Kg	1	10/21/2016 4:38:14 PM
Chloride	3100	150		mg/Kg	100	10/25/2016 10:28:33 PM
Sulfate	4800	150		mg/Kg	100	10/25/2016 10:28:33 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	27000	490		mg/Kg	200	10/18/2016 10:03:51 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1610723

Date Reported: 12/5/2016

CLIENT: Navajo Refining Company

Client Sample ID: Background 5

Project: Effluent Release 8/10/16

Collection Date: 10/12/2016 8:56:00 AM

Lab ID: 1610723-005

Matrix: SOIL

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: LGT
Fluoride	1.6	0.30		mg/Kg	1	10/21/2016 5:27:53 PM
Chloride	600	30		mg/Kg	20	10/21/2016 5:40:18 PM
Sulfate	2300	30		mg/Kg	20	10/21/2016 5:40:18 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	14000	250		mg/Kg	100	10/18/2016 9:27:36 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1610723

Date Reported: 12/5/2016

CLIENT: Navajo Refining Company

Client Sample ID: Background 6

Project: Effluent Release 8/10/16

Collection Date: 10/12/2016 9:01:00 AM

Lab ID: 1610723-006

Matrix: SOIL

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: MRA
Fluoride	3.2	0.30		mg/Kg	1	10/25/2016 12:56:59 PM
Chloride	400	30		mg/Kg	20	10/25/2016 1:34:13 PM
Sulfate	370	30		mg/Kg	20	10/25/2016 1:34:13 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	23000	250		mg/Kg	100	10/18/2016 9:29:09 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1610723

Date Reported: 12/5/2016

CLIENT: Navajo Refining Company

Client Sample ID: Background 7

Project: Effluent Release 8/10/16

Collection Date: 10/12/2016 9:08:00 AM

Lab ID: 1610723-007

Matrix: SOIL

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: MRA
Fluoride	0.80	0.30		mg/Kg	1	10/25/2016 1:46:37 PM
Chloride	7600	300		mg/Kg	200	10/26/2016 11:36:39 PM
Sulfate	780	30		mg/Kg	20	10/25/2016 1:59:02 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	27000	500		mg/Kg	200	10/18/2016 10:05:25 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1610723

Date Reported: 12/5/2016

CLIENT: Navajo Refining Company

Client Sample ID: Background 8

Project: Effluent Release 8/10/16

Collection Date: 10/12/2016 9:14:00 AM

Lab ID: 1610723-008

Matrix: SOIL

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: MRA
Fluoride	1.9	0.30		mg/Kg	1	10/25/2016 2:11:26 PM
Chloride	450	30		mg/Kg	20	10/25/2016 2:23:51 PM
Sulfate	3500	75		mg/Kg	50	10/26/2016 11:49:03 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	24000	250		mg/Kg	100	10/18/2016 9:37:54 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1610723**

Date Reported: **12/5/2016**

CLIENT: Navajo Refining Company

Client Sample ID: Test 3

Project: Effluent Release 8/10/16

Collection Date:

Lab ID: 1610723-009

Matrix: LEACHATE

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: LGT
Fluoride	0.53	0.10		mg/L	1	11/11/2016 6:35:12 PM
Sulfate	520	10	*	mg/L	20	11/10/2016 2:59:00 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1610723**

Date Reported: **12/5/2016**

CLIENT: Navajo Refining Company

Client Sample ID: Test 4

Project: Effluent Release 8/10/16

Collection Date:

Lab ID: 1610723-010

Matrix: LEACHATE

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: LGT
Chloride	150	10		mg/L	20	11/10/2016 3:48:38 AM
EPA 6010B: TOTAL RECOVERABLE METALS						Analyst: MED
Iron	ND	0.050		mg/L	1	11/13/2016 2:46:08 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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1610723

Date Reported: 12/5/2016

CLIENT: Navajo Refining Company

Client Sample ID: SPLP BLANK

Project: Effluent Release 8/10/16

Collection Date:

Lab ID: 1610723-011

Matrix: LEACHATE

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: LGT
Fluoride	ND	0.10		mg/L	1	11/10/2016 4:01:03 AM
Chloride	ND	0.50		mg/L	1	11/10/2016 4:01:03 AM
Sulfate	ND	0.50		mg/L	1	11/10/2016 4:01:03 AM
EPA 6010B: TOTAL RECOVERABLE METALS						Analyst: MED
Iron	ND	0.050		mg/L	1	11/13/2016 2:52:13 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
	R	RPD outside accepted recovery limits	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#: 1610723

05-Dec-16

Client: Navajo Refining Company

Project: Effluent Release 8/10/16

Sample ID	MB-28232		SampType: MBLK		TestCode: EPA Method 300.0: Anions					
Client ID:	PBS		Batch ID: 28232		RunNo: 38151					
Prep Date:	10/21/2016		Analysis Date: 10/21/2016		SeqNo: 1190570		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.30								
Chloride	ND	1.5								
Sulfate	ND	1.5								

Sample ID	LCS-28232		SampType: LCS		TestCode: EPA Method 300.0: Anions					
Client ID:	LCSS		Batch ID: 28232		RunNo: 38151					
Prep Date:	10/21/2016		Analysis Date: 10/21/2016		SeqNo: 1190571		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	1.6	0.30	1.500	0	106	90	110			
Chloride	14	1.5	15.00	0	94.3	90	110			
Sulfate	29	1.5	30.00	0	96.3	90	110			

Sample ID	1610723-001AMS		SampType: MS		TestCode: EPA Method 300.0: Anions					
Client ID:	Test 1		Batch ID: 28232		RunNo: 38151					
Prep Date:	10/21/2016		Analysis Date: 10/21/2016		SeqNo: 1190594		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	1.5	0.30	1.500	1.352	8.14	15	110			S
Chloride	47	1.5	15.00	26.77	138	70.8	119			S

Sample ID	1610723-001AMSD		SampType: MSD		TestCode: EPA Method 300.0: Anions					
Client ID:	Test 1		Batch ID: 28232		RunNo: 38151					
Prep Date:	10/21/2016		Analysis Date: 10/21/2016		SeqNo: 1190595		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	1.3	0.30	1.500	1.352	-1.32	15	110	10.1	20	S
Chloride	47	1.5	15.00	26.77	138	70.8	119	0.00989	20	S

Sample ID	MB-28251	SampType: mblk			TestCode: EPA Method 300.0: Anions					
Client ID:	PBS	Batch ID: 28251			RunNo: 38161					
Prep Date:	10/24/2016	Analysis Date: 10/24/2016			SeqNo: 1191020		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.30								
Chloride	ND	1.5								
Sulfate	ND	1.5								

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1610723

05-Dec-16

Client: Navajo Refining Company

Project: Effluent Release 8/10/16

Sample ID	LCS-28251		SampType: lcs			TestCode: EPA Method 300.0: Anions					
Client ID:	LCSS		Batch ID: 28251			RunNo: 38161					
Prep Date:	10/24/2016		Analysis Date: 10/24/2016			SeqNo: 1191021		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Fluoride	1.5	0.30	1.500	0	103	90	110				
Chloride	14	1.5	15.00	0	96.6	90	110				
Sulfate	29	1.5	30.00	0	97.9	90	110				

Sample ID	1610723-006AMS		SampType: MS			TestCode: EPA Method 300.0: Anions					
Client ID:	Background 6		Batch ID: 28251			RunNo: 38187					
Prep Date:	10/24/2016		Analysis Date: 10/25/2016			SeqNo: 1193030		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Fluoride	3.5	0.30	1.500	3.210	21.9	15	110				

Sample ID	1610723-006AMSD		SampType: MSD			TestCode: EPA Method 300.0: Anions					
Client ID:	Background 6		Batch ID: 28251			RunNo: 38187					
Prep Date:	10/24/2016		Analysis Date: 10/25/2016			SeqNo: 1193031		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Fluoride	3.4	0.30	1.500	3.210	9.98	15	110	5.17	20	S	

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1610723

05-Dec-16

Client: Navajo Refining Company

Project: Effluent Release 8/10/16

Sample ID	MB	SampType: MBLK			TestCode: EPA Method 300.0: Anions						
Client ID:	PBW	Batch ID: A38595			RunNo: 38595						
Prep Date:		Analysis Date: 11/9/2016			SeqNo: 1205622		Units: mg/L				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride		ND	0.50								
Sulfate		ND	0.50								

Sample ID	LCS	SampType: LCS			TestCode: EPA Method 300.0: Anions						
Client ID:	LCSW	Batch ID: A38595			RunNo: 38595						
Prep Date:		Analysis Date: 11/9/2016			SeqNo: 1205623		Units: mg/L				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride		4.8	0.50	5.000	0	96.0	90	110			
Sulfate		9.8	0.50	10.00	0	97.7	90	110			

Sample ID	MB	SampType: MBLK			TestCode: EPA Method 300.0: Anions						
Client ID:	PBW	Batch ID: R38671			RunNo: 38671						
Prep Date:		Analysis Date: 11/11/2016			SeqNo: 1207765		Units: mg/L				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride		ND	0.10								

Sample ID	LCS	SampType:	LCS	TestCode:	EPA Method 300.0: Anions						
Client ID:	LCSW	Batch ID:	R38671	RunNo:	38671						
Prep Date:		Analysis Date:	11/11/2016	SeqNo:	1207766	Units:	mg/L				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride		0.54	0.10	0.5000	0	108	90	110			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1610723

05-Dec-16

Client: Navajo Refining Company

Project: Effluent Release 8/10/16

Sample ID	MB-28097		SampType: MBLK		TestCode: EPA Method 6010B: Soil Metals					
Client ID:	PBS		Batch ID: 28097		RunNo: 38014					
Prep Date:	10/17/2016		Analysis Date: 10/18/2016		SeqNo: 1185141		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	ND	2.5								

Sample ID	LCS-28097		SampType: LCS		TestCode: EPA Method 6010B: Soil Metals					
Client ID:	LCSS		Batch ID: 28097		RunNo: 38014					
Prep Date:	10/17/2016		Analysis Date: 10/18/2016		SeqNo: 1185142		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	25	2.5	25.00	0	101	80	120			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1610723

05-Dec-16

Client: Navajo Refining Company

Project: Effluent Release 8/10/16

Sample ID	MB-28558		SampType: MBLK		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	PBW		Batch ID: 28558		RunNo: 38660					
Prep Date:	11/10/2016		Analysis Date: 11/13/2016		SeqNo: 1207448		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	ND	0.050								

Sample ID	LCS-28558		SampType: LCS		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	LCSW		Batch ID: 28558		RunNo: 38660					
Prep Date:	11/10/2016		Analysis Date: 11/13/2016		SeqNo: 1207452		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	0.48	0.050	0.5000	0	96.8	80	120			

Sample ID	1610723-010BMS		SampType: MS		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	Test 4		Batch ID: 28558		RunNo: 38660					
Prep Date:	11/10/2016		Analysis Date: 11/13/2016		SeqNo: 1207457		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	0.50	0.050	0.5000	0.008830	97.5	75	125			

Sample ID	1610723-010BMSD		SampType:	MSD		TestCode:	EPA 6010B: Total Recoverable Metals				
Client ID:	Test 4		Batch ID:	28558		RunNo:	38660				
Prep Date:	11/10/2016		Analysis Date:	11/13/2016		SeqNo:	1207458		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Iron	0.49	0.050	0.5000	0.008830	95.6	75	125	1.95	20		

Qualifiers:

* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

Sample Log-In Check List

Client Name: **NAVAJO REFINING CO**

Work Order Number: **1610723**

RcptNo: **1**

Received by/date:

AS *10/14/16*

Logged By:

Michelle Garcia
10/14/2016 8:45:00 AM
Michelle Garcia

Completed By:

Michelle Garcia
10/14/2016 1:12:57 PM
Michelle Garcia

Reviewed By:

[Signature] *10/14/16*

Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☒
2. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
3. How was the sample delivered? UPS

Log In

4. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
5. Were all samples received at a temperature of -20°C to 6.0°C ? Yes ☒ No ☐ NA ☐
6. Sample(s) in proper container(s)? Yes ☒ No ☐
7. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
8. Are samples (except VOA and ONG) properly preserved? Yes ☒ No ☐
9. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
10. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☒
11. Were any sample containers received broken? Yes ☐ No ☒
12. Does paperwork match bottle labels?
(Note discrepancies on chain of custody) Yes ☒ No ☐
13. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
14. Is it clear what analyses were requested? Yes ☒ No ☐
15. Were all holding times able to be met?
(If no, notify customer for authorization.) Yes ☒ No ☐

of preserved
bottles checked
for pH:

(<2 or >12 unless noted)

Adjusted?

Checked by:

Special Handling (if applicable)

16. 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:

17. Additional remarks:

18. Cooler Information

Cooler No	Temp $^{\circ}\text{C}$	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	4.7	Good	Yes			



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

August 22, 2016

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

RE: Waste Water Effluent

OrderNo.: 1608660

Dear Robert Combs:

Hall Environmental Analysis Laboratory received 2 sample(s) on 8/11/2016 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,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1608660**

Date Reported: **8/22/2016**

CLIENT: Navajo Refining Company

Client Sample ID: Wastewater Effluent 8-10-16

Project: Waste Water Effluent

Collection Date: 8/10/2016 10:55:00 AM

Lab ID: 1608660-001

Matrix: AQUEOUS

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
IGNITABILITY METHOD 1010							Analyst: SUB
Ignitability	>200	0		°F	1	8/17/2016	R36648
SULFIDE, REACTIVE							Analyst: SUB
Reactive Sulfide	ND	0.20		mg/L	1	8/17/2016	R36648
SPECIFIC GRAVITY							Analyst: LGT
Specific Gravity	1.002	0			1	8/15/2016 4:29:00 PM	R36512
EPA METHOD 300.0: ANIONS							Analyst: MRA
Fluoride	13	0.50	*	mg/L	5	8/11/2016 3:26:00 PM	R36408
Chloride	320	10		mg/L	20	8/11/2016 3:38:24 PM	R36408
Nitrogen, Nitrite (As N)	0.96	0.50		mg/L	5	8/11/2016 3:26:00 PM	R36408
Bromide	1.6	0.50		mg/L	5	8/11/2016 3:26:00 PM	R36408
Nitrogen, Nitrate (As N)	ND	0.50		mg/L	5	8/11/2016 3:26:00 PM	R36408
Phosphorus, Orthophosphate (As P)	ND	2.5		mg/L	5	8/11/2016 3:26:00 PM	R36408
Sulfate	1500	25		mg/L	50	8/18/2016 2:24:04 AM	R36593
SM2510B: SPECIFIC CONDUCTANCE							Analyst: JRR
Conductivity	4400	1.0		µmhos/cm	1	8/15/2016 3:14:28 PM	R36527
SM2320B: ALKALINITY							Analyst: JRR
Bicarbonate (As CaCO3)	289.3	20.00		mg/L CaCO3	1	8/15/2016 4:49:30 PM	R36527
Carbonate (As CaCO3)	ND	2.000		mg/L CaCO3	1	8/15/2016 4:49:30 PM	R36527
Total Alkalinity (as CaCO3)	289.3	20.00		mg/L CaCO3	1	8/15/2016 4:49:30 PM	R36527
SM2540C MOD: TOTAL DISSOLVED SOLIDS							Analyst: KS
Total Dissolved Solids	2800	40.0	*	mg/L	1	8/16/2016 8:21:00 AM	26968
CORROSIVITY							Analyst: SUB
pH	6.99			pH Units	1	8/17/2016	R36648
CYANIDE, REACTIVE							Analyst: SUB
Cyanide, Reactive	0.120	0.0100		mg/L	1	8/16/2016	R36648
SM4500-H+B: PH							Analyst: JRR
pH	7.49	1.68	H	pH units	1	8/15/2016 3:14:28 PM	R36527
EPA METHOD 7470: MERCURY							Analyst: pmf
Mercury	ND	0.00020		mg/L	1	8/12/2016 11:14:45 AM	26894
MERCURY, TCLP							Analyst: pmf
Mercury	ND	0.020		mg/L	1	8/17/2016 10:49:54 AM	27020
EPA 6010B: TOTAL RECOVERABLE METALS							Analyst: MED
Aluminum	0.26	0.020		mg/L	1	8/18/2016 5:02:57 PM	26942

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1608660**

Date Reported: **8/22/2016**

CLIENT: Navajo Refining Company

Client Sample ID: Wastewater Effluent 8-10-16

Project: Waste Water Effluent

Collection Date: 8/10/2016 10:55:00 AM

Lab ID: 1608660-001

Matrix: AQUEOUS

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA 6010B: TOTAL RECOVERABLE METALS				Analyst: MED			
Antimony	ND	0.050		mg/L	1	8/19/2016 10:36:34 AM	26942
Arsenic	0.031	0.020		mg/L	1	8/18/2016 5:02:57 PM	26942
Barium	ND	0.020		mg/L	1	8/18/2016 5:02:57 PM	26942
Beryllium	ND	0.0030		mg/L	1	8/18/2016 5:02:57 PM	26942
Cadmium	ND	0.0020		mg/L	1	8/18/2016 5:02:57 PM	26942
Calcium	130	5.0		mg/L	5	8/18/2016 5:10:17 PM	26942
Chromium	ND	0.0060		mg/L	1	8/18/2016 5:02:57 PM	26942
Cobalt	ND	0.0060		mg/L	1	8/18/2016 5:02:57 PM	26942
Copper	ND	0.0060		mg/L	1	8/18/2016 5:02:57 PM	26942
Iron	2.4	0.25		mg/L	5	8/18/2016 5:10:17 PM	26942
Lead	ND	0.0050		mg/L	1	8/18/2016 5:02:57 PM	26942
Magnesium	41	1.0		mg/L	1	8/18/2016 5:02:57 PM	26942
Manganese	0.15	0.0020		mg/L	1	8/18/2016 5:02:57 PM	26942
Nickel	0.010	0.010		mg/L	1	8/18/2016 5:02:57 PM	26942
Potassium	60	5.0		mg/L	5	8/18/2016 5:10:17 PM	26942
Selenium	ND	0.050		mg/L	1	8/18/2016 5:02:57 PM	26942
Silver	ND	0.0050		mg/L	1	8/18/2016 5:02:57 PM	26942
Sodium	630	10		mg/L	10	8/18/2016 5:21:39 PM	26942
Strontium	1.9	0.10		mg/L	10	8/18/2016 5:21:39 PM	26942
Thallium	ND	0.050		mg/L	1	8/18/2016 5:02:57 PM	26942
Zinc	0.025	0.020		mg/L	1	8/18/2016 5:02:57 PM	26942
Silica	14	5.4		mg/L	5	8/18/2016 5:10:17 PM	26942
EPA 6010B: TCLP METALS				Analyst: MED			
Arsenic	ND	5.0		mg/L	1	8/15/2016 1:30:42 PM	26961
Barium	ND	100		mg/L	1	8/15/2016 1:30:42 PM	26961
Cadmium	ND	1.0		mg/L	1	8/15/2016 1:30:42 PM	26961
Chromium	ND	5.0		mg/L	1	8/15/2016 1:30:42 PM	26961
Lead	ND	5.0		mg/L	1	8/15/2016 1:30:42 PM	26961
Selenium	ND	1.0		mg/L	1	8/15/2016 1:30:42 PM	26961
Silver	ND	5.0		mg/L	1	8/15/2016 1:30:42 PM	26961
EPA METHOD 8260B: VOLATILES				Analyst: SUB			
Acetonitrile	ND	2.5		µg/L	1	8/12/2016	R36648
Allyl chloride	ND	2.5		µg/L	1	8/12/2016	R36648
Chloroprene	ND	2.5		µg/L	1	8/12/2016	R36648
Cyclohexane	ND	2.5		µg/L	1	8/12/2016	R36648
Diethyl ether	ND	2.5		µg/L	1	8/12/2016	R36648
Diisopropyl ether	ND	2.5		µg/L	1	8/12/2016	R36648
Epichlorohydrin	ND	25		µg/L	1	8/12/2016	R36648

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1608660**

Date Reported: **8/22/2016**

CLIENT: Navajo Refining Company

Client Sample ID: Wastewater Effluent 8-10-16

Project: Waste Water Effluent

Collection Date: 8/10/2016 10:55:00 AM

Lab ID: 1608660-001

Matrix: AQUEOUS

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
Ethyl acetate	ND	2.5		µg/L	1	8/12/2016	R36648
Ethyl methacrylate	ND	12		µg/L	1	8/12/2016	R36648
Ethyl tert-butyl ether	ND	2.5		µg/L	1	8/12/2016	R36648
Freon-113	ND	2.5		µg/L	1	8/12/2016	R36648
Isobutanol	ND	50		µg/L	1	8/12/2016	R36648
Isopropyl acetate	ND	2.5		µg/L	1	8/12/2016	R36648
Methacrylonitrile	ND	12		µg/L	1	8/12/2016	R36648
Methyl acetate	ND	2.5		µg/L	1	8/12/2016	R36648
Methyl ethyl ketone	ND	12		µg/L	1	8/12/2016	R36648
Methyl isobutyl ketone	ND	12		µg/L	1	8/12/2016	R36648
Methyl methacrylate	ND	12		µg/L	1	8/12/2016	R36648
Methylcyclohexane	ND	5.0		µg/L	1	8/12/2016	R36648
n-Amyl acetate	ND	2.5		µg/L	1	8/12/2016	R36648
n-Hexane	ND	2.5		µg/L	1	8/12/2016	R36648
Nitrobenzene	ND	25		µg/L	1	8/12/2016	R36648
Pentachloroethane	ND	25		µg/L	1	8/12/2016	R36648
p-isopropyltoluene	ND	2.5		µg/L	1	8/12/2016	R36648
Propionitrile	ND	12		µg/L	1	8/12/2016	R36648
Tetrahydrofuran	ND	2.5		µg/L	1	8/12/2016	R36648
Benzene	ND	2.5		µg/L	1	8/12/2016	R36648
Toluene	12	2.5		µg/L	1	8/12/2016	R36648
Ethylbenzene	ND	2.5		µg/L	1	8/12/2016	R36648
Methyl tert-butyl ether (MTBE)	ND	50		µg/L	1	8/12/2016	R36648
1,2,4-Trimethylbenzene	2.8	2.5		µg/L	1	8/12/2016	R36648
1,3,5-Trimethylbenzene	4.5	2.5		µg/L	1	8/12/2016	R36648
1,2-Dichloroethane (EDC)	ND	2.5		µg/L	1	8/12/2016	R36648
1,2-Dibromoethane (EDB)	ND	2.5		µg/L	1	8/12/2016	R36648
Naphthalene	ND	2.5		µg/L	1	8/12/2016	R36648
Acetone	350	12		µg/L	1	8/12/2016	R36648
Bromobenzene	ND	2.5		µg/L	1	8/12/2016	R36648
Bromodichloromethane	ND	2.5		µg/L	1	8/12/2016	R36648
Bromoform	ND	2.5		µg/L	1	8/12/2016	R36648
Bromomethane	ND	2.5		µg/L	1	8/12/2016	R36648
2-Butanone	47	12		µg/L	1	8/12/2016	R36648
Carbon disulfide	ND	2.5		µg/L	1	8/12/2016	R36648
Carbon Tetrachloride	ND	2.5		µg/L	1	8/12/2016	R36648
Chlorobenzene	ND	2.5		µg/L	1	8/12/2016	R36648
Chloroethane	ND	2.5		µg/L	1	8/12/2016	R36648
Chloroform	ND	2.5		µg/L	1	8/12/2016	R36648

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1608660

Date Reported: 8/22/2016

CLIENT: Navajo Refining Company

Client Sample ID: Wastewater Effluent 8-10-16

Project: Waste Water Effluent

Collection Date: 8/10/2016 10:55:00 AM

Lab ID: 1608660-001

Matrix: AQUEOUS

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
Chloromethane	ND	2.5		µg/L	1	8/12/2016	R36648
2-Chlorotoluene	ND	2.5		µg/L	1	8/12/2016	R36648
4-Chlorotoluene	ND	2.5		µg/L	1	8/12/2016	R36648
cis-1,2-DCE	ND	2.5		µg/L	1	8/12/2016	R36648
cis-1,3-Dichloropropene	ND	2.5		µg/L	1	8/12/2016	R36648
1,2-Dibromo-3-chloropropane	ND	2.5		µg/L	1	8/12/2016	R36648
Dibromochloromethane	ND	2.5		µg/L	1	8/12/2016	R36648
Dibromomethane	ND	2.5		µg/L	1	8/12/2016	R36648
1,2-Dichlorobenzene	ND	2.5		µg/L	1	8/12/2016	R36648
1,3-Dichlorobenzene	ND	2.5		µg/L	1	8/12/2016	R36648
1,4-Dichlorobenzene	ND	2.5		µg/L	1	8/12/2016	R36648
Dichlorodifluoromethane	ND	2.5		µg/L	1	8/12/2016	R36648
1,1-Dichloroethane	ND	2.5		µg/L	1	8/12/2016	R36648
1,1-Dichloroethene	ND	2.5		µg/L	1	8/12/2016	R36648
1,2-Dichloropropane	ND	2.5		µg/L	1	8/12/2016	R36648
1,3-Dichloropropane	ND	2.5		µg/L	1	8/12/2016	R36648
2,2-Dichloropropane	ND	2.5		µg/L	1	8/12/2016	R36648
1,1-Dichloropropene	ND	2.5		µg/L	1	8/12/2016	R36648
Hexachlorobutadiene	ND	2.5		µg/L	1	8/12/2016	R36648
2-Hexanone	28	2.5		µg/L	1	8/12/2016	R36648
Isopropylbenzene	ND	2.5		µg/L	1	8/12/2016	R36648
Methylene Chloride	ND	12		µg/L	1	8/12/2016	R36648
n-Butylbenzene	ND	2.5		µg/L	1	8/12/2016	R36648
n-Propylbenzene	ND	2.5		µg/L	1	8/12/2016	R36648
sec-Butylbenzene	ND	2.5		µg/L	1	8/12/2016	R36648
Styrene	ND	2.5		µg/L	1	8/12/2016	R36648
tert-Butylbenzene	ND	2.5		µg/L	1	8/12/2016	R36648
1,1,1,2-Tetrachloroethane	ND	2.5		µg/L	1	8/12/2016	R36648
1,1,2,2-Tetrachloroethane	ND	2.5		µg/L	1	8/12/2016	R36648
Tetrachloroethene (PCE)	ND	2.5		µg/L	1	8/12/2016	R36648
trans-1,2-DCE	ND	2.5		µg/L	1	8/12/2016	R36648
trans-1,3-Dichloropropene	ND	2.5		µg/L	1	8/12/2016	R36648
1,2,3-Trichlorobenzene	ND	2.5		µg/L	1	8/12/2016	R36648
1,2,4-Trichlorobenzene	ND	2.5		µg/L	1	8/12/2016	R36648
1,1,1-Trichloroethane	ND	2.5		µg/L	1	8/12/2016	R36648
1,1,2-Trichloroethane	ND	2.5		µg/L	1	8/12/2016	R36648
Trichloroethene (TCE)	ND	2.5		µg/L	1	8/12/2016	R36648
Trichlorofluoromethane	ND	2.5		µg/L	1	8/12/2016	R36648
1,2,3-Trichloropropane	ND	2.5		µg/L	1	8/12/2016	R36648

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1608660

Date Reported: 8/22/2016

CLIENT: Navajo Refining Company

Client Sample ID: Wastewater Effluent 8-10-16

Project: Waste Water Effluent

Collection Date: 8/10/2016 10:55:00 AM

Lab ID: 1608660-001

Matrix: AQUEOUS

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
Vinyl chloride	ND	2.5		µg/L	1	8/12/2016	R36648
mp-Xylenes	ND	5.0		µg/L	1	8/12/2016	R36648
o-Xylene	ND	2.5		µg/L	1	8/12/2016	R36648
tert-Amyl methyl ether	ND	2.5		µg/L	1	8/12/2016	R36648
tert-Butyl alcohol	ND	2.5		µg/L	1	8/12/2016	R36648
Acrolein	ND	12		µg/L	1	8/12/2016	R36648
Acrylonitrile	ND	12		µg/L	1	8/12/2016	R36648
Bromochloromethane	ND	2.5		µg/L	1	8/12/2016	R36648
2-Chloroethyl vinyl ether	ND	2.5		µg/L	1	8/12/2016	R36648
Iodomethane	ND	2.5		µg/L	1	8/12/2016	R36648
trans-1,4-Dichloro-2-butene	ND	2.5		µg/L	1	8/12/2016	R36648
Vinyl acetate	ND	2.5		µg/L	1	8/12/2016	R36648
1,4-Dioxane	ND	100		µg/L	1	8/12/2016	R36648
Surr: 1,2-Dichlorobenzene-d4	101	70-130		%Rec	1	8/12/2016	R36648
Surr: 4-Bromofluorobenzene	99.6	70-130		%Rec	1	8/12/2016	R36648
Surr: Toluene-d8	102	70-130		%Rec	1	8/12/2016	R36648
EPA 8270C: SEMIVOLATILES/MOD							Analyst: SUB
1,1-Biphenyl	ND	5.0		µg/L	1	8/17/2016	R36648
Atrazine	ND	5.0		µg/L	1	8/17/2016	R36648
Benzaldehyde	ND	5.0		µg/L	1	8/17/2016	R36648
Caprolactam	ND	5.0		µg/L	1	8/17/2016	R36648
N-Nitroso-di-n-butylamine	ND	5.0		µg/L	1	8/17/2016	R36648
Acetophenone	ND	10		µg/L	1	8/17/2016	R36648
1-Methylnaphthalene	ND	10		µg/L	1	8/17/2016	R36648
2,3,4,6-Tetrachlorophenol	ND	10		µg/L	1	8/17/2016	R36648
2,4,5-Trichlorophenol	ND	10		µg/L	1	8/17/2016	R36648
2,4,6-Trichlorophenol	ND	10		µg/L	1	8/17/2016	R36648
2,4-Dichlorophenol	ND	10		µg/L	1	8/17/2016	R36648
2,4-Dimethylphenol	ND	10		µg/L	1	8/17/2016	R36648
2,4-Dinitrophenol	ND	10		µg/L	1	8/17/2016	R36648
2,4-Dinitrotoluene	ND	10		µg/L	1	8/17/2016	R36648
2,6-Dinitrotoluene	ND	10		µg/L	1	8/17/2016	R36648
2-Chloronaphthalene	ND	10		µg/L	1	8/17/2016	R36648
2-Chlorophenol	ND	10		µg/L	1	8/17/2016	R36648
2-Methylnaphthalene	ND	10		µg/L	1	8/17/2016	R36648
2-Methylphenol	ND	10		µg/L	1	8/17/2016	R36648
2-Nitroaniline	ND	10		µg/L	1	8/17/2016	R36648
2-Nitrophenol	ND	10		µg/L	1	8/17/2016	R36648
3,3'-Dichlorobenzidine	ND	10		µg/L	1	8/17/2016	R36648

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1608660

Date Reported: 8/22/2016

CLIENT: Navajo Refining Company

Client Sample ID: Wastewater Effluent 8-10-16

Project: Waste Water Effluent

Collection Date: 8/10/2016 10:55:00 AM

Lab ID: 1608660-001

Matrix: AQUEOUS

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA 8270C: SEMIVOLATILES/MOD							Analyst: SUB
3-Nitroaniline	ND	10		µg/L	1	8/17/2016	R36648
4,6-Dinitro-2-methylphenol	ND	10		µg/L	1	8/17/2016	R36648
4-Bromophenyl phenyl ether	ND	10		µg/L	1	8/17/2016	R36648
4-Chloro-3-methylphenol	ND	10		µg/L	1	8/17/2016	R36648
4-Chloroaniline	ND	10		µg/L	1	8/17/2016	R36648
4-Chlorophenyl phenyl ether	ND	10		µg/L	1	8/17/2016	R36648
4-Nitroaniline	ND	10		µg/L	1	8/17/2016	R36648
4-Nitrophenol	ND	10		µg/L	1	8/17/2016	R36648
Acenaphthene	ND	10		µg/L	1	8/17/2016	R36648
Acenaphthylene	ND	10		µg/L	1	8/17/2016	R36648
Anthracene	ND	10		µg/L	1	8/17/2016	R36648
Benzo(g,h,i)perylene	ND	10		µg/L	1	8/17/2016	R36648
Benz(a)anthracene	ND	0.20		µg/L	1	8/17/2016	R36648
Benzo(a)pyrene	ND	0.20		µg/L	1	8/17/2016	R36648
Benzo(b)fluoranthene	ND	0.20		µg/L	1	8/17/2016	R36648
Benzo(k)fluoranthene	ND	0.20		µg/L	1	8/17/2016	R36648
Bis(2-chloroethoxy)methane	ND	10		µg/L	1	8/17/2016	R36648
Bis(2-chloroethyl)ether	ND	10		µg/L	1	8/17/2016	R36648
Bis(2-chloroisopropyl)ether	ND	10		µg/L	1	8/17/2016	R36648
Bis(2-ethylhexyl)phthalate	ND	10		µg/L	1	8/17/2016	R36648
Butyl benzyl phthalate	ND	10		µg/L	1	8/17/2016	R36648
Carbazole	ND	10		µg/L	1	8/17/2016	R36648
Chrysene	ND	0.20		µg/L	1	8/17/2016	R36648
Dibenz(a,h)anthracene	ND	0.20		µg/L	1	8/17/2016	R36648
Dibenzofuran	ND	10		µg/L	1	8/17/2016	R36648
Diethyl phthalate	ND	10		µg/L	1	8/17/2016	R36648
Dimethyl phthalate	ND	10		µg/L	1	8/17/2016	R36648
Di-n-butyl phthalate	ND	10		µg/L	1	8/17/2016	R36648
Di-n-octyl phthalate	ND	10		µg/L	1	8/17/2016	R36648
Fluoranthene	ND	10		µg/L	1	8/17/2016	R36648
Fluorene	ND	10		µg/L	1	8/17/2016	R36648
Hexachlorobenzene	ND	2.0		µg/L	1	8/17/2016	R36648
Hexachlorobutadiene	ND	10		µg/L	1	8/17/2016	R36648
Hexachlorocyclopentadiene	ND	10		µg/L	1	8/17/2016	R36648
Hexachloroethane	ND	10		µg/L	1	8/17/2016	R36648
Indeno(1,2,3-cd)pyrene	ND	0.20		µg/L	1	8/17/2016	R36648
Isophorone	ND	10		µg/L	1	8/17/2016	R36648
Naphthalene	ND	10		µg/L	1	8/17/2016	R36648
Nitrobenzene	ND	10		µg/L	1	8/17/2016	R36648

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1608660**

Date Reported: **8/22/2016**

CLIENT: Navajo Refining Company

Client Sample ID: Wastewater Effluent 8-10-16

Project: Waste Water Effluent

Collection Date: 8/10/2016 10:55:00 AM

Lab ID: 1608660-001

Matrix: AQUEOUS

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA 8270C: SEMIVOLATILES/MOD							Analyst: SUB
N-Nitrosodi-n-propylamine	ND	4.0		µg/L	1	8/17/2016	R36648
N-Nitrosodiphenylamine	ND	10		µg/L	1	8/17/2016	R36648
Pentachlorophenol	ND	10		µg/L	1	8/17/2016	R36648
Phenanthrene	ND	10		µg/L	1	8/17/2016	R36648
Phenol	ND	10		µg/L	1	8/17/2016	R36648
Pyrene	ND	10		µg/L	1	8/17/2016	R36648
o-Toluidine	ND	4.0		µg/L	1	8/17/2016	R36648
Pyridine	ND	10		µg/L	1	8/17/2016	R36648
1,2,4,5-Tetrachlorobenzene	ND	10		µg/L	1	8/17/2016	R36648
Surr: 2,4,6-Tribromophenol	90.0	63-110		%Rec	1	8/17/2016	R36648
Surr: 2-Fluorobiphenyl	60.4	58-112		%Rec	1	8/17/2016	R36648
Surr: 2-Fluorophenol	69.0	47-109		%Rec	1	8/17/2016	R36648
Surr: Nitrobenzene-d5	72.0	58-110		%Rec	1	8/17/2016	R36648
Surr: Phenol-d5	67.8	52-105		%Rec	1	8/17/2016	R36648
Surr: Terphenyl-d14	28.7	22-133		%Rec	1	8/17/2016	R36648

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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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1608660

Date Reported: 8/22/2016

CLIENT: Navajo Refining Company

Client Sample ID: TRIP BLANK

Project: Waste Water Effluent

Collection Date:

Lab ID: 1608660-002

Matrix: TRIP BLANK

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
Acetonitrile	ND	0.50		µg/L	1	8/12/2016	R36648
Allyl chloride	ND	0.50		µg/L	1	8/12/2016	R36648
Chloroprene	ND	0.50		µg/L	1	8/12/2016	R36648
Cyclohexane	ND	0.50		µg/L	1	8/12/2016	R36648
Diethyl ether	ND	0.50		µg/L	1	8/12/2016	R36648
Diisopropyl ether	ND	0.50		µg/L	1	8/12/2016	R36648
Epichlorohydrin	ND	5.0		µg/L	1	8/12/2016	R36648
Ethyl acetate	ND	0.50		µg/L	1	8/12/2016	R36648
Ethyl methacrylate	ND	2.5		µg/L	1	8/12/2016	R36648
Ethyl tert-butyl ether	ND	0.50		µg/L	1	8/12/2016	R36648
Freon-113	ND	0.50		µg/L	1	8/12/2016	R36648
Isobutanol	ND	10		µg/L	1	8/12/2016	R36648
Isopropyl acetate	ND	0.50		µg/L	1	8/12/2016	R36648
Methacrylonitrile	ND	2.5		µg/L	1	8/12/2016	R36648
Methyl acetate	ND	0.50		µg/L	1	8/12/2016	R36648
Methyl ethyl ketone	ND	2.5		µg/L	1	8/12/2016	R36648
Methyl isobutyl ketone	ND	2.5		µg/L	1	8/12/2016	R36648
Methyl methacrylate	ND	2.5		µg/L	1	8/12/2016	R36648
Methylcyclohexane	ND	1.0		µg/L	1	8/12/2016	R36648
n-Amyl acetate	ND	0.50		µg/L	1	8/12/2016	R36648
n-Hexane	ND	0.50		µg/L	1	8/12/2016	R36648
Nitrobenzene	ND	5.0		µg/L	1	8/12/2016	R36648
Pentachloroethane	ND	5.0		µg/L	1	8/12/2016	R36648
p-isopropyltoluene	ND	0.50		µg/L	1	8/12/2016	R36648
Propionitrile	ND	2.5		µg/L	1	8/12/2016	R36648
Tetrahydrofuran	ND	0.50		µg/L	1	8/12/2016	R36648
Benzene	ND	0.50		µg/L	1	8/12/2016	R36648
Toluene	ND	0.50		µg/L	1	8/12/2016	R36648
Ethylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
Methyl tert-butyl ether (MTBE)	ND	10		µg/L	1	8/12/2016	R36648
1,2,4-Trimethylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
1,3,5-Trimethylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
1,2-Dichloroethane (EDC)	ND	0.50		µg/L	1	8/12/2016	R36648
1,2-Dibromoethane (EDB)	ND	0.50		µg/L	1	8/12/2016	R36648
Naphthalene	ND	0.50		µg/L	1	8/12/2016	R36648
Acetone	ND	2.5		µg/L	1	8/12/2016	R36648
Bromobenzene	ND	0.50		µg/L	1	8/12/2016	R36648
Bromodichloromethane	ND	0.50		µg/L	1	8/12/2016	R36648
Bromoform	ND	0.50		µg/L	1	8/12/2016	R36648

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1608660

Date Reported: 8/22/2016

CLIENT: Navajo Refining Company

Client Sample ID: TRIP BLANK

Project: Waste Water Effluent

Collection Date:

Lab ID: 1608660-002

Matrix: TRIP BLANK

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
Bromomethane	ND	0.50		µg/L	1	8/12/2016	R36648
2-Butanone	ND	2.5		µg/L	1	8/12/2016	R36648
Carbon disulfide	ND	0.50		µg/L	1	8/12/2016	R36648
Carbon Tetrachloride	ND	0.50		µg/L	1	8/12/2016	R36648
Chlorobenzene	ND	0.50		µg/L	1	8/12/2016	R36648
Chloroethane	ND	0.50		µg/L	1	8/12/2016	R36648
Chloroform	ND	0.50		µg/L	1	8/12/2016	R36648
Chloromethane	ND	0.50		µg/L	1	8/12/2016	R36648
2-Chlorotoluene	ND	0.50		µg/L	1	8/12/2016	R36648
4-Chlorotoluene	ND	0.50		µg/L	1	8/12/2016	R36648
cis-1,2-DCE	ND	0.50		µg/L	1	8/12/2016	R36648
cis-1,3-Dichloropropene	ND	0.50		µg/L	1	8/12/2016	R36648
1,2-Dibromo-3-chloropropane	ND	0.50		µg/L	1	8/12/2016	R36648
Dibromochloromethane	ND	0.50		µg/L	1	8/12/2016	R36648
Dibromomethane	ND	0.50		µg/L	1	8/12/2016	R36648
1,2-Dichlorobenzene	ND	0.50		µg/L	1	8/12/2016	R36648
1,3-Dichlorobenzene	ND	0.50		µg/L	1	8/12/2016	R36648
1,4-Dichlorobenzene	ND	0.50		µg/L	1	8/12/2016	R36648
Dichlorodifluoromethane	ND	0.50		µg/L	1	8/12/2016	R36648
1,1-Dichloroethane	ND	0.50		µg/L	1	8/12/2016	R36648
1,1-Dichloroethene	ND	0.50		µg/L	1	8/12/2016	R36648
1,2-Dichloropropane	ND	0.50		µg/L	1	8/12/2016	R36648
1,3-Dichloropropane	ND	0.50		µg/L	1	8/12/2016	R36648
2,2-Dichloropropane	ND	0.50		µg/L	1	8/12/2016	R36648
1,1-Dichloropropene	ND	0.50		µg/L	1	8/12/2016	R36648
Hexachlorobutadiene	ND	0.50		µg/L	1	8/12/2016	R36648
2-Hexanone	ND	0.50		µg/L	1	8/12/2016	R36648
Isopropylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
Methylene Chloride	ND	2.5		µg/L	1	8/12/2016	R36648
n-Butylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
n-Propylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
sec-Butylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
Styrene	ND	0.50		µg/L	1	8/12/2016	R36648
tert-Butylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
1,1,1,2-Tetrachloroethane	ND	0.50		µg/L	1	8/12/2016	R36648
1,1,2,2-Tetrachloroethane	ND	0.50		µg/L	1	8/12/2016	R36648
Tetrachloroethene (PCE)	ND	0.50		µg/L	1	8/12/2016	R36648
trans-1,2-DCE	ND	0.50		µg/L	1	8/12/2016	R36648
trans-1,3-Dichloropropene	ND	0.50		µg/L	1	8/12/2016	R36648

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1608660

Date Reported: 8/22/2016

CLIENT: Navajo Refining Company

Client Sample ID: TRIP BLANK

Project: Waste Water Effluent

Collection Date:

Lab ID: 1608660-002

Matrix: TRIP BLANK

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
1,2,3-Trichlorobenzene	ND	0.50		µg/L	1	8/12/2016	R36648
1,2,4-Trichlorobenzene	ND	0.50		µg/L	1	8/12/2016	R36648
1,1,1-Trichloroethane	ND	0.50		µg/L	1	8/12/2016	R36648
1,1,2-Trichloroethane	ND	0.50		µg/L	1	8/12/2016	R36648
Trichloroethene (TCE)	ND	0.50		µg/L	1	8/12/2016	R36648
Trichlorofluoromethane	ND	0.50		µg/L	1	8/12/2016	R36648
1,2,3-Trichloropropane	ND	0.50		µg/L	1	8/12/2016	R36648
Vinyl chloride	ND	0.50		µg/L	1	8/12/2016	R36648
mp-Xylenes	ND	1.0		µg/L	1	8/12/2016	R36648
o-Xylene	ND	0.50		µg/L	1	8/12/2016	R36648
tert-Amyl methyl ether	ND	0.50		µg/L	1	8/12/2016	R36648
tert-Butyl alcohol	ND	0.50		µg/L	1	8/12/2016	R36648
Acrolein	ND	2.5		µg/L	1	8/12/2016	R36648
Acrylonitrile	ND	2.5		µg/L	1	8/12/2016	R36648
Bromochloromethane	ND	0.50		µg/L	1	8/12/2016	R36648
2-Chloroethyl vinyl ether	ND	0.50		µg/L	1	8/12/2016	R36648
Iodomethane	ND	0.50		µg/L	1	8/12/2016	R36648
trans-1,4-Dichloro-2-butene	ND	0.50		µg/L	1	8/12/2016	R36648
Vinyl acetate	ND	0.50		µg/L	1	8/12/2016	R36648
1,4-Dioxane	ND	20		µg/L	1	8/12/2016	R36648
Surr: 1,2-Dichlorobenzene-d4	101	70-130		%Rec	1	8/12/2016	R36648
Surr: 4-Bromofluorobenzene	96.4	70-130		%Rec	1	8/12/2016	R36648
Surr: Toluene-d8	101	70-130		%Rec	1	8/12/2016	R36648

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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
	R	RPD outside accepted recovery limits	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#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID MB	SampType: mblk		TestCode: EPA Method 300.0: Anions							
Client ID: PBW	Batch ID: R36408		RunNo: 36408							
Prep Date:	Analysis Date: 8/11/2016		SeqNo: 1128954		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								
Bromide	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: R36408		RunNo: 36408							
Prep Date:	Analysis Date: 8/11/2016		SeqNo: 1128955		Units: mg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.52	0.10	0.5000	0	104	90	110			
Chloride	4.8	0.50	5.000	0	96.2	90	110			
Nitrogen, Nitrite (As N)	0.97	0.10	1.000	0	96.8	90	110			
Bromide	2.4	0.10	2.500	0	96.7	90	110			
Nitrogen, Nitrate (As N)	2.5	0.10	2.500	0	99.0	90	110			
Phosphorus, Orthophosphate (As P)	4.9	0.50	5.000	0	97.2	90	110			

Sample ID MB	SampType: mblk		TestCode: EPA Method 300.0: Anions							
Client ID: PBW	Batch ID: R36593		RunNo: 36593							
Prep Date:	Analysis Date: 8/17/2016		SeqNo: 1133301		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: R36593		RunNo: 36593							
Prep Date:	Analysis Date: 8/17/2016		SeqNo: 1133302		Units: mg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	9.7	0.50	10.00	0	97.0	90	110			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-R36648		SampType:	MBLK		TestCode:	EPA Method 8260B: VOLATILES			
Client ID:	PBW		Batch ID:	R36648		RunNo:	36648			
Prep Date:			Analysis Date:	8/12/2016		SeqNo:	1135033	Units:	µg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acetonitrile	ND	0.50								
Allyl chloride	ND	0.50								
Chloroprene	ND	0.50								
Cyclohexane	ND	0.50								
Diethyl ether	ND	0.50								
Diisopropyl ether	ND	0.50								
Epichlorohydrin	ND	0.50								
Ethyl acetate	ND	0.50								
Ethyl methacrylate	ND	2.5								
Ethyl tert-butyl ether	ND	0.50								
Freon-113	ND	0.50								
Isobutanol	ND	10								
Isopropyl acetate	ND	0.50								
Methacrylonitrile	ND	2.5								
Methyl acetate	ND	0.50								
Methyl ethyl ketone	ND	2.5								
Methyl isobutyl ketone	ND	2.5								
Methyl methacrylate	ND	2.5								
Methylcyclohexane	ND	0.50								
n-Amyl acetate	ND	0.50								
n-Hexane	ND	0.50								
Nitrobenzene	ND	0.50								
Pentachloroethane	ND	0.50								
p-isopropyltoluene	ND	0.50								
Propionitrile	ND	2.5								
Tetrahydrofuran	ND	0.50								
Benzene	ND	0.50								
Toluene	ND	0.50								
Ethylbenzene	ND	0.50								
Methyl tert-butyl ether (MTBE)	ND	0.50								
1,2,4-Trimethylbenzene	ND	0.50								
1,3,5-Trimethylbenzene	ND	0.50								
1,2-Dichloroethane (EDC)	ND	0.50								
1,2-Dibromoethane (EDB)	ND	0.50								
Naphthalene	ND	0.50								
Acetone	ND	2.5								
Bromobenzene	ND	0.50								
Bromodichloromethane	ND	0.50								
Bromoform	ND	0.50								

Qualifiers:

* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-R36648		SampType: MBLK		TestCode: EPA Method 8260B: VOLATILES					
Client ID:	PBW		Batch ID: R36648		RunNo: 36648					
Prep Date:			Analysis Date: 8/12/2016		SeqNo: 1135033		Units: µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Bromomethane	ND	0.50								
2-Butanone	ND	2.5								
Carbon disulfide	ND	0.50								
Carbon Tetrachloride	ND	0.50								
Chlorobenzene	ND	0.50								
Chloroethane	ND	0.50								
Chloroform	ND	0.50								
Chloromethane	ND	0.50								
2-Chlorotoluene	ND	0.50								
4-Chlorotoluene	ND	0.50								
cis-1,2-DCE	ND	0.50								
cis-1,3-Dichloropropene	ND	0.50								
1,2-Dibromo-3-chloropropane	ND	0.50								
Dibromochloromethane	ND	0.50								
Dibromomethane	ND	0.50								
1,2-Dichlorobenzene	ND	0.50								
1,3-Dichlorobenzene	ND	0.50								
1,4-Dichlorobenzene	ND	0.50								
Dichlorodifluoromethane	ND	0.50								
1,1-Dichloroethane	ND	0.50								
1,1-Dichloroethene	ND	0.50								
1,2-Dichloropropane	ND	0.50								
1,3-Dichloropropane	ND	0.50								
2,2-Dichloropropane	ND	0.50								
1,1-Dichloropropene	ND	0.50								
Hexachlorobutadiene	ND	0.50								
2-Hexanone	ND	0.50								
Isopropylbenzene	ND	0.50								
Methylene Chloride	ND	2.5								
n-Butylbenzene	ND	0.50								
n-Propylbenzene	ND	0.50								
sec-Butylbenzene	ND	0.50								
Styrene	ND	0.50								
tert-Butylbenzene	ND	0.50								
1,1,1,2-Tetrachloroethane	ND	0.50								
1,1,2,2-Tetrachloroethane	ND	0.50								
Tetrachloroethene (PCE)	ND	0.50								
trans-1,2-DCE	ND	0.50								
trans-1,3-Dichloropropene	ND	0.50								

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-R36648		SampType:	MBLK		TestCode:	EPA Method 8260B: VOLATILES			
Client ID:	PBW		Batch ID:	R36648		RunNo:	36648			
Prep Date:			Analysis Date:	8/12/2016		SeqNo:	1135033	Units:	µg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,2,3-Trichlorobenzene	ND	0.50								
1,2,4-Trichlorobenzene	ND	0.50								
1,1,1-Trichloroethane	ND	0.50								
1,1,2-Trichloroethane	ND	0.50								
Trichloroethene (TCE)	ND	0.50								
Trichlorofluoromethane	ND	0.50								
1,2,3-Trichloropropane	ND	0.50								
Vinyl chloride	ND	0.50								
mp-Xylenes	ND	1.0								
o-Xylene	ND	0.50								
tert-Amyl methyl ether	ND	0.50								
tert-Butyl alcohol	ND	0.50								
Acrolein	ND	2.5								
Acrylonitrile	ND	2.5								
Bromochloromethane	ND	0.50								
2-Chloroethyl vinyl ether	ND	0.50								
Iodomethane	ND	0.50								
trans-1,4-Dichloro-2-butene	ND	0.50								
Vinyl acetate	ND	0.50								
1,4-Dioxane	ND	0.50								

Sample ID	LCS-R36648		SampType:	LCS		TestCode:	EPA Method 8260B: VOLATILES			
Client ID:	LCSW		Batch ID:	R36648		RunNo:	36648			
Prep Date:			Analysis Date:	8/12/2016		SeqNo:	1135034	Units:	µg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	9.1	0	10.00	0	90.7	80	120			
Toluene	9.4	0	10.00	0	94.5	80	120			
Ethylbenzene	9.6	0	10.00	0	96.4	80	120			
Chlorobenzene	9.1	0	10.00	0	91.2	80	120			
1,1-Dichloroethene	9.1	0	10.00	0	91.1	80	120			
Tetrachloroethene (PCE)	8.7	0	10.00	0	87.1	80	120			
Trichloroethene (TCE)	8.9	0	10.00	0	89.0	80	120			
o-Xylene	10	0	10.00	0	100	80	120			

Qualifiers:

* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-R36648	SampType: MBLK			TestCode: EPA 8270C: Semivolatiles/Mod					
Client ID:	PBW	Batch ID: R36648			RunNo: 36648					
Prep Date:		Analysis Date: 8/17/2016			SeqNo: 1135037		Units: µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
N-Nitroso-di-n-butylamine	ND	1.0								
Acetophenone	ND	10								
1-Methylnaphthalene	ND	10								
2,3,4,6-Tetrachlorophenol	ND	10								
2,4,5-Trichlorophenol	ND	10								
2,4,6-Trichlorophenol	ND	10								
2,4-Dichlorophenol	ND	10								
2,4-Dimethylphenol	ND	10								
2,4-Dinitrophenol	ND	10								
2,4-Dinitrotoluene	ND	10								
2,6-Dinitrotoluene	ND	10								
2-Chloronaphthalene	ND	10								
2-Chlorophenol	ND	10								
2-Methylnaphthalene	ND	10								
2-Methylphenol	ND	10								
2-Nitroaniline	ND	10								
2-Nitrophenol	ND	10								
3,3'-Dichlorobenzidine	ND	10								
3-Nitroaniline	ND	10								
4,6-Dinitro-2-methylphenol	ND	10								
4-Bromophenyl phenyl ether	ND	10								
4-Chloro-3-methylphenol	ND	5.0								
4-Chloroaniline	ND	10								
4-Chlorophenyl phenyl ether	ND	10								
4-Nitroaniline	ND	10								
4-Nitrophenol	ND	10								
Acenaphthene	ND	10								
Acenaphthylene	ND	10								
Anthracene	ND	10								
Benzo(g,h,i)perylene	ND	1.0								
Benz(a)anthracene	ND	1.0								
Benzo(a)pyrene	ND	1.0								
Benzo(b)fluoranthene	ND	1.0								
Benzo(k)fluoranthene	ND	1.0								
Bis(2-chloroethoxy)methane	ND	10								
Bis(2-chloroethyl)ether	ND	10								
Bis(2-chloroisopropyl)ether	ND	10								
Bis(2-ethylhexyl)phthalate	ND	5.0								
Butyl benzyl phthalate	ND	10								

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-R36648		SampType: MBLK		TestCode: EPA 8270C: Semivolatiles/Mod					
Client ID:	PBW		Batch ID: R36648		RunNo: 36648					
Prep Date:			Analysis Date: 8/17/2016		SeqNo: 1135037		Units: µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Carbazole	ND	10								
Chrysene	ND	0.10								
Dibenz(a,h)anthracene	ND	1.0								
Dibenzofuran	ND	10								
Diethyl phthalate	ND	10								
Dimethyl phthalate	ND	10								
Di-n-butyl phthalate	ND	10								
Di-n-octyl phthalate	ND	10								
Fluoranthene	ND	10								
Fluorene	ND	10								
Hexachlorobenzene	ND	1.0								
Hexachlorobutadiene	ND	10								
Hexachlorocyclopentadiene	ND	10								
Hexachloroethane	ND	10								
Indeno(1,2,3-cd)pyrene	ND	1.0								
Isophorone	ND	10								
Naphthalene	ND	10								
Nitrobenzene	ND	10								
N-Nitrosodi-n-propylamine	ND	10								
N-Nitrosodiphenylamine	ND	2.0								
Pentachlorophenol	ND	10								
Phenanthrene	ND	10								
Phenol	ND	5.0								
Pyrene	ND	10								
o-Toluidine	ND	1.0								
Pyridine	ND	1.0								
1,2,4,5-Tetrachlorobenzene	ND	10								

Sample ID	LCS-R36648		SampType: LCS		TestCode: EPA 8270C: Semivolatiles/Mod					
Client ID:	LCSW		Batch ID: R36648		RunNo: 36648					
Prep Date:			Analysis Date: 8/17/2016		SeqNo: 1135038		Units: µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2,4-Dinitrotoluene	4.6	0	5.000	0	91.8	49	134			
2-Chlorophenol	4.6	0	5.000	0	93.0	50	131			
4-Chloro-3-methylphenol	5.1	0	5.000	0	102	42	139			
4-Nitrophenol	4.7	0	5.000	0	94.2	19	137			
Acenaphthene	4.5	0	5.000	0	89.8	36	122			
Bis(2-ethylhexyl)phthalate	5.1	0	5.000	0	102	43	142			

Qualifiers:

* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	LCS-R36648			SampType:	LCS			TestCode:	EPA 8270C: Semivolatiles/Mod		
Client ID:	LCSW			Batch ID:	R36648			RunNo:	36648		
Prep Date:				Analysis Date:	8/17/2016			SeqNo:	1135038		
						Units: µg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
N-Nitrosodi-n-propylamine	4.2	0	5.000	0	84.0	46	140				
Pentachlorophenol	2.2	0	5.000	0	45.0	22	138				
Phenol	4.7	0	5.000	0	93.4	45	134				
Pyrene	5.0	0	5.000	0	100	45	138				

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-26894		SampType:	MBLK		TestCode:	EPA Method 7470: Mercury				
Client ID:	PBW		Batch ID:	26894		RunNo:	36465				
Prep Date:	8/10/2016		Analysis Date:	8/12/2016		SeqNo:	1129407		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercury	ND	0.00020									

Sample ID	LCS-26894		SampType: LCS		TestCode: EPA Method 7470: Mercury					
Client ID:	LCSW		Batch ID: 26894		RunNo: 36465					
Prep Date:	8/10/2016		Analysis Date: 8/12/2016		SeqNo: 1129408		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0053	0.00020	0.005000	0	105	80	120			

Sample ID	1608660-001BMS		SampType: MS		TestCode: EPA Method 7470: Mercury					
Client ID:	Wastewater Effluent		Batch ID: 26894		RunNo: 36465					
Prep Date:	8/10/2016		Analysis Date: 8/12/2016		SeqNo: 1129410		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0057	0.00020	0.005000	0	113	75	125			

Sample ID	1608660-001BMSD			SampType:	MSD		TestCode:	EPA Method 7470: Mercury			
Client ID:	Wastewater Effluent			Batch ID:	26894		RunNo:	36465			
Prep Date:	8/10/2016		Analysis Date:	8/12/2016		SeqNo:	1129411		Units: mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercury	0.0057	0.00020	0.005000	0	114	75	125	0.473	20		

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-27020		SampType:	MBLK		TestCode:	MERCURY, TCLP				
Client ID:	PBW		Batch ID:	27020		RunNo:	36563				
Prep Date:	8/16/2016		Analysis Date:	8/17/2016		SeqNo:	1132320		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercurv	ND	0.020									

Sample ID	LCS-27020			SampType:	LCS		TestCode:	MERCURY, TCLP			
Client ID:	LCSW			Batch ID:	27020		RunNo:	36563			
Prep Date:	8/16/2016			Analysis Date:	8/17/2016		SeqNo:	1132321		Units:	mg/L
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercury	ND	0.020	0.005000	0	98.1	80	120				

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-26942		SampType:	MBLK		TestCode:	EPA 6010B: Total Recoverable Metals			
Client ID:	PBW		Batch ID:	26942		RunNo:	36611			
Prep Date:	8/11/2016		Analysis Date:	8/18/2016		SeqNo:	1134113	Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020								
Arsenic	ND	0.020								
Barium	ND	0.020								
Beryllium	ND	0.0030								
Cadmium	ND	0.0020								
Calcium	ND	1.0								
Chromium	ND	0.0060								
Cobalt	ND	0.0060								
Copper	ND	0.0060								
Iron	ND	0.050								
Lead	ND	0.0050								
Magnesium	ND	1.0								
Manganese	ND	0.0020								
Nickel	ND	0.010								
Potassium	ND	1.0								
Selenium	ND	0.050								
Silver	ND	0.0050								
Sodium	ND	1.0								
Strontium	ND	0.010								
Thallium	ND	0.050								
Zinc	ND	0.020								
Silica	ND	1.1								

Sample ID	LCS-26942		SampType:	LCS		TestCode:	EPA 6010B: Total Recoverable Metals			
Client ID:	LCSW		Batch ID:	26942		RunNo:	36611			
Prep Date:	8/11/2016		Analysis Date:	8/18/2016		SeqNo:	1134115	Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.52	0.020	0.5000	0	103	80	120			
Arsenic	0.49	0.020	0.5000	0	97.6	80	120			
Barium	0.48	0.020	0.5000	0	95.1	80	120			
Beryllium	0.51	0.0030	0.5000	0	101	80	120			
Cadmium	0.47	0.0020	0.5000	0	94.9	80	120			
Calcium	50	1.0	50.00	0	99.0	80	120			
Chromium	0.47	0.0060	0.5000	0	94.7	80	120			
Cobalt	0.46	0.0060	0.5000	0	91.2	80	120			
Copper	0.47	0.0060	0.5000	0	94.2	80	120			
Iron	0.47	0.050	0.5000	0	93.1	80	120			
Lead	0.46	0.0050	0.5000	0	92.8	80	120			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	LCS-26942		SampType: LCS		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	LCSW		Batch ID: 26942		RunNo: 36611					
Prep Date:	8/11/2016		Analysis Date: 8/18/2016		SeqNo: 1134115		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Magnesium	50	1.0	50.00	0	99.0	80	120			
Manganese	0.47	0.0020	0.5000	0	93.4	80	120			
Nickel	0.45	0.010	0.5000	0	90.3	80	120			
Potassium	48	1.0	50.00	0	96.0	80	120			
Selenium	0.50	0.050	0.5000	0	99.0	80	120			
Silver	0.097	0.0050	0.1000	0	96.8	80	120			
Sodium	49	1.0	50.00	0	97.0	80	120			
Strontium	0.11	0.010	0.1000	0	110	80	120			
Thallium	0.49	0.050	0.5000	0	97.0	80	120			
Zinc	0.46	0.020	0.5000	0	91.0	80	120			
Silica	5.4	1.1	5.350	0	101	80	120			

Sample ID	1608660-001BMS		SampType: MS		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	Wastewater Effluent		Batch ID: 26942		RunNo: 36611					
Prep Date:	8/11/2016		Analysis Date: 8/18/2016		SeqNo: 1134120		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.79	0.020	0.5000	0.2561	106	75	125			
Arsenic	0.52	0.020	0.5000	0.03115	98.4	75	125			
Barium	0.48	0.020	0.5000	0.01539	93.1	75	125			
Beryllium	0.49	0.0030	0.5000	0.0002600	97.2	75	125			
Cadmium	0.47	0.0020	0.5000	0	93.5	75	125			
Chromium	0.46	0.0060	0.5000	0	91.1	75	125			
Cobalt	0.45	0.0060	0.5000	0.002780	89.5	75	125			
Copper	0.51	0.0060	0.5000	0	101	75	125			
Lead	0.45	0.0050	0.5000	0	89.7	75	125			
Magnesium	90	1.0	50.00	41.34	97.7	75	125			
Manganese	0.61	0.0020	0.5000	0.1524	91.0	75	125			
Nickel	0.45	0.010	0.5000	0.01016	88.2	75	125			
Selenium	0.52	0.050	0.5000	0.03028	97.3	75	125			
Silver	0.097	0.0050	0.1000	0	97.3	75	125			
Thallium	0.48	0.050	0.5000	0	95.8	75	125			
Zinc	0.47	0.020	0.5000	0.02456	88.1	75	125			

Sample ID	1608660-001BMSD		SampType: MSD		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	Wastewater Effluent		Batch ID: 26942		RunNo: 36611					
Prep Date:	8/11/2016		Analysis Date: 8/18/2016		SeqNo: 1134122		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.80	0.020	0.5000	0.2561	108	75	125	1.20	20	

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	1608660-001BMSD		SampType: MSD		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	Wastewater Effluent		Batch ID: 26942		RunNo: 36611					
Prep Date:	8/11/2016		Analysis Date: 8/18/2016		SeqNo: 1134122		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.54	0.020	0.5000	0.03115	102	75	125	3.44	20	
Barium	0.48	0.020	0.5000	0.01539	93.8	75	125	0.725	20	
Beryllium	0.49	0.0030	0.5000	0.0002600	98.0	75	125	0.895	20	
Cadmium	0.48	0.0020	0.5000	0	95.7	75	125	2.34	20	
Chromium	0.47	0.0060	0.5000	0	93.8	75	125	2.88	20	
Cobalt	0.46	0.0060	0.5000	0.002780	92.2	75	125	2.97	20	
Copper	0.51	0.0060	0.5000	0	102	75	125	1.08	20	
Lead	0.46	0.0050	0.5000	0	92.1	75	125	2.73	20	
Magnesium	91	1.0	50.00	41.34	98.8	75	125	0.587	20	
Manganese	0.61	0.0020	0.5000	0.1524	91.8	75	125	0.656	20	
Nickel	0.46	0.010	0.5000	0.01016	90.5	75	125	2.44	20	
Selenium	0.52	0.050	0.5000	0.03028	97.8	75	125	0.514	20	
Silver	0.097	0.0050	0.1000	0	97.0	75	125	0.216	20	
Thallium	0.48	0.050	0.5000	0	95.2	75	125	0.572	20	
Zinc	0.48	0.020	0.5000	0.02456	90.6	75	125	2.56	20	

Sample ID	1608660-001BMS		SampType: MS		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	Wastewater Effluent		Batch ID: 26942		RunNo: 36611					
Prep Date:	8/11/2016		Analysis Date: 8/18/2016		SeqNo: 1134131		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Potassium	110	5.0	50.00	60.03	97.9	75	125			

Sample ID	1608660-001BMSD		SampType: MSD		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	Wastewater Effluent		Batch ID: 26942		RunNo: 36611					
Prep Date:	8/11/2016		Analysis Date: 8/18/2016		SeqNo: 1134132		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Potassium	110	5.0	50.00	60.03	97.4	75	125	0.257	20	

Sample ID	MB-26942		SampType: MBLK		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	PBW		Batch ID: 26942		RunNo: 36628					
Prep Date:	8/11/2016		Analysis Date: 8/19/2016		SeqNo: 1134578		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	ND	0.050								

Qualifiers:

* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	LCS-26942		SampType: LCS		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	LCSW		Batch ID: 26942		RunNo: 36628					
Prep Date:	8/11/2016		Analysis Date: 8/19/2016		SeqNo: 1134579		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.49	0.050	0.5000	0	97.9	80	120			

Sample ID	1608660-001BMS		SampType: MS		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	Wastewater Effluent		Batch ID: 26942		RunNo: 36628					
Prep Date:	8/11/2016		Analysis Date: 8/19/2016		SeqNo: 1134583		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.49	0.050	0.5000	0	97.2	75	125			

Sample ID	1608660-001BMSD		SampType:	MSD		TestCode:	EPA 6010B: Total Recoverable Metals				
Client ID:	Wastewater Effluent		Batch ID:	26942		RunNo:	36628				
Prep Date:	8/11/2016		Analysis Date:	8/19/2016		SeqNo:	1134584		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Antimony	0.49	0.050	0.5000	0	98.5	75	125	1.33	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
R RPD outside accepted recovery limits	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#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-26961		SampType:	MBLK		TestCode:	EPA 6010B: TCLP Metals			
Client ID:	PBW		Batch ID:	26961		RunNo:	36503			
Prep Date:	8/12/2016		Analysis Date:	8/15/2016		SeqNo:	1130431	Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020								
Antimony	ND	0.050								
Arsenic	ND	0.020								
Barium	ND	0.020								
Beryllium	ND	0.0030								
Cadmium	ND	0.0020								
Chromium	ND	0.0060								
Cobalt	ND	0.0060								
Copper	ND	0.0060								
Lead	ND	0.0050								
Manganese	ND	0.0020								
Nickel	ND	0.010								
Selenium	ND	0.050								
Silver	ND	0.0050								
Thallium	ND	0.050								
Vanadium	ND	0.050								

Sample ID	LCS-26961		SampType:	LCS		TestCode:	EPA 6010B: TCLP Metals			
Client ID:	LCSW		Batch ID:	26961		RunNo:	36503			
Prep Date:	8/12/2016		Analysis Date:	8/15/2016		SeqNo:	1130432	Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.51	0.020	0.5000	0	103	80	120			
Antimony	0.49	0.050	0.5000	0	98.3	80	120			
Arsenic	0.48	0.020	0.5000	0	95.2	80	120			
Barium	0.46	0.020	0.5000	0	93.0	80	120			
Beryllium	0.49	0.0030	0.5000	0	97.7	80	120			
Cadmium	0.47	0.0020	0.5000	0	94.7	80	120			
Chromium	0.47	0.0060	0.5000	0	93.1	80	120			
Cobalt	0.46	0.0060	0.5000	0	91.2	80	120			
Copper	0.48	0.0060	0.5000	0	95.2	80	120			
Lead	0.46	0.0050	0.5000	0	92.1	80	120			
Manganese	0.46	0.0020	0.5000	0	92.3	80	120			
Nickel	0.46	0.010	0.5000	0	92.0	80	120			
Selenium	0.49	0.050	0.5000	0	97.2	80	120			
Silver	0.096	0.0050	0.1000	0	95.6	80	120			
Thallium	0.47	0.050	0.5000	0	93.1	80	120			
Vanadium	0.49	0.050	0.5000	0	98.0	80	120			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	1608660-001CMS		SampType:	MS		TestCode:	EPA 6010B: TCLP Metals			
Client ID:	Wastewater Effluent		Batch ID:	26961		RunNo:	36503			
Prep Date:	8/12/2016		Analysis Date:	8/15/2016		SeqNo:	1130536		Units: mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.78	0.020	0.5000	0.2003	116	75	125			
Antimony	0.50	0.050	0.5000	0	101	75	125			
Arsenic	0.53	0.020	0.5000	0.02818	101	75	125			
Barium	0.48	0.020	0.5000	0.01425	92.4	75	125			
Beryllium	0.49	0.0030	0.5000	0.0004400	97.1	75	125			
Cadmium	0.48	0.0020	0.5000	0	95.8	75	125			
Chromium	0.46	0.0060	0.5000	0	92.3	75	125			
Cobalt	0.46	0.0060	0.5000	0.001460	91.1	75	125			
Copper	0.51	0.0060	0.5000	0	102	75	125			
Lead	0.46	0.0050	0.5000	0.003590	90.5	75	125			
Manganese	0.61	0.0020	0.5000	0.1322	95.0	75	125			
Nickel	0.47	0.010	0.5000	0.009620	92.8	75	125			
Selenium	0.56	0.050	0.5000	0.03775	105	75	125			
Silver	0.098	0.0050	0.1000	0	97.9	75	125			
Vanadium	0.50	0.050	0.5000	0.006750	98.8	75	125			

Sample ID	1608660-001CMSD		SampType:	MSD		TestCode:	EPA 6010B: TCLP Metals			
Client ID:	Wastewater Effluent		Batch ID:	26961		RunNo:	36503			
Prep Date:	8/12/2016		Analysis Date:	8/15/2016		SeqNo:	1130537		Units: mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.79	0.020	0.5000	0.2003	118	75	125	1.17	20	
Antimony	0.47	0.050	0.5000	0	94.6	75	125	6.35	20	
Arsenic	0.53	0.020	0.5000	0.02818	99.4	75	125	1.25	20	
Barium	0.48	0.020	0.5000	0.01425	93.4	75	125	1.05	20	
Beryllium	0.49	0.0030	0.5000	0.0004400	97.9	75	125	0.828	20	
Cadmium	0.48	0.0020	0.5000	0	95.9	75	125	0.169	20	
Chromium	0.46	0.0060	0.5000	0	92.2	75	125	0.119	20	
Cobalt	0.46	0.0060	0.5000	0.001460	91.6	75	125	0.583	20	
Copper	0.52	0.0060	0.5000	0	104	75	125	1.52	20	
Lead	0.46	0.0050	0.5000	0.003590	90.6	75	125	0.0438	20	
Manganese	0.62	0.0020	0.5000	0.1322	97.0	75	125	1.70	20	
Nickel	0.47	0.010	0.5000	0.009620	92.8	75	125	0.0190	20	
Selenium	0.53	0.050	0.5000	0.03775	97.9	75	125	6.15	20	
Silver	0.10	0.0050	0.1000	0	99.8	75	125	2.01	20	
Vanadium	0.51	0.050	0.5000	0.006750	99.9	75	125	1.05	20	

Qualifiers:

* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	1608660-001CMS			SampType:	MS		TestCode:	EPA 6010B: TCLP Metals			
Client ID:	Wastewater Effluent			Batch ID:	26961		RunNo:	36503			
Prep Date:	8/12/2016		Analysis Date:	8/15/2016		SeqNo:	1130575		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Thallium	0.54	0.25	0.5000	0	107	75	125				

Sample ID	1608660-001CMSD			SampType:	MSD		TestCode:	EPA 6010B: TCLP Metals			
Client ID:	Wastewater Effluent		Batch ID:	26961		RunNo:	36503				
Prep Date:	8/12/2016		Analysis Date:	8/15/2016		SeqNo:	1130576		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Thallium	0.50	0.25	0.5000	0	100	75	125	11.2	20		

Sample ID	MB-26961	SampType:	MBLK		TestCode:	EPA 6010B: TCLP Metals				
Client ID:	PBW	Batch ID:	26961		RunNo:	36584				
Prep Date:	8/12/2016	Analysis Date:	8/17/2016		SeqNo:	1132791	Units:	mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	ND	1.0								
Iron	ND	0.050								
Magnesium	ND	1.0								
Potassium	ND	1.0								
Sodium	ND	1.0								

Sample ID	LCS-26961			SampType:	LCS		TestCode:	EPA 6010B: TCLP Metals			
Client ID:	LCSW			Batch ID:	26961		RunNo:	36584			
Prep Date:	8/12/2016			Analysis Date:	8/17/2016		SeqNo:	1132792		Units:	mg/L
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Calcium	50	1.0	50.00	0	101	80	120				
Iron	0.50	0.050	0.5000	0	99.4	80	120				
Magnesium	50	1.0	50.00	0	99.7	80	120				
Potassium	48	1.0	50.00	0	97.0	80	120				
Sodium	49	1.0	50.00	0	98.4	80	120				

Sample ID	1608660-001CMS	SampType:	MS	TestCode:	EPA 6010B: TCLP Metals					
Client ID:	Wastewater Effluent	Batch ID:	26961	RunNo:	36584					
Prep Date:	8/12/2016	Analysis Date:	8/17/2016	SeqNo:	1132798	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Magnesium	90	1.0	50.00	35.08	110	75	125			

Qualifiers:

* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	1608660-001CMSD			SampType:	MSD		TestCode:	EPA 6010B: TCLP Metals			
Client ID:	Wastewater Effluent			Batch ID:	26961		RunNo:	36584			
Prep Date:	8/12/2016		Analysis Date:	8/17/2016		SeqNo:	1132799		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Magnesium	87	1.0	50.00	35.08	104	75	125	3.07	20		

Sample ID	1608660-001CMS	SampType:	MS	TestCode:	EPA 6010B: TCLP Metals					
Client ID:	Wastewater Effluent	Batch ID:	26961	RunNo:	36584					
Prep Date:	8/12/2016	Analysis Date:	8/17/2016	SeqNo:	1132804	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Potassium	110	5.0	50.00	59.21	104	75	125			

Sample ID	1608660-001CMSD		SampType:	MSD		TestCode:	EPA 6010B: TCLP Metals				
Client ID:	Wastewater Effluent		Batch ID:	26961		RunNo:	36584				
Prep Date:	8/12/2016		Analysis Date:	8/17/2016		SeqNo:	1132805		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Potassium	110	5.0	50.00	59.21	93.6	75	125	4.76	20		

Sample ID	MB-26961	SampType:	MBLK	TestCode:	EPA 6010B: TCLP Metals					
Client ID:	PBW	Batch ID:	26961	RunNo:	36591					
Prep Date:	8/12/2016	Analysis Date:	8/18/2016	SeqNo:	1133361	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Zinc	ND	0.020								

Sample ID	LCS-26961	SampType:	LCS	TestCode:	EPA 6010B: TCLP Metals					
Client ID:	LCSW	Batch ID:	26961	RunNo:	36591					
Prep Date:	8/12/2016	Analysis Date:	8/18/2016	SeqNo:	1133362	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Zinc	0.47	0.020	0.5000	0	93.6	80	120			

Sample ID	1608660-001CMS	SampType:	MS	TestCode:	EPA 6010B: TCLP Metals					
Client ID:	Wastewater Effluent	Batch ID:	26961	RunNo:	36591					
Prep Date:	8/12/2016	Analysis Date:	8/18/2016	SeqNo:	1133467	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Zinc	0.50	0.020	0.5000	0.02262	95.6	75	125			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID 1608660-001CMSD		SampType: MSD			TestCode: EPA 6010B: TCLP Metals					
Client ID: Wastewater Effluent		Batch ID: 26961			RunNo: 36591					
Prep Date: 8/12/2016		Analysis Date: 8/18/2016			SeqNo: 1133468		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Zinc	0.49	0.020	0.5000	0.02262	92.8	75	125	2.78	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
R RPD outside accepted recovery limits	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#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-R36648		SampType:	MBLK		TestCode:	CYANIDE, Reactive				
Client ID:	PBW		Batch ID:	R36648		RunNo:	36648				
Prep Date:			Analysis Date:	8/16/2016		SeqNo:	1135042		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Cyanide, Reactive	ND	1.00									

Sample ID	LCS-R36648			SampType:	LCS		TestCode:	CYANIDE, Reactive			
Client ID:	LCSW			Batch ID:	R36648		RunNo:	36648			
Prep Date:				Analysis Date:	8/16/2016		SeqNo:	1135043		Units:	mg/L
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Cyanide, Reactive	0.578		0.5000	0	116	80	120				

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-R36648		SampType:	MBLK		TestCode:	SULFIDE, Reactive				
Client ID:	PBW		Batch ID:	R36648		RunNo:	36648				
Prep Date:			Analysis Date:	8/17/2016		SeqNo:	1135045		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Reactive Sulfide	ND	1.0									

Sample ID	LCS-R36648		SampType: LCS		TestCode: SULFIDE, Reactive					
Client ID:	LCSW		Batch ID: R36648		RunNo: 36648					
Prep Date:			Analysis Date: 8/17/2016		SeqNo: 1135046		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Reactive Sulfide	0.20		0.2000	0	100	70	130			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	mb-1		SampType: mblk		TestCode: SM2320B: Alkalinity					
Client ID:	PBW		Batch ID: R36527		RunNo: 36527					
Prep Date:			Analysis Date: 8/15/2016		SeqNo: 1131152		Units: mg/L CaCO3			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	ND	20.00								

Sample ID	Ics-1		SampType: Ics		TestCode: SM2320B: Alkalinity					
Client ID:	LCSW		Batch ID: R36527		RunNo: 36527					
Prep Date:			Analysis Date: 8/15/2016		SeqNo: 1131153		Units: mg/L CaCO3			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	79.40	20.00	80.00	0	99.2	90	110			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-26968		SampType:	MBLK		TestCode:	SM2540C MOD: Total Dissolved Solids				
Client ID:	PBW		Batch ID:	26968		RunNo:	36519				
Prep Date:	8/13/2016		Analysis Date:	8/16/2016		SeqNo:	1130783		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-26968		SampType:	LCS		TestCode:	SM2540C MOD: Total Dissolved Solids				
Client ID:	LCSW		Batch ID:	26968		RunNo:	36519				
Prep Date:	8/13/2016		Analysis Date:	8/16/2016		SeqNo:	1130784		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Total Dissolved Solids	994	20.0	1000	0	99.4	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
R RPD outside accepted recovery limits	RL Reporting Detection Limit
S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

Sample Log-In Check List

Client Name: **NAVAJO REFINING COM**

Work Order Number: **1608660**

RcptNo: 1

Received by/date:

Logged By: **Lindsay Mangin**

8/11/2016 9:05:00 AM

Completed By: **Lindsay Mangin**

8/11/2016 10:45:24 AM

Reviewed By:

Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☒
2. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
3. How was the sample delivered? Courier

Log In

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

of preserved
bottles checked
for pH: **3 2**
3 or **>12** (unless noted)
Adjusted? **NO**

Checked by: **AS**

Special Handling (if applicable)

16. 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:

17. Additional remarks:

18. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.5	Good	Yes			



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

April 28, 2017

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

RE: 2016 Effluent PL Release

OrderNo.: 1704B56

Dear Robert Combs:

Hall Environmental Analysis Laboratory received 8 sample(s) on 4/27/2017 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,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1704B56**

Date Reported: **4/28/2017**

CLIENT: Navajo Refining Company

Client Sample ID: SP-1 Test 1

Project: 2016 Effluent PL Release

Collection Date: 4/27/2017 8:00:00 AM

Lab ID: 1704B56-005

Matrix: LEACHATE

Received Date: 4/27/2017 8:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: MRA
Fluoride	0.32	0.10		mg/L	1	4/27/2017 3:39:39 PM
Chloride	110	10		mg/L	20	4/27/2017 4:16:53 PM
Sulfate	410	50	*	mg/L	20	4/27/2017 4:16:53 PM
EPA METHOD 6010B: SPLP METALS						Analyst: JLF
Iron	ND	0.050		mg/L	1	4/28/2017 4:02:23 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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1704B56**

Date Reported: **4/28/2017**

CLIENT: Navajo Refining Company

Client Sample ID: SP-2 Test 2

Project: 2016 Effluent PL Release

Collection Date: 4/27/2017 8:00:00 AM

Lab ID: 1704B56-006

Matrix: LEACHATE

Received Date: 4/27/2017 8:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: MRA
Fluoride	0.55	0.10		mg/L	1	4/27/2017 4:29:18 PM
Chloride	91	10		mg/L	20	4/27/2017 4:41:43 PM
Sulfate	260	50	*	mg/L	20	4/27/2017 4:41:43 PM
EPA METHOD 6010B: SPLP METALS						Analyst: JLF
Iron	ND	0.050		mg/L	1	4/28/2017 4:13:32 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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1704B56**

Date Reported: **4/28/2017**

CLIENT: Navajo Refining Company

Client Sample ID: SP-3 Test 3

Project: 2016 Effluent PL Release

Collection Date: 4/27/2017 8:00:00 AM

Lab ID: 1704B56-007

Matrix: LEACHATE

Received Date: 4/27/2017 8:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: MRA
Fluoride	0.62	0.10		mg/L	1	4/27/2017 4:54:07 PM
Chloride	3.5	0.50		mg/L	1	4/27/2017 4:54:07 PM
Sulfate	ND	50		mg/L	20	4/27/2017 5:06:31 PM
EPA METHOD 6010B: SPLP METALS						Analyst: JLF
Iron	3.6	0.050		mg/L	1	4/28/2017 4:15:03 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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1704B56**

Date Reported: **4/28/2017**

CLIENT: Navajo Refining Company

Client Sample ID: SP-3 Test 4

Project: 2016 Effluent PL Release

Collection Date: 4/27/2017 8:00:00 AM

Lab ID: 1704B56-008

Matrix: LEACHATE

Received Date: 4/27/2017 8:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: MRA
Fluoride	0.65	0.10		mg/L	1	4/27/2017 5:43:44 PM
Chloride	82	10		mg/L	20	4/27/2017 5:56:09 PM
Sulfate	64	50		mg/L	20	4/27/2017 5:56:09 PM
EPA METHOD 6010B: SPLP METALS						Analyst: JLF
Iron	0.25	0.050		mg/L	1	4/28/2017 4:16:09 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
	R	RPD outside accepted recovery limits	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#: 1704B56

28-Apr-17

Client: Navajo Refining Company

Project: 2016 Effluent PL Release

Sample ID	MB-SPLP 2996		SampType: mblk		TestCode: EPA Method 300.0: Anions					
Client ID:	PBW		Batch ID: R42410		RunNo: 42410					
Prep Date:			Analysis Date: 4/27/2017		SeqNo: 1333857		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								
Sulfate	ND	2.5								

Sample ID	LCS-SPLP 2996		SampType: lcs		TestCode: EPA Method 300.0: Anions					
Client ID:	LCSW		Batch ID: R42410		RunNo: 42410					
Prep Date:			Analysis Date: 4/27/2017		SeqNo: 1333858		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.49	0.10	0.5000	0	97.7	90	110			
Chloride	4.7	0.50	5.000	0	94.7	90	110			
Sulfate	10	2.5	10.00	0	100	90	110			

Sample ID	1704B56-005AMS		SampType: ms		TestCode: EPA Method 300.0: Anions					
Client ID:	SP-1 Test 1		Batch ID: R42410		RunNo: 42410					
Prep Date:			Analysis Date: 4/27/2017		SeqNo: 1333860		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.89	0.10	0.5000	0.3220	114	70.4	122			

Sample ID	1704B56-005AMSD		SampType: msd		TestCode: EPA Method 300.0: Anions					
Client ID:	SP-1 Test 1		Batch ID: R42410		RunNo: 42410					
Prep Date:			Analysis Date: 4/27/2017		SeqNo: 1333861		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.89	0.10	0.5000	0.3220	114	70.4	122	0.0705	20	

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1704B56

28-Apr-17

Client: Navajo Refining Company

Project: 2016 Effluent PL Release

Sample ID	MB-31484		SampType:	MBLK		TestCode:	EPA Method 6010B: SPLP Metals				
Client ID:	PBW		Batch ID:	31484		RunNo:	42444				
Prep Date:	4/28/2017		Analysis Date:	4/28/2017		SeqNo:	1334411		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Iron	ND	0.050									

Sample ID	LCS-31484		SampType:	LCS		TestCode:	EPA Method 6010B: SPLP Metals				
Client ID:	LCSW		Batch ID:	31484		RunNo:	42444				
Prep Date:	4/28/2017		Analysis Date:	4/28/2017		SeqNo:	1334412		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Iron	0.51	0.050	0.5000	0	101	80	120				

Sample ID	1704B56-005BMSD		SampType:	MSD		TestCode:	EPA Method 6010B: SPLP Metals				
Client ID:	SP-1 Test 1		Batch ID:	31484		RunNo:	42444				
Prep Date:	4/28/2017		Analysis Date:	4/28/2017		SeqNo:	1334415		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Iron	0.50	0.050	0.5000	0	100	75	125	0.405	20		

Sample ID	1704B56-005BMS			SampType:	MS		TestCode:	EPA Method 6010B: SPLP Metals			
Client ID:	SP-1 Test 1			Batch ID:	31484		RunNo:	42444			
Prep Date:	4/28/2017			Analysis Date:	4/28/2017		SeqNo:	1334416		Units:	mg/L
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Iron	0.50	0.050	0.5000	0	101	75	125				

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

Sample Log-In Check List

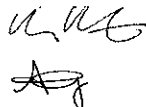
Client Name: **NAVAJO REFINING CO**

Work Order Number: **1704B56**

RcptNo: **1**

Received By: **Erin Melendrez** 4/26/2017 9:35:00 AM

Completed By: **Ashley Gallegos** 4/26/2017 10:02:17 AM

Reviewed By: **SRE 04/26/17**


Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☒
2. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
3. How was the sample delivered? Courier

Log In

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

of preserved
bottles checked
for pH:

(<2 or >12 unless noted)

Adjusted? _____

Checked by: _____

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified:		Date:	
By Whom:		Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:			
Client Instructions:			

17. Additional remarks:

18. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	4.1	Good	Yes			



HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

Analysis Request

Client:	HollyFrontier Navajo Refining LLC
Mailing Address:	PO Box 159 Artesia, NM 88211-0159
Phone #	575-308-2718
email or Fax#:	
QA/QC Package:	X Level 4 (Full Validation)
Standard	
<input type="checkbox"/> Other	
<input type="checkbox"/> EDD (Type)	

Project Name	2016 Effluent PL Release
Project #:	PO: 231642
Project Manager:	Robert Combs Scott Denton
Sampler:	Dave Boyer
On Ice:	X Yes <input type="checkbox"/> No
Sample Temperature:	4.1
Container Type and #	HEAL No.
Preservative Type	17043540
SP-1 Test 1	-001
SP-2 Test 2	-002
SP-3 Test 3	-003
SP-3 Test 4	-004

Date:	4/25/17	Time:	1500
Date:	4/25/17	Time:	1300
Date:	4/25/17	Time:	1200
Date:	4/25/17	Time:	0935

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.

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised August 8, 2011

Submit 1 Copy to appropriate District Office in
accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☐ Initial Report ☒ Final Report

Name of Company: HollyFrontier Navajo Refining LLC	Contact: Robert Combs
Address: 501 E. Main St., Artesia, NM 88210	Telephone No.: 575-746-5382
Facility Name: Navajo Refining LLC	Facility Type: Petroleum Refinery
Surface Owner: Navajo Refining LLC	Mineral Owner N/A
API No. N/A	

LOCATION OF RELEASE

Unit Letter	Section 18	Township 17S	Range 27E	Feet from the	North/South Line	Feet from the	East/West Line	County
-------------	---------------	-----------------	--------------	---------------	------------------	---------------	----------------	--------

Latitude_32°50'5.66"N Longitude_104°19'8.12"W

NATURE OF RELEASE

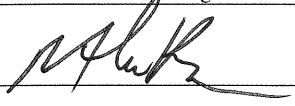
Type of Release: Non-hazardous treated wastewater effluent	Volume of Release: Est. 10 bbls initial est., final est. approx. 40 bbls	Volume Recovered 40 bbls
Source of Release: Failed collar on pipeline approximately 5 miles east of the Artesia Refinery	Date and Hour of Occurrence: 08/09/16, 18:00	Date and Hour of Discovery: 08/09/16, 18:00
Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not Required	If YES, To Whom? NM Oil Conservation Division Santa Fe – Left message to Carl Chavez NM Oil Conservation Division Artesia – Left message NMED Hazardous Waste Bureau – Spoke with Leona Tsinnajinnie	
By Whom? Richard Orosco, Robert Combs	Date and Hour 08/09/16 21:00, 8/10/16 10:00, 8/10/16 16:15	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse. None	

If a Watercourse was Impacted, Describe Fully.*
N/A

Describe Cause of Problem and Remedial Action Taken.* Pipeline leak was discovered based on change in pipeline flow/pressure parameters. Wastewater effluent discharge pumps located at the refinery were shut down and in-line valves were blocked-in to minimize flow back. A field crew was dispatched to repair the line and a vacuum truck was dispatched to the scene to remove the released water which had accumulated in the immediate vicinity. The vacuumed water was returned to the refinery wastewater treatment unit.

Describe Area Affected and Cleanup Action Taken.* Pooled water was removed by vacuum truck and returned to the refinery wastewater treatment unit. An investigation of the wastewater effluent and soil at the release location was conducted as described in the attached letter. The investigation results indicate that no further action is required regarding this release as described in the attached letter.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: 	OIL CONSERVATION DIVISION	
Printed Name: Robert Combs	Approved by Environmental Specialist:	
Title: Environmental Specialist	Approval Date:	Expiration Date:
E-mail Address: Robert.Combs@hollyfrontier.com	Conditions of Approval:	
Date: 5/23/17 Phone: 575-746-5382	Attached <input type="checkbox"/>	

* Attach Additional Sheets If Necessary

Chavez, Carl J, EMNRD

From: Combs, Robert <Robert.Combs@HollyFrontier.com>
Sent: Friday, May 19, 2017 12:26 PM
To: Chavez, Carl J, EMNRD
Cc: Griswold, Jim, EMNRD; Denton, Scott
Subject: RE: GW-28 Pipeline Release C-141s Due Today!
Attachments: 2017-05-18 Follow up report for 2015 WW Effluent Release.pdf

Carl,

Please see attached for the 2015 effluent pipeline release (April 12, 2015) follow-up report. The 2016 release (August 9, 2016) Final C-141 and report will follow next week.
Please let me know if you have any questions or would like to discuss.

Thanks and have a good weekend,

Robert

Robert Combs

Environmental Specialist
The HollyFrontier Companies
P.O. Box 159
Artesia, NM 88211-0159
office: 575-746-5382
cell: 575-308-2718
fax: 575-746-5451
Robert.Combs@hollyfrontier.com

From: Chavez, Carl J, EMNRD [<mailto:CarlJ.Chavez@state.nm.us>]
Sent: Thursday, May 11, 2017 1:21 PM
To: Combs, Robert
Cc: Griswold, Jim, EMNRD; Denton, Scott
Subject: RE: GW-28 Pipeline Release C-141s Due Today!

Robert:

End of May 2017 is fine.

Thank you.

From: Combs, Robert [<mailto:Robert.Combs@HollyFrontier.com>]
Sent: Wednesday, May 10, 2017 9:30 AM
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Cc: Griswold, Jim, EMNRD <Jim.Griswold@state.nm.us>; Denton, Scott <Scott.Denton@HollyFrontier.com>
Subject: RE: GW-28 Pipeline Release C-141s Due Today!

Hi Carl; on our last phone conversation on 4/21 we agreed to the end of May to provide the updates for the two events. We have the sample results and the consultants are currently preparing the write-ups. I can check with them on their status and possibly move them quicker if needed – please let me know.

Thanks,
Robert

From: Chavez, Carl J, EMNRD [<mailto:CarlJ.Chavez@state.nm.us>]
Sent: Wednesday, May 10, 2017 8:23 AM
To: Combs, Robert
Cc: Griswold, Jim, EMNRD
Subject: FW: GW-28 Pipeline Release C-141s Due Today!

Robert:

The New Mexico Oil Conservation Division (OCD) has not received the updates on the pipeline releases that occurred in 2015 and 2016.

OCD had requested updates on the releases on or before May 5, 2017.

Thank you.

CONFIDENTIALITY NOTICE: This e-mail, and any attachments, may contain information that is privileged and confidential. If you received this message in error, please advise the sender immediately by reply e-mail and do not retain any paper or electronic copies of this message or any attachments. Unless expressly stated, nothing contained in this message should be construed as a digital or electronic signature or a commitment to a binding agreement.

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May 18, 2017

Robert Combs
Arsin Sahba
HollyFrontier Navajo Refining LLC
510 East Main Street
Artesia, New Mexico 88210

Soil Pile Sampling
April 12, 2015 Wastewater Pipeline Break near the Former
Evaporation Ponds Area
HollyFrontier Navajo Refining LLC – Artesia, New Mexico
Discharge Permit GW-028

Dear Robert:

Amec Foster Wheeler prepared a release response report that described investigation of the soil and shallow groundwater near a wastewater pipeline break that occurred near the former evaporation ponds located east of the HollyFrontier Navajo Refining LLC (Navajo) Refinery in Artesia, New Mexico. This investigation was performed according to the revised work plan submitted to the New Mexico Energy, Minerals and Natural Resources Department Oil Conservation Division (OCD) in October 2015. The release response report was submitted to OCD on July 28, 2016.

In November 2016, OCD requested that the soil that was excavated from the pipeline break area to allow repairs of the pipeline be sampled and analyzed. The request stated that three discrete (grab) soil samples be collected to be analyzed for the following:

- ▶ Volatile Organic Compounds (VOCs) by Method 8260
- ▶ Total Petroleum Hydrocarbons (TPH) by Method 8015 (extended range)
- ▶ Iron and Manganese by Method 6010
- ▶ Chloride, Fluoride, and Sulfate by Method 300

Three discrete soil samples were collected on April 25, 2017 from the stockpiled, excavated soil. The samples were submitted to Hall Environmental Analysis Laboratory, Inc. (Hall) for the requested analyses. Following initial review of the data, the three samples were additionally analyzed for iron using the synthetic precipitation leaching procedure (SPLP). A copy of the full laboratory report, including quality control data, is provided as Attachment A to this letter.

The analytical results from the soil pile samples are provided in Table 1 along with the results of the soil samples collected during the initial investigation of the release area performed in May 2016. The analytical results presented in Table 1 were compared to the following standards:

- ▶ OCD Spill Guidance standards for TPH and benzene
- ▶ New Mexico Environment Department (NMED) soil screening levels (SSLs):
 - Cancer and Non-cancer residential exposure scenarios
 - Soil leaching to groundwater exposure scenarios, both risk-based and drinking water standard based, using a dilution attenuation factor (DAF) of 20
- ▶ Background threshold values (BTVs) calculated for soils in the vicinity of the nearby former evaporation ponds, approved by the NMED
- ▶ Water Quality Control Commission (WQCC) domestic water supply standard for iron (SPLP samples only)

The following is a summary of the comparison of the soil analytical results to the various screening standards:

- ▶ TPH was not detected in any of the soil pile samples. Samples collected during the 2016 investigation were either not detected or contained low concentrations of TPH well below the screening standards.
- ▶ VOCs were not detected in any of the soil pile samples nor the samples collected during the 2016 investigation.
- ▶ Anions (Chloride, Fluoride, and Sulfate) were detected in both the soil pile samples and the samples collected during the 2016 investigation. All reported concentrations of anions were below all of the screening standards.
- ▶ Iron was detected in the soil pile samples at concentrations above the BTV and above the DAF 20 SSL, but below the Residential SSL. The SPLP results indicated that potential leachate from the soil pile would not contain detectable iron, with a detection limit two orders of magnitude below the WQCC standard. The iron concentrations reported in the samples collected during the 2016 investigation ranged from below all of the screening standards to above the DAF 20 SSL but below both the BTV and the Residential SSL.
- ▶ Manganese was detected in the soil pile samples and the samples collected during the 2016 investigation at concentrations below all of the screening standards.

Thus, iron is the only constituent of concern that exceeds any of the screening standards. It should be noted that groundwater samples collected during the 2016 investigation contained iron

at a concentration well below the screening standard for “domestic water supply” for iron, as listed in the WQCC regulations (New Mexico Administrative Code 20.6.2.3103.b). This empirical data and the SPLP results indicate that iron does not pose a threat to the shallow groundwater.

We believe that the iron detected in the soil pile does not present a human health risk if left in place.

If you have any questions or comments, please feel free to contact me at 713-929-5674 or 713-249-8548.

Sincerely,
Amec Foster Wheeler Environment & Infrastructure, Inc.



Pamela R. Krueger
Senior Associate

Enclosures:

Table 1 – Soil Analytical Results – 2015 Wastewater Line Break
Attachment A – Analytical Report for Soil Pile Samples

TABLE 1

Table 1 - Soil Analytical Results - 2015 Wastewater Line Break
HollyFrontier Navajo Refining, LLC - Artesia, New Mexico

								Location:	South Pile (Sample 1)	Center Pile (Sample 2)	North Pile (Sample 3)	TMW-WWL1			TMW-WWL2			
								Sample Depth (ft bgs):	-	-	-	1	5	12	1	5	12	12 (Duplicate)
								Sample Date:	4/25/2017	4/25/2017	4/25/2017	05/10/2016	05/10/2016	05/10/2016	05/10/2016	05/10/2016	05/10/2016	05/10/2016
Analyte	OCD Spill Guidance	Former EP BTV	Res SSL, Cancer	Res SSL, Non-Cancer	DAF 20 SSL, Risk-Based	DAF 20 SSL, MCL-Based	WQCC Domestic											
TPH (mg/kg)																		
Gasoline Range Organics	1.00E+02	---	---	1.00E+03	---	---	---	<4.0	<4.4	<3.6	< 0.108	< 0.108	< 0.108	0.255	< 0.108	< 0.108	< 0.108	< 0.108
Diesel Range Organics	1.00E+02	---	---	1.00E+03	---	2.0E+04	---	<9.6	<9.8	<9.6	7.31	< 1.61	< 1.61	< 1.61	< 1.61	< 1.61	< 1.61	< 1.61
Motor Oil Range Organic	1.00E+02	---	---	1.00E+03	---	2.0E+04	---	<48	<49	<48	3.15	< 0.274	< 0.274	0.687	< 0.274	< 0.274	< 0.274	< 0.274
Metals (mg/kg)																		
Iron	---	1.73E+04	---	5.48E+04	6.96E+03	---	---	18,000	18,000	19,000	12,200	7,850	2,710	10,500	5,580	2,880	3,950	
Manganese	---	4.88E+02	---	1.05E+04	2.63E+03	---	---	430	360	440	388	162	65	344	71	80	95	
Metals by SPLP (mg/L)																		
Iron	---	---	---	---	---	---	1.00E+00	< 0.05	< 0.05	< 0.05	--	--	--	--	--	--	--	--
Anions (mg/kg)																		
Chloride	---	5.26E+03	---	1.88E+07	---	---	---	1,200	1,200	330	1,730	1,070	1,690	113	712	712	899	
Fluoride	---	1.79E+01	---	4.69E+03	---	---	---	8.9	11	11	5.61	16.1	11.8	4.56	15.8	8.01	11.2	
Sulfate	---	2.16E+04	---	---	---	---	---	8,200	8,100	7,000	7,580	18,300	18,300	2,590	18,300	17,200	18,200	
VOCs (mg/kg)																		
Benzene	1.00E+01	---	1.77E+01	1.14E+02	3.80E-02	4.18E-02	---	<0.020	<0.022	<0.018	< 0.00135	< 0.00135	< 0.00135	< 0.00135	< 0.00135	< 0.00135	< 0.00135	< 0.00135
Toluene	---	---	---	5.22E+03	1.21E+01	1.11E+01	---	<0.040	<0.044	<0.036	< 0.00217	< 0.00217	< 0.00217	< 0.00217	< 0.00217	< 0.00217	< 0.00217	< 0.00148
Ethylbenzene	---	---	7.45E+01	3.92E+03	2.64E-01	1.23E+01	---	<0.040	<0.044	<0.036	< 0.00148	< 0.00148	< 0.00148	< 0.00148	< 0.00148	< 0.00148	< 0.00148	< 0.00148
1,2-Dichloroethane	---	---	8.25E+00	5.52E+01	8.14E-03	2.38E-02	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
1,2-Dibromoethane	---	---	6.68E-01	1.34E+02	3.52E-04	2.36E-04	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
Carbon Disulfide	---	---	---	1.54E+03	4.42E+00	---	---	<0.40	<0.44	<0.36	--	--	--	--	--	--	--	--
Chloroform	---	---	5.85E+00	3.04E+02	1.09E-02	---	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
1,1-Dichloroethane	---	---	7.79E+01	1.56E+04	1.36E-01	---	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
1,1-Dichloroethene	---	---	---	4.36E+02	1.95E+00	4.79E-02	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
Methylene chloride	---	---	7.66E+02	4.09E+02	4.71E-01	2.21E-02	---	<0.12	<0.13	<0.11	--	--	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	---	---	7.93E+00	1.56E+03	4.81E-03	---	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
Tetrachloroethene	---	---	3.35E+02	1.10E+02	3.21E-01	3.98E-02	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
1,1,1-Trichloroethane	---	---	---	1.43E+04	5.11E+01	1.28E+00	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
1,1,2-Trichloroethane	---	---	1.86E+01	2.59E+00	2.23E-03	2.68E-02	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
Trichloroethene	---	---	1.54E+01	6.72E+00	1.61E-02	3.10E-02	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
Vinyl chloride	---	---	7.41E-01	1.13E+02	2.17E-03	1.34E-02	---	<0.040	<0.044	<0.036	--	--	--	--	--	--	--	--
Xylene, total	---	---	---	8.63E+02	2.98E+00	1.54E+02	---	<0.080	<0.087	<0.073	< 0.00349	< 0.00349	< 0.00349	< 0.00349	< 0.00349	< 0.00349	< 0.00349	< 0.00349

Notes:

< X = result not detected with a detection limit of X
Values shown in italics with green highlight exceed the BTV and DAF 20 SSL but are below the Res SSL
Values shown in regular font with blue highlight exceed the DAF 20 SSL but are below the Res SSL and BTV

Definitions

- = sample depth does not apply
- = sample was not analyzed for this constituent
- = no standard available from this source or for this pathway
- BTV = Background Threshold Value
- DAF 20 = Soil Leaching to Groundwater Exposure Scenario, with Dilution Attenuation Factor = 20
- EP = Evaporation Ponds
- ft bgs = feet below ground surface
- MCL = Maximum Contaminant Level for drinking water

Definitions (continued)

- mg/kg = milligrams per kilogram
- mg/L = milligrams per Liter
- NMAC = New Mexico Administrative Code
- NMED = New Mexico Environment Department
- OCD = Oil Conservation Division
- Res = Residential exposure scenario
- SSL = Soil Screening Level from NMED risk assessment guidance, March 2017
- TPH = Total Petroleum Hydrocarbons
- WQCC Domestic = Water Quality Control Commission limit for domestic water supply (NMAC 20.6.2.3103.B)



ATTACHMENT A



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

May 17, 2017

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

RE: 2015 Effluent PL Release

OrderNo.: 1704B58

Dear Robert Combs:

Hall Environmental Analysis Laboratory received 6 sample(s) on 5/12/2017 for the analyses presented in the following report.

This report is a revised report and it replaces the original report issued April 28, 2017.

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. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. All samples are reported as received unless otherwise indicated.

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

Sincerely,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1704B58**

Date Reported: **5/17/2017**

CLIENT: Navajo Refining Company

Client Sample ID: South Pile Sample 1

Project: 2015 Effluent PL Release

Collection Date: 4/25/2017 11:20:00 AM

Lab ID: 1704B58-001

Matrix: SOIL

Received Date: 5/12/2017 8:40:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: TOM
Diesel Range Organics (DRO)	ND	9.6		mg/Kg	1	4/26/2017 2:07:57 PM
Motor Oil Range Organics (MRO)	ND	48		mg/Kg	1	4/26/2017 2:07:57 PM
Surr: DNOP	104	70-130		%Rec	1	4/26/2017 2:07:57 PM
EPA METHOD 300.0: ANIONS						Analyst: MRA
Fluoride	8.9	0.30		mg/Kg	1	4/26/2017 1:21:41 PM
Chloride	1200	150		mg/Kg	100	4/26/2017 2:36:09 PM
Sulfate	8200	150		mg/Kg	100	4/26/2017 2:36:09 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	18000	250		mg/Kg	100	4/27/2017 10:06:50 AM
Manganese	430	0.51		mg/Kg	5	4/27/2017 10:08:11 AM
EPA METHOD 8260B: VOLATILES						Analyst: AG
Benzene	ND	0.020		mg/Kg	1	4/26/2017 11:34:00 AM
Toluene	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
Ethylbenzene	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
1,2-Dichloroethane (EDC)	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
1,2-Dibromoethane (EDB)	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
Carbon disulfide	ND	0.40		mg/Kg	1	4/26/2017 11:34:00 AM
Chloroform	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
1,1-Dichloroethane	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
1,1-Dichloroethene	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
Methylene chloride	ND	0.12		mg/Kg	1	4/26/2017 11:34:00 AM
1,1,2,2-Tetrachloroethane	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
Tetrachloroethene (PCE)	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
1,1,1-Trichloroethane	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
1,1,2-Trichloroethane	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
Trichloroethene (TCE)	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
Vinyl chloride	ND	0.040		mg/Kg	1	4/26/2017 11:34:00 AM
Xylenes, Total	ND	0.080		mg/Kg	1	4/26/2017 11:34:00 AM
Surr: Dibromofluoromethane	98.1	70-130		%Rec	1	4/26/2017 11:34:00 AM
Surr: 1,2-Dichloroethane-d4	91.0	70-130		%Rec	1	4/26/2017 11:34:00 AM
Surr: Toluene-d8	108	70-130		%Rec	1	4/26/2017 11:34:00 AM
Surr: 4-Bromofluorobenzene	110	70-130		%Rec	1	4/26/2017 11:34:00 AM
EPA METHOD 8015D MOD: GASOLINE RANGE						Analyst: AG
Gasoline Range Organics (GRO)	ND	4.0		mg/Kg	1	4/26/2017 11:34:00 AM
Surr: BFB	94.7	70-130		%Rec	1	4/26/2017 11:34:00 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1704B58**

Date Reported: **5/17/2017**

CLIENT: Navajo Refining Company

Client Sample ID: Center Pile Sample 2

Project: 2015 Effluent PL Release

Collection Date: 4/25/2017 11:25:00 AM

Lab ID: 1704B58-002

Matrix: SOIL

Received Date: 5/12/2017 8:40:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: TOM
Diesel Range Organics (DRO)	ND	9.8		mg/Kg	1	4/26/2017 2:30:04 PM
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	4/26/2017 2:30:04 PM
Surr: DNOP	99.0	70-130		%Rec	1	4/26/2017 2:30:04 PM
EPA METHOD 300.0: ANIONS						Analyst: MRA
Fluoride	11	0.30		mg/Kg	1	4/26/2017 1:46:30 PM
Chloride	1200	150		mg/Kg	100	4/26/2017 2:48:34 PM
Sulfate	8100	150		mg/Kg	100	4/26/2017 2:48:34 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	18000	250		mg/Kg	100	4/27/2017 10:09:33 AM
Manganese	360	0.50		mg/Kg	5	4/27/2017 10:10:54 AM
EPA METHOD 8260B: VOLATILES						Analyst: AG
Benzene	ND	0.022		mg/Kg	1	4/26/2017 12:03:19 PM
Toluene	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
Ethylbenzene	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
1,2-Dichloroethane (EDC)	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
1,2-Dibromoethane (EDB)	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
Carbon disulfide	ND	0.44		mg/Kg	1	4/26/2017 12:03:19 PM
Chloroform	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
1,1-Dichloroethane	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
1,1-Dichloroethene	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
Methylene chloride	ND	0.13		mg/Kg	1	4/26/2017 12:03:19 PM
1,1,2,2-Tetrachloroethane	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
Tetrachloroethene (PCE)	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
1,1,1-Trichloroethane	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
1,1,2-Trichloroethane	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
Trichloroethene (TCE)	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
Vinyl chloride	ND	0.044		mg/Kg	1	4/26/2017 12:03:19 PM
Xylenes, Total	ND	0.087		mg/Kg	1	4/26/2017 12:03:19 PM
Surr: Dibromofluoromethane	100	70-130		%Rec	1	4/26/2017 12:03:19 PM
Surr: 1,2-Dichloroethane-d4	85.3	70-130		%Rec	1	4/26/2017 12:03:19 PM
Surr: Toluene-d8	108	70-130		%Rec	1	4/26/2017 12:03:19 PM
Surr: 4-Bromofluorobenzene	107	70-130		%Rec	1	4/26/2017 12:03:19 PM
EPA METHOD 8015D MOD: GASOLINE RANGE						Analyst: AG
Gasoline Range Organics (GRO)	ND	4.4		mg/Kg	1	4/26/2017 12:03:19 PM
Surr: BFB	94.4	70-130		%Rec	1	4/26/2017 12:03:19 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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1704B58

Date Reported: 5/17/2017

CLIENT: Navajo Refining Company

Client Sample ID: North Pile Sample 3

Project: 2015 Effluent PL Release

Collection Date: 4/25/2017 11:30:00 AM

Lab ID: 1704B58-003

Matrix: SOIL

Received Date: 5/12/2017 8:40:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: TOM
Diesel Range Organics (DRO)	ND	9.6		mg/Kg	1	4/26/2017 2:52:19 PM
Motor Oil Range Organics (MRO)	ND	48		mg/Kg	1	4/26/2017 2:52:19 PM
Surr: DNOP	100	70-130		%Rec	1	4/26/2017 2:52:19 PM
EPA METHOD 300.0: ANIONS						Analyst: MRA
Fluoride	11	0.30		mg/Kg	1	4/26/2017 2:11:20 PM
Chloride	330	30		mg/Kg	20	4/26/2017 2:23:44 PM
Sulfate	7000	150		mg/Kg	100	4/26/2017 3:25:47 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	19000	250		mg/Kg	100	4/27/2017 10:12:16 AM
Manganese	440	0.50		mg/Kg	5	4/27/2017 10:13:38 AM
EPA METHOD 8260B: VOLATILES						Analyst: AG
Benzene	ND	0.018		mg/Kg	1	4/26/2017 12:32:58 PM
Toluene	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
Ethylbenzene	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
1,2-Dichloroethane (EDC)	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
1,2-Dibromoethane (EDB)	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
Carbon disulfide	ND	0.36		mg/Kg	1	4/26/2017 12:32:58 PM
Chloroform	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
1,1-Dichloroethane	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
1,1-Dichloroethene	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
Methylene chloride	ND	0.11		mg/Kg	1	4/26/2017 12:32:58 PM
1,1,2,2-Tetrachloroethane	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
Tetrachloroethene (PCE)	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
1,1,1-Trichloroethane	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
1,1,2-Trichloroethane	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
Trichloroethene (TCE)	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
Vinyl chloride	ND	0.036		mg/Kg	1	4/26/2017 12:32:58 PM
Xylenes, Total	ND	0.073		mg/Kg	1	4/26/2017 12:32:58 PM
Surr: Dibromofluoromethane	101	70-130		%Rec	1	4/26/2017 12:32:58 PM
Surr: 1,2-Dichloroethane-d4	90.6	70-130		%Rec	1	4/26/2017 12:32:58 PM
Surr: Toluene-d8	108	70-130		%Rec	1	4/26/2017 12:32:58 PM
Surr: 4-Bromofluorobenzene	110	70-130		%Rec	1	4/26/2017 12:32:58 PM
EPA METHOD 8015D MOD: GASOLINE RANGE						Analyst: AG
Gasoline Range Organics (GRO)	ND	3.6		mg/Kg	1	4/26/2017 12:32:58 PM
Surr: BFB	95.0	70-130		%Rec	1	4/26/2017 12:32:58 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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1704B58**

Date Reported: **5/17/2017**

CLIENT: Navajo Refining Company

Client Sample ID: South Pile Sample 1

Project: 2015 Effluent PL Release

Collection Date: 5/12/2017 8:00:00 AM

Lab ID: 1704B58-004

Matrix: LEACHATE

Received Date: 5/12/2017 8:40:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 6010B: SPLP METALS						Analyst: MED
Iron	ND	0.050		mg/L	1	5/17/2017 8:35:53 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1704B58**

Date Reported: **5/17/2017**

CLIENT: Navajo Refining Company

Client Sample ID: Center Pile Sample 2

Project: 2015 Effluent PL Release

Collection Date: 5/12/2017 8:00:00 AM

Lab ID: 1704B58-005

Matrix: LEACHATE

Received Date: 5/12/2017 8:40:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 6010B: SPLP METALS						Analyst: MED
Iron	ND	0.050		mg/L	1	5/17/2017 8:41:45 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1704B58**

Date Reported: **5/17/2017**

CLIENT: Navajo Refining Company

Client Sample ID: North Pile Sample 3

Project: 2015 Effluent PL Release

Collection Date: 5/12/2017 8:00:00 AM

Lab ID: 1704B58-006

Matrix: LEACHATE

Received Date: 5/12/2017 8:40:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 6010B: SPLP METALS						Analyst: MED
Iron	ND	0.050		mg/L	1	5/17/2017 8:43:41 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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#: 1704B58

17-May-17

Client: Navajo Refining Company

Project: 2015 Effluent PL Release

Sample ID	MB-31441		SampType:	mblk		TestCode:	EPA Method 300.0: Anions				
Client ID:	PBS		Batch ID:	31441		RunNo:	42386				
Prep Date:	4/26/2017		Analysis Date:	4/26/2017		SeqNo:	1333287		Units: mg/Kg		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Fluoride	ND	0.30									
Chloride	ND	1.5									
Sulfate	ND	1.5									

Sample ID	LCS-31441		SampType: lcs		TestCode: EPA Method 300.0: Anions					
Client ID:	LCSS		Batch ID: 31441		RunNo: 42386					
Prep Date:	4/26/2017		Analysis Date: 4/26/2017		SeqNo: 1333288		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	1.5	0.30	1.500	0	100	90	110			
Chloride	15	1.5	15.00	0	97.7	90	110			
Sulfate	29	1.5	30.00	0	98.0	90	110			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1704B58

17-May-17

Client: Navajo Refining Company

Project: 2015 Effluent PL Release

Sample ID	LCS-31439		SampType: LCS		TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	LCSS		Batch ID: 31439		RunNo: 42363					
Prep Date:	4/26/2017		Analysis Date: 4/26/2017		SeqNo: 1332305		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	42	10	50.00	0	83.8	63.8	116			
Surr: DNOP	4.3		5.000		86.0	70	130			

Sample ID	MB-31439	SampType: MBLK			TestCode: EPA Method 8015M/D: Diesel Range Organics					
Client ID:	PBS	Batch ID: 31439			RunNo: 42363					
Prep Date:	4/26/2017	Analysis Date: 4/26/2017			SeqNo: 1332306		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	10								
Motor Oil Range Organics (MRO)	ND	50								
Surr: DNOP	8.1		10.00		80.6	70	130			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1704B58

17-May-17

Client: Navajo Refining Company

Project: 2015 Effluent PL Release

Sample ID	rb	SampType: MBLK				TestCode: EPA Method 8260B: Volatiles				
Client ID:	PBS	Batch ID: R42377				RunNo: 42377				
Prep Date:		Analysis Date: 4/26/2017				SeqNo: 1332328 Units: mg/Kg				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	0.025								
Toluene	ND	0.050								
Ethylbenzene	ND	0.050								
1,2-Dichloroethane (EDC)	ND	0.050								
1,2-Dibromoethane (EDB)	ND	0.050								
Carbon disulfide	ND	0.50								
Chloroform	ND	0.050								
1,1-Dichloroethane	ND	0.050								
1,1-Dichloroethene	ND	0.050								
Methylene chloride	ND	0.15								
1,1,2,2-Tetrachloroethane	ND	0.050								
Tetrachloroethene (PCE)	ND	0.050								
1,1,1-Trichloroethane	ND	0.050								
1,1,2-Trichloroethane	ND	0.050								
Trichloroethene (TCE)	ND	0.050								
Vinyl chloride	ND	0.050								
Xylenes, Total	ND	0.10								
Surr: Dibromofluoromethane	0.53		0.5000		106	70	130			
Surr: 1,2-Dichloroethane-d4	0.49		0.5000		97.1	70	130			
Surr: Toluene-d8	0.50		0.5000		101	70	130			
Surr: 4-Bromofluorobenzene	0.54		0.5000		108	70	130			

Sample ID	100ng lcs	SampType: LCS				TestCode: EPA Method 8260B: Volatiles				
Client ID:	LCSS	Batch ID: R42377				RunNo: 42377				
Prep Date:		Analysis Date: 4/26/2017				SeqNo: 1332329 Units: mg/Kg				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	1.2	0.025	1.000	0	119	70	130			
Toluene	1.1	0.050	1.000	0	114	70	130			
1,1-Dichloroethene	1.2	0.050	1.000	0	119	72	146			
Trichloroethene (TCE)	1.1	0.050	1.000	0	113	70	130			
Surr: Dibromofluoromethane	0.52		0.5000		103	70	130			
Surr: 1,2-Dichloroethane-d4	0.46		0.5000		91.9	70	130			
Surr: Toluene-d8	0.48		0.5000		96.3	70	130			
Surr: 4-Bromofluorobenzene	0.56		0.5000		113	70	130			

Qualifiers:

* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1704B58

17-May-17

Client: Navajo Refining Company

Project: 2015 Effluent PL Release

Sample ID	1704b58-002ams	SampType: MS			TestCode: EPA Method 8260B: Volatiles					
Client ID:	Center Pile Sample	Batch ID: R42377			RunNo: 42377					
Prep Date:	Analysis Date: 4/26/2017			SeqNo: 1332784		Units: mg/Kg				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.94	0.022	0.8726	0	108	61.9	146			
Toluene	1.1	0.044	0.8726	0.02386	120	70	130			
1,1-Dichloroethene	0.98	0.044	0.8726	0	113	37.1	170			
Trichloroethene (TCE)	0.87	0.044	0.8726	0	99.2	49.8	150			
Surr: Dibromofluoromethane	0.41		0.4363		95.1	70	130			
Surr: 1,2-Dichloroethane-d4	0.38		0.4363		87.4	70	130			
Surr: Toluene-d8	0.46		0.4363		105	70	130			
Surr: 4-Bromofluorobenzene	0.46		0.4363		106	70	130			

Sample ID	1704b58-002amsd	SampType: MSD		TestCode: EPA Method 8260B: Volatiles						
Client ID:	Center Pile Sample	Batch ID: R42377		RunNo: 42377						
Prep Date:	Analysis Date: 4/26/2017		SeqNo: 1332785		Units: mg/Kg					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.87	0.022	0.8726	0	99.7	61.9	146	7.73	20	
Toluene	0.99	0.044	0.8726	0.02386	111	70	130	7.09	20	
1,1-Dichloroethene	0.92	0.044	0.8726	0	105	37.1	170	6.93	20	
Trichloroethene (TCE)	0.85	0.044	0.8726	0	97.5	49.8	150	1.71	20	
Surr: Dibromofluoromethane	0.41		0.4363		93.8	70	130	0	0	
Surr: 1,2-Dichloroethane-d4	0.37		0.4363		85.8	70	130	0	0	
Surr: Toluene-d8	0.46		0.4363		105	70	130	0	0	
Surr: 4-Bromofluorobenzene	0.47		0.4363		108	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
R	RPD outside accepted recovery limits	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#: 1704B58

17-May-17

Client: Navajo Refining Company

Project: 2015 Effluent PL Release

Sample ID	MB-31451	SampType:	MBLK	TestCode:	EPA Method 6010B: Soil Metals					
Client ID:	PBS	Batch ID:	31451	RunNo:	42402					
Prep Date:	4/26/2017	Analysis Date:	4/27/2017	SeqNo:	1333071	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	ND	2.5								
Manganese	ND	0.10								

Sample ID	LCS-31451	SampType:	LCS	TestCode:	EPA Method 6010B: Soil Metals					
Client ID:	LCSS	Batch ID:	31451	RunNo:	42402					
Prep Date:	4/26/2017	Analysis Date:	4/27/2017	SeqNo:	1333072	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	26	2.5	25.00	0	105	80	120			
Manganese	25	0.10	25.00	0	101	80	120			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1704B58

17-May-17

Client: Navajo Refining Company

Project: 2015 Effluent PL Release

Sample ID	MB-31758		SampType:	MBLK		TestCode:	EPA Method 6010B: SPLP Metals				
Client ID:	PBW		Batch ID:	31758		RunNo:	42833				
Prep Date:	5/16/2017		Analysis Date:	5/17/2017		SeqNo:	1347165		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Iron	ND	0.050									

Sample ID	LCS-31758		SampType:	LCS		TestCode:	EPA Method 6010B: SPLP Metals				
Client ID:	LCSW		Batch ID:	31758		RunNo:	42833				
Prep Date:	5/16/2017		Analysis Date:	5/17/2017		SeqNo:	1347166		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Iron	0.53	0.050	0.5000	0	106	80	120				

Sample ID	1704B58-004AMS		SampType:	MS		TestCode:	EPA Method 6010B: SPLP Metals				
Client ID:	South Pile Sample 1		Batch ID:	31758		RunNo:	42833				
Prep Date:	5/16/2017		Analysis Date:	5/17/2017		SeqNo:	1347168		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Iron	0.53	0.050	0.5000	0	106	75	125				

Sample ID	1704B58-004AMSD		SampType:	MSD		TestCode:	EPA Method 6010B: SPLP Metals				
Client ID:	South Pile Sample 1		Batch ID:	31758		RunNo:	42833				
Prep Date:	5/16/2017		Analysis Date:	5/17/2017		SeqNo:	1347169		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Iron	0.52	0.050	0.5000	0	104	75	125	1.93	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
R RPD outside accepted recovery limits	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#: 1704B58

17-May-17

Client: Navajo Refining Company

Project: 2015 Effluent PL Release

Sample ID	1704b58-001ams	SampType:	MS	TestCode:	EPA Method 8015D Mod: Gasoline Range					
Client ID:	South Pile Sample 1	Batch ID:	A42377	RunNo:	42377					
Prep Date:		Analysis Date:	4/26/2017	SeqNo:	1332780	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	25	4.0	20.03	0	124	63.2	128			
Surr: BFB	370		400.6		93.1	70	130			

Sample ID	1704b58-001amsd	SampType:	MSD	TestCode:	EPA Method 8015D Mod: Gasoline Range					
Client ID:	South Pile Sample 1	Batch ID:	A42377	RunNo:	42377					
Prep Date:		Analysis Date:	4/26/2017	SeqNo:	1332781	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	23	4.0	20.03	0	116	63.2	128	6.14	20	
Surr: BFB	390		400.6		96.8	70	130	0	0	

Sample ID	2.5ug gro lcs	SampType:	LCS	TestCode:	EPA Method 8015D Mod: Gasoline Range					
Client ID:	LCSS	Batch ID:	A42377	RunNo:	42377					
Prep Date:		Analysis Date:	4/26/2017	SeqNo:	1332782	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	27	5.0	25.00	0	106	70	130			
Surr: BFB	520		500.0		104	70	130			

Sample ID	rb	SampType:	MBLK	TestCode:	EPA Method 8015D Mod: Gasoline Range					
Client ID:	PBS	Batch ID:	A42377	RunNo:	42377					
Prep Date:		Analysis Date:	4/26/2017	SeqNo:	1332783	Units:	mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	ND	5.0								
Surr: BFB	500		500.0		100	70	130			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

Sample Log-In Check List

Client Name: NAVAJO REFINING CO

Work Order Number: 1704B58

RcptNo: 1

Received By: Erin Melendrez

4/26/2017 9:35:00 AM

[Signature]

Completed By: Anne Thorne

4/26/2017 10:10:47 AM

[Signature]

Reviewed By:

[Signature]

04/26/17

Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☒
2. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
3. How was the sample delivered? Courier

Log In

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

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

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified:	_____	Date:	_____
By Whom:	_____	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	_____		
Client Instructions:	_____		

17. Additional remarks:

18. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	2.1	Good	Yes			



www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

Analysis Request

[illegible]

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.

Chavez, Carl J, EMNRD

From: Combs, Robert <Robert.Combs@HollyFrontier.com>
Sent: Wednesday, May 24, 2017 3:32 PM
To: Chavez, Carl J, EMNRD
Cc: Griswold, Jim, EMNRD; Denton, Scott; Sahba, Arsin M.; Dade, Lewis (Randy)
Subject: RE: GW-28 Pipeline Release C-141s Due Today!
Attachments: Artesia Aug2016 WW Effluent Release FINAL to Navajo 052417.pdf; 2017-05-24 Final C-141 2016 WW Effluent Release 2016-08-09.pdf

Carl,
Please find the attached Final C-141 form and Release Report for the 2016-08-09 Artesia WW effluent release.
Please let us know if you would like to discuss.
Thanks,
Robert

From: Chavez, Carl J, EMNRD [<mailto:CarlJ.Chavez@state.nm.us>]
Sent: Thursday, May 11, 2017 1:21 PM
To: Combs, Robert
Cc: Griswold, Jim, EMNRD; Denton, Scott
Subject: RE: GW-28 Pipeline Release C-141s Due Today!

Robert:

End of May 2017 is fine.

Thank you.

From: Combs, Robert [<mailto:Robert.Combs@HollyFrontier.com>]
Sent: Wednesday, May 10, 2017 9:30 AM
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Cc: Griswold, Jim, EMNRD <Jim.Griswold@state.nm.us>; Denton, Scott <Scott.Denton@HollyFrontier.com>
Subject: RE: GW-28 Pipeline Release C-141s Due Today!

Hi Carl; on our last phone conversation on 4/21 we agreed to the end of May to provide the updates for the two events. We have the sample results and the consultants are currently preparing the write-ups. I can check with them on their status and possibly move them quicker if needed – please let me know.

Thanks,
Robert

From: Chavez, Carl J, EMNRD [<mailto:CarlJ.Chavez@state.nm.us>]
Sent: Wednesday, May 10, 2017 8:23 AM
To: Combs, Robert
Cc: Griswold, Jim, EMNRD
Subject: FW: GW-28 Pipeline Release C-141s Due Today!

Robert:

The New Mexico Oil Conservation Division (OCD) has not received the updates on the pipeline releases that occurred in 2015 and 2016.

OCD had requested updates on the releases on or before May 5, 2017.

Thank you.

CONFIDENTIALITY NOTICE: This e-mail, and any attachments, may contain information that is privileged and confidential. If you received this message in error, please advise the sender immediately by reply e-mail and do not retain any paper or electronic copies of this message or any attachments. Unless expressly stated, nothing contained in this message should be construed as a digital or electronic signature or a commitment to a binding agreement.

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District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised August 8, 2011

Submit 1 Copy to appropriate District Office in
accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☐ Initial Report ☒ Final Report

Name of Company: HollyFrontier Navajo Refining LLC	Contact: Robert Combs	
Address: 501 E. Main St., Artesia, NM 88210	Telephone No.: 575-746-5382	
Facility Name: Navajo Refining LLC	Facility Type: Petroleum Refinery	
Surface Owner: Navajo Refining LLC	Mineral Owner N/A	API No. N/A

LOCATION OF RELEASE

Unit Letter	Section 18	Township 17S	Range 27E	Feet from the	North/South Line	Feet from the	East/West Line	County
-------------	---------------	-----------------	--------------	---------------	------------------	---------------	----------------	--------

Latitude_32°50'5.66"N Longitude_104°19'8.12"W

NATURE OF RELEASE

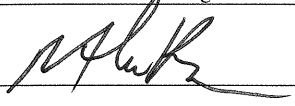
Type of Release: Non-hazardous treated wastewater effluent	Volume of Release: Est. 10 bbls initial est., final est. approx. 40 bbls	Volume Recovered 40 bbls
Source of Release: Failed collar on pipeline approximately 5 miles east of the Artesia Refinery	Date and Hour of Occurrence: 08/09/16, 18:00	Date and Hour of Discovery: 08/09/16, 18:00
Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not Required	If YES, To Whom? NM Oil Conservation Division Santa Fe – Left message to Carl Chavez NM Oil Conservation Division Artesia – Left message NMED Hazardous Waste Bureau – Spoke with Leona Tsinnajinnie	
By Whom? Richard Orosco, Robert Combs	Date and Hour 08/09/16 21:00, 8/10/16 10:00, 8/10/16 16:15	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse. None	

If a Watercourse was Impacted, Describe Fully.*
N/A

Describe Cause of Problem and Remedial Action Taken.* Pipeline leak was discovered based on change in pipeline flow/pressure parameters. Wastewater effluent discharge pumps located at the refinery were shut down and in-line valves were blocked-in to minimize flow back. A field crew was dispatched to repair the line and a vacuum truck was dispatched to the scene to remove the released water which had accumulated in the immediate vicinity. The vacuumed water was returned to the refinery wastewater treatment unit.

Describe Area Affected and Cleanup Action Taken.* Pooled water was removed by vacuum truck and returned to the refinery wastewater treatment unit. An investigation of the wastewater effluent and soil at the release location was conducted as described in the attached letter. The investigation results indicate that no further action is required regarding this release as described in the attached letter.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: 	<u>OIL CONSERVATION DIVISION</u>		
Printed Name: Robert Combs	Approved by Environmental Specialist:		
Title: Environmental Specialist	Approval Date:	Expiration Date:	
E-mail Address: Robert.Combs@hollyfrontier.com	Conditions of Approval:		Attached <input type="checkbox"/>
Date: 5/23/17	Phone: 575-746-5382		

* Attach Additional Sheets If Necessary



505 East Huntland Drive
Suite 250
Austin, TX 78752

512.329.6080 PHONE
512.329.8750 FAX

www.TRCsolutions.com

May 24, 2017

Mr. Robert Combs, Mr. Scott Denton, Mr. Arsin Sahba
HollyFrontier Navajo Refining LLC
PO Box 159
Artesia, New Mexico 88211

**Re: August 2016 Wastewater Effluent Pipeline Release Investigation Results and
Request for Closure
HollyFrontier Navajo Refining LLC, Artesia Refinery
Discharge Permit GW-028**

Dear Mr. Combs, et al.:

TRC Environmental Corporation (TRC) is pleased to provide HollyFrontier Navajo Refining LLC (Navajo) with this letter to document investigation results completed by Navajo related to the August 2016 wastewater effluent release that occurred approximately 5 miles east of Artesia, New Mexico. The release occurred from the Navajo pipeline that conveys treated wastewater from Navajo's Artesia Refinery (refinery) to injection wells for disposal in accordance with Discharge Permit GW-028 and Underground Injection Control (UIC) permits.

BACKGROUND

Wastewater effluent was released at 6:00 PM on August 9, 2016, due to a collar failure in the pipeline that conveys treated wastewater from the refinery to injection wells located approximately 15 miles southeast of the refinery. The refinery and release locations are shown on Figure 1. The pipeline release was discovered based on a sudden change in monitored pipeline flow and pressure. Navajo completed initial release response and abatement activities on August 9, 2016, immediately following the release. Wastewater effluent discharge pumps located at the refinery were shut down and in-line valves were blocked-in to minimize flow back. The initial Form C-141 documented a release of 10 barrels but the release was greater than the original estimate based on recovery of 40 barrels. Operations reported that 10 barrels were initially released to the surface. As the pipeline was further exposed for repairs, the section of pipeline between the nearest block valve and the line breach drained into the excavation, thus the additional volume recovered by the vacuum truck.

The recovered water was returned to the refinery waste water treatment unit for processing. The released water did not migrate from the release location or enter the Pecos River.

The pipeline was repaired and returned to service on August 10, 2016. The maintenance contractor performed the required repairs and backfilled the excavation with the excavated material due to an absence of obvious impacts. The soil investigation below addresses the entire release area including the material that was backfilled.

Navajo notified the New Mexico Oil Conservation Division (OCD), OCD Artesia District office, and the New Mexico Environment Department (NMED) Hazardous Waste Bureau within 24 hours of the release by telephone. An initial Form C-141 was submitted to the OCD on August 12, 2016, to document the release and initial response and abatement activities. The approximate aerial extent of the accumulated released wastewater is shown on Figure 2.

RELEASE INVESTIGATION

Navajo conducted wastewater and surface soil investigation related to the August 2016 wastewater effluent release. The investigation activities and results are discussed below.

Wastewater Investigation

Navajo collected a sample of wastewater from a pipeline pump on August 10, 2016; this sample is considered equivalent to the wastewater that was released. The wastewater sample was submitted to Hall Environmental Analysis Laboratory (Hall) in Albuquerque, New Mexico for analysis of the same analytical suite required for the quarterly effluent monitoring in the UIC permits. The analytical results are summarized and compared to applicable Water Quality Control Commission Groundwater Standards (WQCC Standards) in Table 1. The following parameters were detected in the wastewater effluent sample in exceedance of WQCC Standards: chloride (320 milligrams per liter [mg/L]), fluoride (13 mg/L), sulfate (1,500 mg/L), iron (2.40 mg/L), and total dissolved solids (TDS) (2,800 mg/L).

Soil Investigation

On October 10, 2016, Navajo collected four surface soil samples from within the release area (samples “Test 1” through “Test 4”) and four surface soil samples from non-release locations in the general vicinity of the release to provide data representative of background conditions (samples “Background 5” through “Background 8”). The sample locations are shown on Figure 2 and include two samples (Test 2 and Test 3) within the material used to backfill the excavation. The surface soil samples were submitted to Hall for laboratory analysis of chloride, fluoride, sulfate, and iron – consistent with the parameters detected in the wastewater effluent sample that exceeded the WQCC Standards. Surface soil analytical results are presented in Table 2 and Figure 2. Laboratory analytical reports are provided in Attachment A. Surface soil analytical results indicate each parameter is present at a highly variable distribution across the release and non-release areas as follows:

- Chloride: Concentrations ranged from 27 milligrams per kilogram (mg/kg) to 3,100 mg/kg in the release area; and 400 mg/kg to 7,600 mg/kg in the non-release areas. Chloride concentrations ranged by up to two orders of magnitude across the release and non-release areas, and were overall greater at locations outside the release area.
- Fluoride: Concentrations ranged from 0.65 mg/kg to 1.8 mg/kg in the release area; and 0.8 mg/kg to 3.2 mg/kg in the non-release areas. Overall fluoride concentrations were greater outside the release area.
- Sulfate: Concentrations ranged from 1,300 mg/kg to 5,200 mg/kg in the release area; and 370 mg/kg to 3,500 mg/kg in the non-release areas. Overall sulfate concentrations were greater within the release area.
- Iron: Concentrations ranged from 20,000 mg/kg to 27,000 mg/kg in the release area; and 14,000 mg/kg to 27,000 mg/kg in the non-release areas. Overall iron concentrations were similar within the release and non-release areas.

To assess the potential for chloride, fluoride, sulfate, and iron to leach from surface soil within the release area to groundwater, surface soil samples were collected on April 27, 2017 from the same four sample locations (“Test 1” through “Test 4”), and submitted to Hall for synthetic precipitation leaching procedure (SPLP) analysis for each of these parameters. The SPLP results are presented and compared to WQCC Standards in Table 2. The SPLP results indicate that chloride, fluoride, and sulfate do not have the potential to leach from surface soil to groundwater at concentrations greater than WQCC Standards. The SPLP iron results indicate that iron has the potential to leach from surface soil to groundwater at a concentration greater than the WQCC Standard at only one of the four sample locations (Test 3) within the release area. The presence of iron at this sample location (Test 3) is attributed to background conditions and not attributed to the August 2016 wastewater release based on the following:

- The iron concentration in soil at Test 3 (23,000 mg/kg) was less than or equal to three of the four samples collected from the non-release areas that are representative of background concentrations (which ranged from 14,000 mg/kg to 27,000 mg/kg).
- The SPLP iron concentration at Test 3 (3.2 mg/L) was greater than the iron concentration in the released wastewater effluent (2.4 mg/L), thus indicating there is additional background source of iron.

Request for Closure

TRC recommends Navajo request that no further action be required in regards to the August 2016 wastewater effluent release based on the following:

- A majority of the wastewater effluent released was recovered via vacuum truck immediately following the release.

- The parameters present in the wastewater effluent at concentrations above WQCC Standards (chloride, fluoride, sulfate, and iron) are present in background (non-release) soils at concentrations similar to or greater than concentrations in the release area. In addition, the distribution of these parameters is highly variable across the release and non-release areas. Therefore, the presence of these parameters in soil at the release location are attributed to background condition and not attributed to the August 2016 wastewater effluent release.
- Chloride, fluoride, and sulfate in soil does not have the potential to leach to groundwater at concentrations above WQCC Standards based on SPLP laboratory analysis. Iron has the potential to leach to groundwater at a concentration above the WQCC Standard at one of the four locations within the release area, but the presence of iron at this location is attributed to background conditions and not the August 2016 wastewater effluent release as described above.

If you have any questions or comments regarding this letter, please feel free to contact me at 512-684-3148.

Sincerely,



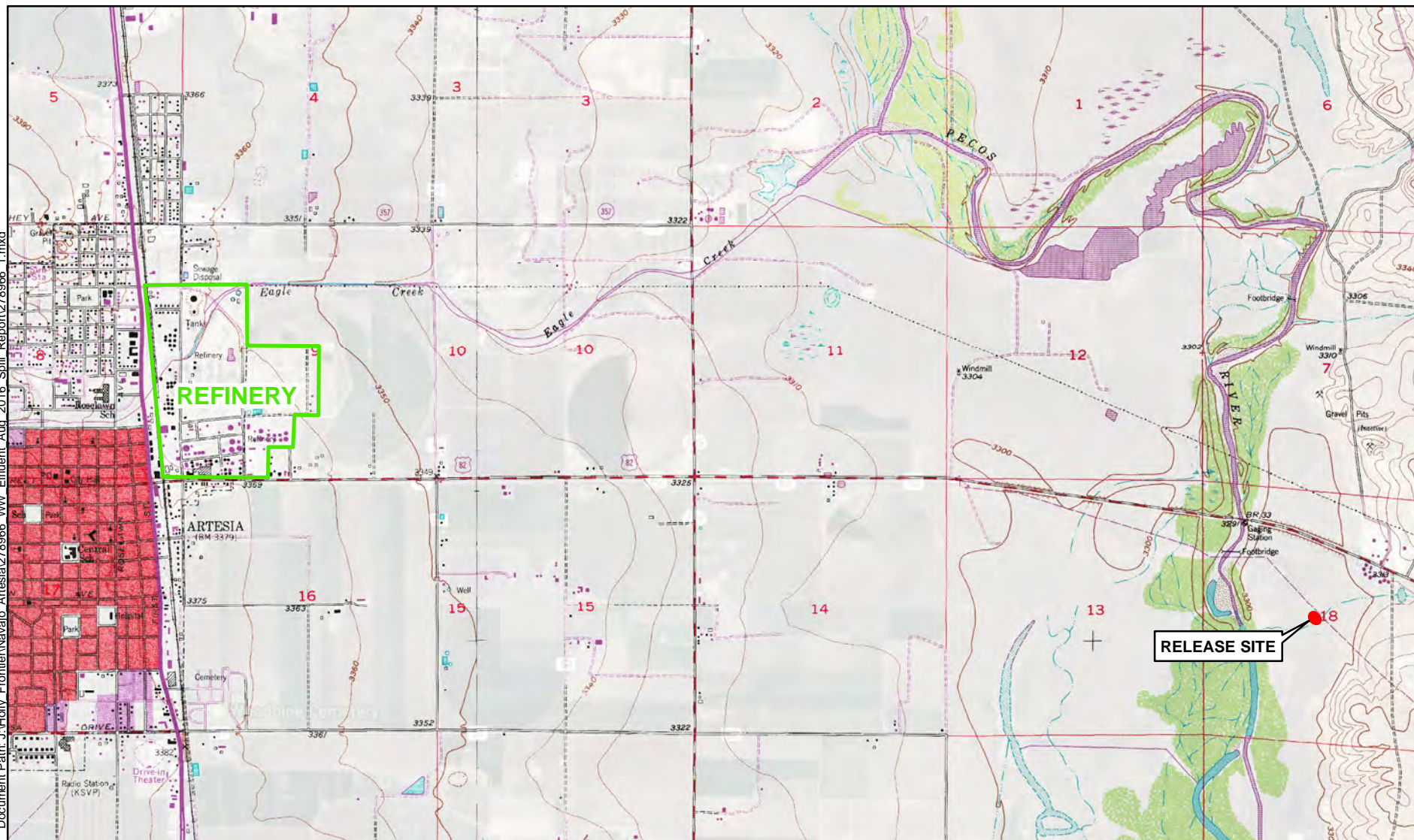
Julie Speer
Project Manager
TRC Environmental Corporation

cc: TRC: B. Gilbert, C. Smith

Attachments:

- Figure 1 – Site Location Map
- Figure 2 – Sample Location and Results Map
- Table 1 – Wastewater Effluent Analytical Results
- Table 2 – Soil Analytical Results
- Attachment A – Laboratory Analytical Reports

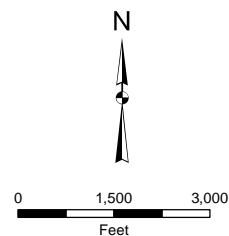
FIGURES



Legend

- RELEASE SITE
- REFINERY

SOURCE: BASE MAP USGS 7.5 MINUTE
SERIES QUADS, ARTESIA AND SPRINGLAKE
QUADRANGLES, 1955, PHOTOREVISED 1983.



SITE LOCATION MAP
AUGUST 2016 WASTEWATER EFFLUENT RELEASE
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

PROJECT NUMBER: 278966

FILE NAME: 278966_1

AUTHOR: MLOVELACE

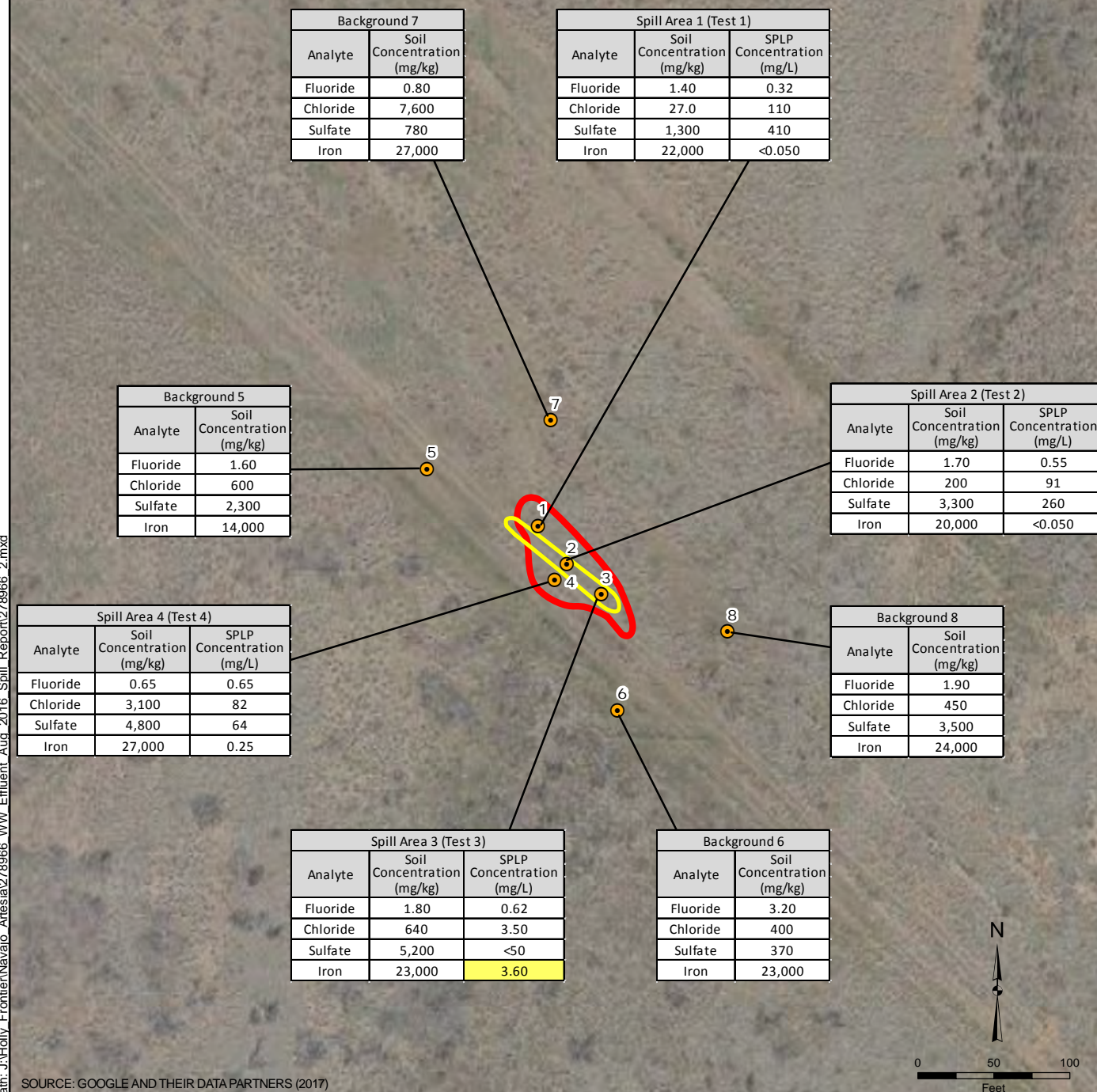
DATE: 5/16/2017



505 E. HUNTLAND DR.
SUITE 250
AUSTIN, TX 78752
PH:512-329-6080

FIGURE

1



LEGEND

- SOIL SAMPLE LOCATIONS
- ▭ EXTENT OF EXCAVATION FOR PIPELINE REPAIR
- ▭ EXTENT OF RELEASE
- ▭ SPLP CONCENTRATION EXCEEDS WQCC STANDARD (WQCC STANDARDS: FLUORIDE, 1.6 mg/L, CHLORIDE = 250 mg/L, SULFATE = 600 mg/L, IRON = 1.0 mg/L)
- SPLP = SYNTHETIC PRECIPITATION LEACHING PROCEDURE
- mg/Kg = MILLIGRAMS PER KILOGRAM
- mg/L = MILLIGRAMS PER LITER
- WQCC STANDARD = WATER QUALITY CONTROL COMMISSION GROUNDWATER STANDARD FOR HUMAN HEALTH EXPOSURE (20.6.2 NMAC)

SAMPLE LOCATION AND RESULTS MAP

AUGUST 2016 WASTEWATER EFFLUENT RELEASE
HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

PROJECT NUMBER: 278966

FILE NAME: 278966_2

AUTHOR: MLOVELACE

DATE: 5/23/2017



505 E. HUNTLAND DR.
SUITE 250
AUSTIN, TX 78752
PH:512-329-6080

FIGURE

2

TABLES

Table 1. Wastewater Effluent Analytical Results
Wastewater Pipeline Release Approximately 5 Miles East of Artesia - August 9, 2016
HollyFrontier Navajo Refining, LLC, GW-028, Artesia, New Mexico

Sample ID: Date:				Wastewater Effluent 8/10/2016
Analyte	Units	WQCC Standard	Screening Standard	Result
VOCs				
1,1,1-Trichloroethane	mg/L	0.060	NMED GW Human Health	< 0.0025
1,1,2,2-Tetrachloroethane	mg/L	0.010	NMED GW Human Health	< 0.0025
1,1,2-Trichloroethane	mg/L	0.100	NMED GW Human Health	< 0.0025
1,1-Dichloroethane	mg/L	0.025	NMED GW Human Health	< 0.0025
1,1-Dichloroethene	mg/L	0.005	NMED GW Human Health	< 0.0025
1,2-Dichloroethane	mg/L	0.010	NMED GW Human Health	< 0.0025
Benzene	mg/L	0.010	NMED GW Human Health	< 0.0025
Carbon Tetrachloride	mg/L	0.010	NMED GW Human Health	< 0.0025
Chloroform	mg/L	0.100	NMED GW Human Health	< 0.0025
Ethylbenzene	mg/L	0.750	NMED GW Human Health	< 0.0025
Methylene Chloride	mg/L	0.100	NMED GW Human Health	< 0.012
Tetrachloroethene	mg/L	0.020	NMED GW Human Health	< 0.0025
Toluene	mg/L	0.750	NMED GW Human Health	0.012
Total Xylenes	mg/L	0.620	NMED GW Human Health	< 0.005
Trichloroethene	mg/L	0.100	NMED GW Human Health	< 0.0025
Vinyl Chloride	mg/L	0.001	NMED GW Human Health	< 0.0025
SVOCs				
1-Methylnaphthalene	mg/L	0.03	NMED GW Human Health	< 0.010
2-Methylnaphthalene	mg/L	0.03	NMED GW Human Health	< 0.010
Naphthalene	mg/L	0.03	NMED GW Human Health	< 0.010
Benzo(a)Pyrene	mg/L	0.0002	EPA MCL	< 0.0002
Total Metals (mg/L)				
Aluminum	mg/L	5.00	NMED GW Irrigation	0.260
Arsenic	mg/L	0.100	NMED GW Human Health	0.031
Barium	mg/L	1.00	NMED GW Human Health	< 0.020
Cadmium	mg/L	0.010	NMED GW Human Health	< 0.0020
Calcium	mg/L	--		130
Chromium	mg/L	0.050	NMED GW Human Health	< 0.0060
Cobalt	mg/L	0.050	NMED GW Irrigation	< 0.0060
Copper	mg/L	1.00	NMED GW Irrigation	< 0.0060
Iron	mg/L	1.00	NMED GW Irrigation	2.40
Lead	mg/L	0.050	NMED GW Human Health	< 0.0050
Manganese	mg/L	0.200	NMED GW Domestic	0.15
Mercury	mg/L	0.002	NMED GW Human Health	< 0.0002
Nickel	mg/L	0.200	NMED GW Irrigation	0.010
Potassium	mg/L	--		60.0
Selenium	mg/L	0.050	NMED GW Human Health	< 0.050
Silver	mg/L	0.050	NMED GW Human Health	< 0.0050
Sodium	mg/L	--		630
Zinc	mg/L	10.0	NMED GW Domestic	0.025
Anions				
Bromide	mg/L	--		1.60
Chloride	mg/L	250	NMED GW Domestic	320
Fluoride (F-, Anion)	mg/L	1.60	NMED GW Human Health	13.0
Nitrite (as N)	mg/L	1.00	NMED GW Human Health	0.96
Nitrate (as N)	mg/L	1.00	NMED GW Human Health	0.50
Sulfate	mg/L	600	NMED GW Domestic	1,500
Other Parameters				
Total Dissolved Solids	mg/L	1,000	NMED GW Domestic	2,800

Notes:

Yellow highlighted concentration exceeds applicable WQCC Standard

mg/L = milligrams per liter

NMED = New Mexico Environment Department

NMED GW Human Health = NMED groundwater standard for human health exposure, NMAC 20.6.2.3103.A

NMED GW Irrigation = NMED groundwater standard for irrigation exposure, NMAC 20.6.2.3103.C

NMED GW Domestic = NMED groundwater standard for domestic exposure, NMAC 20.6.2.3103.B

NMAC = New Mexico Administrative Code

WQCC = Water Quality Control Commission

Table 2. Soil Analytical Results
Wastewater Effluent Pipeline Release Approximately 5 Miles East of Artesia - August 9, 2016
HollyFrontier Navajo Refining, LLC, GW-028, Artesia, New Mexico

Sample Location:	Release Area Soil Samples ⁽¹⁾				Non-Release "Background" Samples ⁽¹⁾				Max Release Area	Max Background
	Test 1	Test 2	Test 3	Test 4	Background 5	Background 6	Background 7	Background 8		
Analyte	Concentration (mg/kg)									
Fluoride	1.40	1.70	1.80	0.65	1.60	3.20	0.80	1.90	1.80	3.20
Chloride	27.0	200	640	3,100	600	400	7,600	450	3,100	7,600
Sulfate	1,300	3,300	5,200	4,800	2,300	370	780	3,500	5,200	3,500
Iron	22,000	20,000	23,000	27,000	14,000	23,000	27,000	24,000	27,000	27,000

Sample Location:	Release Area Soil SPLP Samples ⁽²⁾				Wastewater Effluent ⁽³⁾	WQCC Standard ⁽⁴⁾
	Test 1	Test 2	Test 3	Test 4		
Analyte	Concentration (mg/L)					
Fluoride	0.32	0.55	0.62	0.65	13.0	1.6
Chloride	110	91	3.5	82	320	250
Sulfate	410	260	<50	64	1,500	600
Iron	<0.050	<0.050	3.6	0.25	2.40	1.0

Notes:

Yellow highlighted concentration exceeds applicable WQCC Standard

mg/kg = milligrams per kilogram

mg/L = milligrams per liter

Concentrations highlighted in yellow

⁽¹⁾ Soil samples were collected on October 10, 2016 and analyzed by Hall Environmental Analysis Laboratory in Albuquerque, New Mexico

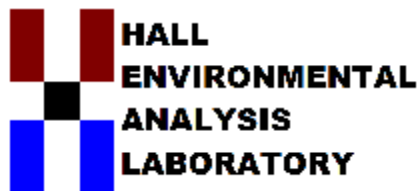
⁽²⁾ Soil samples were collected on April 27, 2017 and analyzed by Hall Environmental Analysis Laboratory in Albuquerque, New Mexico

⁽³⁾ Wastewater effluent sample was collected on August 10, 2016 and analyzed by Hall Environmental Analysis Laboratory in Albuquerque, New Mexico

⁽⁴⁾ Water Quality Control Commission Groundwater Standard for human health exposure (20.6.2 NMAC)

ATTACHMENT A

Laboratory Analytical Reports



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

December 05, 2016

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

RE: Effluent Release 8/10/16

OrderNo.: 1610723

Dear Robert Combs:

Hall Environmental Analysis Laboratory received 11 sample(s) on 10/14/2016 for the analyses presented in the following report.

This report is a revised report and it replaces the original report issued October 31, 2016.

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. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. All samples are reported as received unless otherwise indicated.

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

Sincerely,<>>

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1610723**

Date Reported: **12/5/2016**

CLIENT: Navajo Refining Company

Client Sample ID: Test 1

Project: Effluent Release 8/10/16

Collection Date: 10/12/2016 8:27:00 AM

Lab ID: 1610723-001

Matrix: SOIL

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: LGT
Fluoride	1.4	0.30		mg/Kg	1	10/21/2016 2:58:57 PM
Chloride	27	1.5		mg/Kg	1	10/21/2016 2:58:57 PM
Sulfate	1300	30		mg/Kg	20	10/21/2016 3:36:12 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	22000	250		mg/Kg	100	10/18/2016 9:21:23 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1610723

Date Reported: 12/5/2016

CLIENT: Navajo Refining Company

Client Sample ID: Test 2

Project: Effluent Release 8/10/16

Collection Date: 10/12/2016 8:32:00 AM

Lab ID: 1610723-002

Matrix: SOIL

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: LGT
Fluoride	1.7	0.30		mg/Kg	1	10/21/2016 3:48:36 PM
Chloride	200	30		mg/Kg	20	10/21/2016 4:01:01 PM
Sulfate	3300	75		mg/Kg	50	10/25/2016 10:03:43 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	20000	240		mg/Kg	100	10/18/2016 9:22:56 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1610723

Date Reported: 12/5/2016

CLIENT: Navajo Refining Company

Client Sample ID: Test 3

Project: Effluent Release 8/10/16

Collection Date: 10/12/2016 8:37:00 AM

Lab ID: 1610723-003

Matrix: SOIL

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: LGT
Fluoride	1.8	0.30		mg/Kg	1	10/21/2016 4:13:25 PM
Chloride	640	30		mg/Kg	20	10/21/2016 4:25:50 PM
Sulfate	5200	75		mg/Kg	50	10/25/2016 10:16:08 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	23000	240		mg/Kg	100	10/18/2016 9:24:29 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1610723

Date Reported: 12/5/2016

CLIENT: Navajo Refining Company

Client Sample ID: Test 4

Project: Effluent Release 8/10/16

Collection Date: 10/12/2016 8:44:00 AM

Lab ID: 1610723-004

Matrix: SOIL

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: LGT
Fluoride	0.65	0.30		mg/Kg	1	10/21/2016 4:38:14 PM
Chloride	3100	150		mg/Kg	100	10/25/2016 10:28:33 PM
Sulfate	4800	150		mg/Kg	100	10/25/2016 10:28:33 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	27000	490		mg/Kg	200	10/18/2016 10:03:51 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1610723

Date Reported: 12/5/2016

CLIENT: Navajo Refining Company

Client Sample ID: Background 5

Project: Effluent Release 8/10/16

Collection Date: 10/12/2016 8:56:00 AM

Lab ID: 1610723-005

Matrix: SOIL

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: LGT
Fluoride	1.6	0.30		mg/Kg	1	10/21/2016 5:27:53 PM
Chloride	600	30		mg/Kg	20	10/21/2016 5:40:18 PM
Sulfate	2300	30		mg/Kg	20	10/21/2016 5:40:18 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	14000	250		mg/Kg	100	10/18/2016 9:27:36 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1610723

Date Reported: 12/5/2016

CLIENT: Navajo Refining Company

Client Sample ID: Background 6

Project: Effluent Release 8/10/16

Collection Date: 10/12/2016 9:01:00 AM

Lab ID: 1610723-006

Matrix: SOIL

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: MRA
Fluoride	3.2	0.30		mg/Kg	1	10/25/2016 12:56:59 PM
Chloride	400	30		mg/Kg	20	10/25/2016 1:34:13 PM
Sulfate	370	30		mg/Kg	20	10/25/2016 1:34:13 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	23000	250		mg/Kg	100	10/18/2016 9:29:09 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1610723

Date Reported: 12/5/2016

CLIENT: Navajo Refining Company

Client Sample ID: Background 7

Project: Effluent Release 8/10/16

Collection Date: 10/12/2016 9:08:00 AM

Lab ID: 1610723-007

Matrix: SOIL

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: MRA
Fluoride	0.80	0.30		mg/Kg	1	10/25/2016 1:46:37 PM
Chloride	7600	300		mg/Kg	200	10/26/2016 11:36:39 PM
Sulfate	780	30		mg/Kg	20	10/25/2016 1:59:02 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	27000	500		mg/Kg	200	10/18/2016 10:05:25 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1610723

Date Reported: 12/5/2016

CLIENT: Navajo Refining Company

Client Sample ID: Background 8

Project: Effluent Release 8/10/16

Collection Date: 10/12/2016 9:14:00 AM

Lab ID: 1610723-008

Matrix: SOIL

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: MRA
Fluoride	1.9	0.30		mg/Kg	1	10/25/2016 2:11:26 PM
Chloride	450	30		mg/Kg	20	10/25/2016 2:23:51 PM
Sulfate	3500	75		mg/Kg	50	10/26/2016 11:49:03 PM
EPA METHOD 6010B: SOIL METALS						Analyst: MED
Iron	24000	250		mg/Kg	100	10/18/2016 9:37:54 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1610723**

Date Reported: **12/5/2016**

CLIENT: Navajo Refining Company

Client Sample ID: Test 3

Project: Effluent Release 8/10/16

Collection Date:

Lab ID: 1610723-009

Matrix: LEACHATE

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: LGT
Fluoride	0.53	0.10		mg/L	1	11/11/2016 6:35:12 PM
Sulfate	520	10	*	mg/L	20	11/10/2016 2:59:00 AM

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1610723**

Date Reported: **12/5/2016**

CLIENT: Navajo Refining Company

Client Sample ID: Test 4

Project: Effluent Release 8/10/16

Collection Date:

Lab ID: 1610723-010

Matrix: LEACHATE

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: LGT
Chloride	150	10		mg/L	20	11/10/2016 3:48:38 AM
EPA 6010B: TOTAL RECOVERABLE METALS						Analyst: MED
Iron	ND	0.050		mg/L	1	11/13/2016 2:46:08 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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1610723

Date Reported: 12/5/2016

CLIENT: Navajo Refining Company

Client Sample ID: SPLP BLANK

Project: Effluent Release 8/10/16

Collection Date:

Lab ID: 1610723-011

Matrix: LEACHATE

Received Date: 10/14/2016 8:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: LGT
Fluoride	ND	0.10		mg/L	1	11/10/2016 4:01:03 AM
Chloride	ND	0.50		mg/L	1	11/10/2016 4:01:03 AM
Sulfate	ND	0.50		mg/L	1	11/10/2016 4:01:03 AM
EPA 6010B: TOTAL RECOVERABLE METALS						Analyst: MED
Iron	ND	0.050		mg/L	1	11/13/2016 2:52:13 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
	R	RPD outside accepted recovery limits	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#: 1610723

05-Dec-16

Client: Navajo Refining Company

Project: Effluent Release 8/10/16

Sample ID	MB-28232		SampType: MBLK		TestCode: EPA Method 300.0: Anions					
Client ID:	PBS		Batch ID: 28232		RunNo: 38151					
Prep Date:	10/21/2016		Analysis Date: 10/21/2016		SeqNo: 1190570		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.30								
Chloride	ND	1.5								
Sulfate	ND	1.5								

Sample ID	LCS-28232		SampType: LCS		TestCode: EPA Method 300.0: Anions					
Client ID:	LCSS		Batch ID: 28232		RunNo: 38151					
Prep Date:	10/21/2016		Analysis Date: 10/21/2016		SeqNo: 1190571		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	1.6	0.30	1.500	0	106	90	110			
Chloride	14	1.5	15.00	0	94.3	90	110			
Sulfate	29	1.5	30.00	0	96.3	90	110			

Sample ID	1610723-001AMS		SampType: MS		TestCode: EPA Method 300.0: Anions					
Client ID:	Test 1		Batch ID: 28232		RunNo: 38151					
Prep Date:	10/21/2016		Analysis Date: 10/21/2016		SeqNo: 1190594		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	1.5	0.30	1.500	1.352	8.14	15	110			S
Chloride	47	1.5	15.00	26.77	138	70.8	119			S

Sample ID	1610723-001AMSD		SampType: MSD		TestCode: EPA Method 300.0: Anions						
Client ID:	Test 1		Batch ID: 28232		RunNo: 38151						
Prep Date:	10/21/2016		Analysis Date: 10/21/2016		SeqNo: 1190595		Units: mg/Kg				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Fluoride	1.3	0.30	1.500	1.352	-1.32	15	110	10.1	20	S	
Chloride	47	1.5	15.00	26.77	138	70.8	119	0.00989	20	S	

Sample ID	MB-28251	SampType: mblk			TestCode: EPA Method 300.0: Anions					
Client ID:	PBS	Batch ID: 28251			RunNo: 38161					
Prep Date:	10/24/2016	Analysis Date: 10/24/2016			SeqNo: 1191020		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.30								
Chloride	ND	1.5								
Sulfate	ND	1.5								

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1610723

05-Dec-16

Client: Navajo Refining Company

Project: Effluent Release 8/10/16

Sample ID	LCS-28251		SampType: lcs		TestCode: EPA Method 300.0: Anions					
Client ID:	LCSS		Batch ID: 28251		RunNo: 38161					
Prep Date:	10/24/2016		Analysis Date: 10/24/2016		SeqNo: 1191021		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	1.5	0.30	1.500	0	103	90	110			
Chloride	14	1.5	15.00	0	96.6	90	110			
Sulfate	29	1.5	30.00	0	97.9	90	110			

Sample ID	1610723-006AMS		SampType: MS		TestCode: EPA Method 300.0: Anions					
Client ID:	Background 6		Batch ID: 28251		RunNo: 38187					
Prep Date:	10/24/2016		Analysis Date: 10/25/2016		SeqNo: 1193030		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	3.5	0.30	1.500	3.210	21.9	15	110			

Sample ID	1610723-006AMSD		SampType: MSD		TestCode: EPA Method 300.0: Anions						
Client ID:	Background 6		Batch ID: 28251		RunNo: 38187						
Prep Date:	10/24/2016		Analysis Date: 10/25/2016		SeqNo: 1193031		Units: mg/Kg				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Fluoride	3.4	0.30	1.500	3.210	9.98	15	110	5.17	20	S	

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1610723

05-Dec-16

Client: Navajo Refining Company

Project: Effluent Release 8/10/16

Sample ID	MB	SampType: MBLK			TestCode: EPA Method 300.0: Anions						
Client ID:	PBW	Batch ID: A38595			RunNo: 38595						
Prep Date:		Analysis Date: 11/9/2016			SeqNo: 1205622		Units: mg/L				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride		ND	0.50								
Sulfate		ND	0.50								

Sample ID	LCS	SampType: LCS			TestCode: EPA Method 300.0: Anions						
Client ID:	LCSW	Batch ID: A38595			RunNo: 38595						
Prep Date:		Analysis Date: 11/9/2016			SeqNo: 1205623		Units: mg/L				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride		4.8	0.50	5.000	0	96.0	90	110			
Sulfate		9.8	0.50	10.00	0	97.7	90	110			

Sample ID	MB	SampType: MBLK			TestCode: EPA Method 300.0: Anions						
Client ID:	PBW	Batch ID: R38671			RunNo: 38671						
Prep Date:		Analysis Date: 11/11/2016			SeqNo: 1207765		Units: mg/L				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride		ND	0.10								

Sample ID	LCS	SampType:	LCS	TestCode:	EPA Method 300.0: Anions						
Client ID:	LCSW	Batch ID:	R38671	RunNo:	38671						
Prep Date:		Analysis Date:	11/11/2016	SeqNo:	1207766	Units:	mg/L				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride		0.54	0.10	0.5000	0	108	90	110			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1610723

05-Dec-16

Client: Navajo Refining Company

Project: Effluent Release 8/10/16

Sample ID	MB-28097		SampType: MBLK		TestCode: EPA Method 6010B: Soil Metals					
Client ID:	PBS		Batch ID: 28097		RunNo: 38014					
Prep Date:	10/17/2016		Analysis Date: 10/18/2016		SeqNo: 1185141		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	ND	2.5								

Sample ID	LCS-28097		SampType: LCS		TestCode: EPA Method 6010B: Soil Metals					
Client ID:	LCSS		Batch ID: 28097		RunNo: 38014					
Prep Date:	10/17/2016		Analysis Date: 10/18/2016		SeqNo: 1185142		Units: mg/Kg			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	25	2.5	25.00	0	101	80	120			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1610723

05-Dec-16

Client: Navajo Refining Company

Project: Effluent Release 8/10/16

Sample ID	MB-28558		SampType: MBLK		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	PBW		Batch ID: 28558		RunNo: 38660					
Prep Date:	11/10/2016		Analysis Date: 11/13/2016		SeqNo: 1207448		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	ND	0.050								

Sample ID	LCS-28558		SampType: LCS		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	LCSW		Batch ID: 28558		RunNo: 38660					
Prep Date:	11/10/2016		Analysis Date: 11/13/2016		SeqNo: 1207452		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	0.48	0.050	0.5000	0	96.8	80	120			

Sample ID	1610723-010BMS		SampType: MS		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	Test 4		Batch ID: 28558		RunNo: 38660					
Prep Date:	11/10/2016		Analysis Date: 11/13/2016		SeqNo: 1207457		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	0.50	0.050	0.5000	0.008830	97.5	75	125			

Sample ID	1610723-010BMSD		SampType:	MSD		TestCode:	EPA 6010B: Total Recoverable Metals				
Client ID:	Test 4		Batch ID:	28558		RunNo:	38660				
Prep Date:	11/10/2016		Analysis Date:	11/13/2016		SeqNo:	1207458		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Iron	0.49	0.050	0.5000	0.008830	95.6	75	125	1.95	20		

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

Sample Log-In Check List

Client Name: **NAVAJO REFINING CO**

Work Order Number: **1610723**

RcptNo: **1**

Received by/date:

AS *10/14/16*

Logged By: **Michelle Garcia**

10/14/2016 8:45:00 AM

Michelle Garcia

Completed By: **Michelle Garcia**

10/14/2016 1:12:57 PM

Michelle Garcia

Reviewed By:

[Signature] *10/14/16*

Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☒
2. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
3. How was the sample delivered? UPS

Log In

4. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
5. Were all samples received at a temperature of -20°C to 6.0°C ? Yes ☒ No ☐ NA ☐
6. Sample(s) in proper container(s)? Yes ☒ No ☐
7. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
8. Are samples (except VOA and ONG) properly preserved? Yes ☒ No ☐
9. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
10. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☒
11. Were any sample containers received broken? Yes ☐ No ☒
12. Does paperwork match bottle labels?
(Note discrepancies on chain of custody) Yes ☒ No ☐
13. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
14. Is it clear what analyses were requested? Yes ☒ No ☐
15. Were all holding times able to be met?
(If no, notify customer for authorization.) Yes ☒ No ☐

of preserved
bottles checked
for pH:

(<2 or >12 unless noted)

Adjusted?

Checked by:

Special Handling (if applicable)

16. 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:

17. Additional remarks:

18. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	4.7	Good	Yes			

Chain-of-Custody Record

Turn-Around Time:

Client: Holly Frontier

☒ Standard ☐ Rush

Project Name:

Mailing Address: P.O. Box 159

ARTESIA, NM 88211

Phone #: 575-746-5281

Email or Fax#: 525-746-5451

QA/QC Package:

☒ Standard ☐ Level 4 (Full Validation)

Accreditation:

☐ NELAP ☐ Other

☐ EDD (Type)

Sampler:

On Ice: ☒ Yes ☐ No

Sample Temperature: 78° when collected

Container Type and #

Preservative Type

HEAL No.

4.70C

11010723

Chloride

Fluoride

Sulfate

ARCN

TDS (Total Dissolved Solids)

my 10/14/16

Analysis Request

Remarks:

Verified Analysis with

Randy Date my 12/14/16

Add NLP - 7.4

for Fe + 4 11/4

10.1 Fe

10.1 Fe

10.1 Fe

10.1 Fe

10.1 Fe

10.1 Fe

10.1 Fe

10.1 Fe

10.1 Fe

10.1 Fe

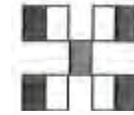
10.1 Fe

10.1 Fe

10.1 Fe

10.1 Fe

10.1 Fe



**HALL ENVIRONMENTAL
ANALYSIS LABORATORY**

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

Analysis Request

Received by:

am/11/16

Date: 10/14/16

Time: 0945

Received by:

Date:

Time:

Relinquished by:

SDade

Relinquished by:

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

August 22, 2016

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

RE: Waste Water Effluent

OrderNo.: 1608660

Dear Robert Combs:

Hall Environmental Analysis Laboratory received 2 sample(s) on 8/11/2016 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,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1608660**

Date Reported: **8/22/2016**

CLIENT: Navajo Refining Company

Client Sample ID: Wastewater Effluent 8-10-16

Project: Waste Water Effluent

Collection Date: 8/10/2016 10:55:00 AM

Lab ID: 1608660-001

Matrix: AQUEOUS

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
IGNITABILITY METHOD 1010							Analyst: SUB
Ignitability	>200	0		°F	1	8/17/2016	R36648
SULFIDE, REACTIVE							Analyst: SUB
Reactive Sulfide	ND	0.20		mg/L	1	8/17/2016	R36648
SPECIFIC GRAVITY							Analyst: LGT
Specific Gravity	1.002	0			1	8/15/2016 4:29:00 PM	R36512
EPA METHOD 300.0: ANIONS							Analyst: MRA
Fluoride	13	0.50	*	mg/L	5	8/11/2016 3:26:00 PM	R36408
Chloride	320	10		mg/L	20	8/11/2016 3:38:24 PM	R36408
Nitrogen, Nitrite (As N)	0.96	0.50		mg/L	5	8/11/2016 3:26:00 PM	R36408
Bromide	1.6	0.50		mg/L	5	8/11/2016 3:26:00 PM	R36408
Nitrogen, Nitrate (As N)	ND	0.50		mg/L	5	8/11/2016 3:26:00 PM	R36408
Phosphorus, Orthophosphate (As P)	ND	2.5		mg/L	5	8/11/2016 3:26:00 PM	R36408
Sulfate	1500	25		mg/L	50	8/18/2016 2:24:04 AM	R36593
SM2510B: SPECIFIC CONDUCTANCE							Analyst: JRR
Conductivity	4400	1.0		µmhos/cm	1	8/15/2016 3:14:28 PM	R36527
SM2320B: ALKALINITY							Analyst: JRR
Bicarbonate (As CaCO3)	289.3	20.00		mg/L CaCO3	1	8/15/2016 4:49:30 PM	R36527
Carbonate (As CaCO3)	ND	2.000		mg/L CaCO3	1	8/15/2016 4:49:30 PM	R36527
Total Alkalinity (as CaCO3)	289.3	20.00		mg/L CaCO3	1	8/15/2016 4:49:30 PM	R36527
SM2540C MOD: TOTAL DISSOLVED SOLIDS							Analyst: KS
Total Dissolved Solids	2800	40.0	*	mg/L	1	8/16/2016 8:21:00 AM	26968
CORROSIVITY							Analyst: SUB
pH	6.99			pH Units	1	8/17/2016	R36648
CYANIDE, REACTIVE							Analyst: SUB
Cyanide, Reactive	0.120	0.0100		mg/L	1	8/16/2016	R36648
SM4500-H+B: PH							Analyst: JRR
pH	7.49	1.68	H	pH units	1	8/15/2016 3:14:28 PM	R36527
EPA METHOD 7470: MERCURY							Analyst: pmf
Mercury	ND	0.00020		mg/L	1	8/12/2016 11:14:45 AM	26894
MERCURY, TCLP							Analyst: pmf
Mercury	ND	0.020		mg/L	1	8/17/2016 10:49:54 AM	27020
EPA 6010B: TOTAL RECOVERABLE METALS							Analyst: MED
Aluminum	0.26	0.020		mg/L	1	8/18/2016 5:02:57 PM	26942

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1608660**

Date Reported: **8/22/2016**

CLIENT: Navajo Refining Company

Client Sample ID: Wastewater Effluent 8-10-16

Project: Waste Water Effluent

Collection Date: 8/10/2016 10:55:00 AM

Lab ID: 1608660-001

Matrix: AQUEOUS

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA 6010B: TOTAL RECOVERABLE METALS				Analyst: MED			
Antimony	ND	0.050		mg/L	1	8/19/2016 10:36:34 AM	26942
Arsenic	0.031	0.020		mg/L	1	8/18/2016 5:02:57 PM	26942
Barium	ND	0.020		mg/L	1	8/18/2016 5:02:57 PM	26942
Beryllium	ND	0.0030		mg/L	1	8/18/2016 5:02:57 PM	26942
Cadmium	ND	0.0020		mg/L	1	8/18/2016 5:02:57 PM	26942
Calcium	130	5.0		mg/L	5	8/18/2016 5:10:17 PM	26942
Chromium	ND	0.0060		mg/L	1	8/18/2016 5:02:57 PM	26942
Cobalt	ND	0.0060		mg/L	1	8/18/2016 5:02:57 PM	26942
Copper	ND	0.0060		mg/L	1	8/18/2016 5:02:57 PM	26942
Iron	2.4	0.25		mg/L	5	8/18/2016 5:10:17 PM	26942
Lead	ND	0.0050		mg/L	1	8/18/2016 5:02:57 PM	26942
Magnesium	41	1.0		mg/L	1	8/18/2016 5:02:57 PM	26942
Manganese	0.15	0.0020		mg/L	1	8/18/2016 5:02:57 PM	26942
Nickel	0.010	0.010		mg/L	1	8/18/2016 5:02:57 PM	26942
Potassium	60	5.0		mg/L	5	8/18/2016 5:10:17 PM	26942
Selenium	ND	0.050		mg/L	1	8/18/2016 5:02:57 PM	26942
Silver	ND	0.0050		mg/L	1	8/18/2016 5:02:57 PM	26942
Sodium	630	10		mg/L	10	8/18/2016 5:21:39 PM	26942
Strontium	1.9	0.10		mg/L	10	8/18/2016 5:21:39 PM	26942
Thallium	ND	0.050		mg/L	1	8/18/2016 5:02:57 PM	26942
Zinc	0.025	0.020		mg/L	1	8/18/2016 5:02:57 PM	26942
Silica	14	5.4		mg/L	5	8/18/2016 5:10:17 PM	26942
EPA 6010B: TCLP METALS				Analyst: MED			
Arsenic	ND	5.0		mg/L	1	8/15/2016 1:30:42 PM	26961
Barium	ND	100		mg/L	1	8/15/2016 1:30:42 PM	26961
Cadmium	ND	1.0		mg/L	1	8/15/2016 1:30:42 PM	26961
Chromium	ND	5.0		mg/L	1	8/15/2016 1:30:42 PM	26961
Lead	ND	5.0		mg/L	1	8/15/2016 1:30:42 PM	26961
Selenium	ND	1.0		mg/L	1	8/15/2016 1:30:42 PM	26961
Silver	ND	5.0		mg/L	1	8/15/2016 1:30:42 PM	26961
EPA METHOD 8260B: VOLATILES				Analyst: SUB			
Acetonitrile	ND	2.5		µg/L	1	8/12/2016	R36648
Allyl chloride	ND	2.5		µg/L	1	8/12/2016	R36648
Chloroprene	ND	2.5		µg/L	1	8/12/2016	R36648
Cyclohexane	ND	2.5		µg/L	1	8/12/2016	R36648
Diethyl ether	ND	2.5		µg/L	1	8/12/2016	R36648
Diisopropyl ether	ND	2.5		µg/L	1	8/12/2016	R36648
Epichlorohydrin	ND	25		µg/L	1	8/12/2016	R36648

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1608660**

Date Reported: **8/22/2016**

CLIENT: Navajo Refining Company

Client Sample ID: Wastewater Effluent 8-10-16

Project: Waste Water Effluent

Collection Date: 8/10/2016 10:55:00 AM

Lab ID: 1608660-001

Matrix: AQUEOUS

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
Ethyl acetate	ND	2.5		µg/L	1	8/12/2016	R36648
Ethyl methacrylate	ND	12		µg/L	1	8/12/2016	R36648
Ethyl tert-butyl ether	ND	2.5		µg/L	1	8/12/2016	R36648
Freon-113	ND	2.5		µg/L	1	8/12/2016	R36648
Isobutanol	ND	50		µg/L	1	8/12/2016	R36648
Isopropyl acetate	ND	2.5		µg/L	1	8/12/2016	R36648
Methacrylonitrile	ND	12		µg/L	1	8/12/2016	R36648
Methyl acetate	ND	2.5		µg/L	1	8/12/2016	R36648
Methyl ethyl ketone	ND	12		µg/L	1	8/12/2016	R36648
Methyl isobutyl ketone	ND	12		µg/L	1	8/12/2016	R36648
Methyl methacrylate	ND	12		µg/L	1	8/12/2016	R36648
Methylcyclohexane	ND	5.0		µg/L	1	8/12/2016	R36648
n-Amyl acetate	ND	2.5		µg/L	1	8/12/2016	R36648
n-Hexane	ND	2.5		µg/L	1	8/12/2016	R36648
Nitrobenzene	ND	25		µg/L	1	8/12/2016	R36648
Pentachloroethane	ND	25		µg/L	1	8/12/2016	R36648
p-isopropyltoluene	ND	2.5		µg/L	1	8/12/2016	R36648
Propionitrile	ND	12		µg/L	1	8/12/2016	R36648
Tetrahydrofuran	ND	2.5		µg/L	1	8/12/2016	R36648
Benzene	ND	2.5		µg/L	1	8/12/2016	R36648
Toluene	12	2.5		µg/L	1	8/12/2016	R36648
Ethylbenzene	ND	2.5		µg/L	1	8/12/2016	R36648
Methyl tert-butyl ether (MTBE)	ND	50		µg/L	1	8/12/2016	R36648
1,2,4-Trimethylbenzene	2.8	2.5		µg/L	1	8/12/2016	R36648
1,3,5-Trimethylbenzene	4.5	2.5		µg/L	1	8/12/2016	R36648
1,2-Dichloroethane (EDC)	ND	2.5		µg/L	1	8/12/2016	R36648
1,2-Dibromoethane (EDB)	ND	2.5		µg/L	1	8/12/2016	R36648
Naphthalene	ND	2.5		µg/L	1	8/12/2016	R36648
Acetone	350	12		µg/L	1	8/12/2016	R36648
Bromobenzene	ND	2.5		µg/L	1	8/12/2016	R36648
Bromodichloromethane	ND	2.5		µg/L	1	8/12/2016	R36648
Bromoform	ND	2.5		µg/L	1	8/12/2016	R36648
Bromomethane	ND	2.5		µg/L	1	8/12/2016	R36648
2-Butanone	47	12		µg/L	1	8/12/2016	R36648
Carbon disulfide	ND	2.5		µg/L	1	8/12/2016	R36648
Carbon Tetrachloride	ND	2.5		µg/L	1	8/12/2016	R36648
Chlorobenzene	ND	2.5		µg/L	1	8/12/2016	R36648
Chloroethane	ND	2.5		µg/L	1	8/12/2016	R36648
Chloroform	ND	2.5		µg/L	1	8/12/2016	R36648

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1608660

Date Reported: 8/22/2016

CLIENT: Navajo Refining Company

Client Sample ID: Wastewater Effluent 8-10-16

Project: Waste Water Effluent

Collection Date: 8/10/2016 10:55:00 AM

Lab ID: 1608660-001

Matrix: AQUEOUS

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
Chloromethane	ND	2.5		µg/L	1	8/12/2016	R36648
2-Chlorotoluene	ND	2.5		µg/L	1	8/12/2016	R36648
4-Chlorotoluene	ND	2.5		µg/L	1	8/12/2016	R36648
cis-1,2-DCE	ND	2.5		µg/L	1	8/12/2016	R36648
cis-1,3-Dichloropropene	ND	2.5		µg/L	1	8/12/2016	R36648
1,2-Dibromo-3-chloropropane	ND	2.5		µg/L	1	8/12/2016	R36648
Dibromochloromethane	ND	2.5		µg/L	1	8/12/2016	R36648
Dibromomethane	ND	2.5		µg/L	1	8/12/2016	R36648
1,2-Dichlorobenzene	ND	2.5		µg/L	1	8/12/2016	R36648
1,3-Dichlorobenzene	ND	2.5		µg/L	1	8/12/2016	R36648
1,4-Dichlorobenzene	ND	2.5		µg/L	1	8/12/2016	R36648
Dichlorodifluoromethane	ND	2.5		µg/L	1	8/12/2016	R36648
1,1-Dichloroethane	ND	2.5		µg/L	1	8/12/2016	R36648
1,1-Dichloroethene	ND	2.5		µg/L	1	8/12/2016	R36648
1,2-Dichloropropane	ND	2.5		µg/L	1	8/12/2016	R36648
1,3-Dichloropropane	ND	2.5		µg/L	1	8/12/2016	R36648
2,2-Dichloropropane	ND	2.5		µg/L	1	8/12/2016	R36648
1,1-Dichloropropene	ND	2.5		µg/L	1	8/12/2016	R36648
Hexachlorobutadiene	ND	2.5		µg/L	1	8/12/2016	R36648
2-Hexanone	28	2.5		µg/L	1	8/12/2016	R36648
Isopropylbenzene	ND	2.5		µg/L	1	8/12/2016	R36648
Methylene Chloride	ND	12		µg/L	1	8/12/2016	R36648
n-Butylbenzene	ND	2.5		µg/L	1	8/12/2016	R36648
n-Propylbenzene	ND	2.5		µg/L	1	8/12/2016	R36648
sec-Butylbenzene	ND	2.5		µg/L	1	8/12/2016	R36648
Styrene	ND	2.5		µg/L	1	8/12/2016	R36648
tert-Butylbenzene	ND	2.5		µg/L	1	8/12/2016	R36648
1,1,1,2-Tetrachloroethane	ND	2.5		µg/L	1	8/12/2016	R36648
1,1,2,2-Tetrachloroethane	ND	2.5		µg/L	1	8/12/2016	R36648
Tetrachloroethene (PCE)	ND	2.5		µg/L	1	8/12/2016	R36648
trans-1,2-DCE	ND	2.5		µg/L	1	8/12/2016	R36648
trans-1,3-Dichloropropene	ND	2.5		µg/L	1	8/12/2016	R36648
1,2,3-Trichlorobenzene	ND	2.5		µg/L	1	8/12/2016	R36648
1,2,4-Trichlorobenzene	ND	2.5		µg/L	1	8/12/2016	R36648
1,1,1-Trichloroethane	ND	2.5		µg/L	1	8/12/2016	R36648
1,1,2-Trichloroethane	ND	2.5		µg/L	1	8/12/2016	R36648
Trichloroethene (TCE)	ND	2.5		µg/L	1	8/12/2016	R36648
Trichlorofluoromethane	ND	2.5		µg/L	1	8/12/2016	R36648
1,2,3-Trichloropropane	ND	2.5		µg/L	1	8/12/2016	R36648

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1608660

Date Reported: 8/22/2016

CLIENT: Navajo Refining Company

Client Sample ID: Wastewater Effluent 8-10-16

Project: Waste Water Effluent

Collection Date: 8/10/2016 10:55:00 AM

Lab ID: 1608660-001

Matrix: AQUEOUS

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
Vinyl chloride	ND	2.5		µg/L	1	8/12/2016	R36648
mp-Xylenes	ND	5.0		µg/L	1	8/12/2016	R36648
o-Xylene	ND	2.5		µg/L	1	8/12/2016	R36648
tert-Amyl methyl ether	ND	2.5		µg/L	1	8/12/2016	R36648
tert-Butyl alcohol	ND	2.5		µg/L	1	8/12/2016	R36648
Acrolein	ND	12		µg/L	1	8/12/2016	R36648
Acrylonitrile	ND	12		µg/L	1	8/12/2016	R36648
Bromochloromethane	ND	2.5		µg/L	1	8/12/2016	R36648
2-Chloroethyl vinyl ether	ND	2.5		µg/L	1	8/12/2016	R36648
Iodomethane	ND	2.5		µg/L	1	8/12/2016	R36648
trans-1,4-Dichloro-2-butene	ND	2.5		µg/L	1	8/12/2016	R36648
Vinyl acetate	ND	2.5		µg/L	1	8/12/2016	R36648
1,4-Dioxane	ND	100		µg/L	1	8/12/2016	R36648
Surr: 1,2-Dichlorobenzene-d4	101	70-130		%Rec	1	8/12/2016	R36648
Surr: 4-Bromofluorobenzene	99.6	70-130		%Rec	1	8/12/2016	R36648
Surr: Toluene-d8	102	70-130		%Rec	1	8/12/2016	R36648
EPA 8270C: SEMIVOLATILES/MOD							Analyst: SUB
1,1-Biphenyl	ND	5.0		µg/L	1	8/17/2016	R36648
Atrazine	ND	5.0		µg/L	1	8/17/2016	R36648
Benzaldehyde	ND	5.0		µg/L	1	8/17/2016	R36648
Caprolactam	ND	5.0		µg/L	1	8/17/2016	R36648
N-Nitroso-di-n-butylamine	ND	5.0		µg/L	1	8/17/2016	R36648
Acetophenone	ND	10		µg/L	1	8/17/2016	R36648
1-Methylnaphthalene	ND	10		µg/L	1	8/17/2016	R36648
2,3,4,6-Tetrachlorophenol	ND	10		µg/L	1	8/17/2016	R36648
2,4,5-Trichlorophenol	ND	10		µg/L	1	8/17/2016	R36648
2,4,6-Trichlorophenol	ND	10		µg/L	1	8/17/2016	R36648
2,4-Dichlorophenol	ND	10		µg/L	1	8/17/2016	R36648
2,4-Dimethylphenol	ND	10		µg/L	1	8/17/2016	R36648
2,4-Dinitrophenol	ND	10		µg/L	1	8/17/2016	R36648
2,4-Dinitrotoluene	ND	10		µg/L	1	8/17/2016	R36648
2,6-Dinitrotoluene	ND	10		µg/L	1	8/17/2016	R36648
2-Chloronaphthalene	ND	10		µg/L	1	8/17/2016	R36648
2-Chlorophenol	ND	10		µg/L	1	8/17/2016	R36648
2-Methylnaphthalene	ND	10		µg/L	1	8/17/2016	R36648
2-Methylphenol	ND	10		µg/L	1	8/17/2016	R36648
2-Nitroaniline	ND	10		µg/L	1	8/17/2016	R36648
2-Nitrophenol	ND	10		µg/L	1	8/17/2016	R36648
3,3'-Dichlorobenzidine	ND	10		µg/L	1	8/17/2016	R36648

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1608660

Date Reported: 8/22/2016

CLIENT: Navajo Refining Company

Client Sample ID: Wastewater Effluent 8-10-16

Project: Waste Water Effluent

Collection Date: 8/10/2016 10:55:00 AM

Lab ID: 1608660-001

Matrix: AQUEOUS

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA 8270C: SEMIVOLATILES/MOD							Analyst: SUB
3-Nitroaniline	ND	10		µg/L	1	8/17/2016	R36648
4,6-Dinitro-2-methylphenol	ND	10		µg/L	1	8/17/2016	R36648
4-Bromophenyl phenyl ether	ND	10		µg/L	1	8/17/2016	R36648
4-Chloro-3-methylphenol	ND	10		µg/L	1	8/17/2016	R36648
4-Chloroaniline	ND	10		µg/L	1	8/17/2016	R36648
4-Chlorophenyl phenyl ether	ND	10		µg/L	1	8/17/2016	R36648
4-Nitroaniline	ND	10		µg/L	1	8/17/2016	R36648
4-Nitrophenol	ND	10		µg/L	1	8/17/2016	R36648
Acenaphthene	ND	10		µg/L	1	8/17/2016	R36648
Acenaphthylene	ND	10		µg/L	1	8/17/2016	R36648
Anthracene	ND	10		µg/L	1	8/17/2016	R36648
Benzo(g,h,i)perylene	ND	10		µg/L	1	8/17/2016	R36648
Benz(a)anthracene	ND	0.20		µg/L	1	8/17/2016	R36648
Benzo(a)pyrene	ND	0.20		µg/L	1	8/17/2016	R36648
Benzo(b)fluoranthene	ND	0.20		µg/L	1	8/17/2016	R36648
Benzo(k)fluoranthene	ND	0.20		µg/L	1	8/17/2016	R36648
Bis(2-chloroethoxy)methane	ND	10		µg/L	1	8/17/2016	R36648
Bis(2-chloroethyl)ether	ND	10		µg/L	1	8/17/2016	R36648
Bis(2-chloroisopropyl)ether	ND	10		µg/L	1	8/17/2016	R36648
Bis(2-ethylhexyl)phthalate	ND	10		µg/L	1	8/17/2016	R36648
Butyl benzyl phthalate	ND	10		µg/L	1	8/17/2016	R36648
Carbazole	ND	10		µg/L	1	8/17/2016	R36648
Chrysene	ND	0.20		µg/L	1	8/17/2016	R36648
Dibenz(a,h)anthracene	ND	0.20		µg/L	1	8/17/2016	R36648
Dibenzofuran	ND	10		µg/L	1	8/17/2016	R36648
Diethyl phthalate	ND	10		µg/L	1	8/17/2016	R36648
Dimethyl phthalate	ND	10		µg/L	1	8/17/2016	R36648
Di-n-butyl phthalate	ND	10		µg/L	1	8/17/2016	R36648
Di-n-octyl phthalate	ND	10		µg/L	1	8/17/2016	R36648
Fluoranthene	ND	10		µg/L	1	8/17/2016	R36648
Fluorene	ND	10		µg/L	1	8/17/2016	R36648
Hexachlorobenzene	ND	2.0		µg/L	1	8/17/2016	R36648
Hexachlorobutadiene	ND	10		µg/L	1	8/17/2016	R36648
Hexachlorocyclopentadiene	ND	10		µg/L	1	8/17/2016	R36648
Hexachloroethane	ND	10		µg/L	1	8/17/2016	R36648
Indeno(1,2,3-cd)pyrene	ND	0.20		µg/L	1	8/17/2016	R36648
Isophorone	ND	10		µg/L	1	8/17/2016	R36648
Naphthalene	ND	10		µg/L	1	8/17/2016	R36648
Nitrobenzene	ND	10		µg/L	1	8/17/2016	R36648

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1608660**

Date Reported: **8/22/2016**

CLIENT: Navajo Refining Company

Client Sample ID: Wastewater Effluent 8-10-16

Project: Waste Water Effluent

Collection Date: 8/10/2016 10:55:00 AM

Lab ID: 1608660-001

Matrix: AQUEOUS

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA 8270C: SEMIVOLATILES/MOD							Analyst: SUB
N-Nitrosodi-n-propylamine	ND	4.0		µg/L	1	8/17/2016	R36648
N-Nitrosodiphenylamine	ND	10		µg/L	1	8/17/2016	R36648
Pentachlorophenol	ND	10		µg/L	1	8/17/2016	R36648
Phenanthrene	ND	10		µg/L	1	8/17/2016	R36648
Phenol	ND	10		µg/L	1	8/17/2016	R36648
Pyrene	ND	10		µg/L	1	8/17/2016	R36648
o-Toluidine	ND	4.0		µg/L	1	8/17/2016	R36648
Pyridine	ND	10		µg/L	1	8/17/2016	R36648
1,2,4,5-Tetrachlorobenzene	ND	10		µg/L	1	8/17/2016	R36648
Surr: 2,4,6-Tribromophenol	90.0	63-110		%Rec	1	8/17/2016	R36648
Surr: 2-Fluorobiphenyl	60.4	58-112		%Rec	1	8/17/2016	R36648
Surr: 2-Fluorophenol	69.0	47-109		%Rec	1	8/17/2016	R36648
Surr: Nitrobenzene-d5	72.0	58-110		%Rec	1	8/17/2016	R36648
Surr: Phenol-d5	67.8	52-105		%Rec	1	8/17/2016	R36648
Surr: Terphenyl-d14	28.7	22-133		%Rec	1	8/17/2016	R36648

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1608660

Date Reported: 8/22/2016

CLIENT: Navajo Refining Company

Client Sample ID: TRIP BLANK

Project: Waste Water Effluent

Collection Date:

Lab ID: 1608660-002

Matrix: TRIP BLANK

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
Acetonitrile	ND	0.50		µg/L	1	8/12/2016	R36648
Allyl chloride	ND	0.50		µg/L	1	8/12/2016	R36648
Chloroprene	ND	0.50		µg/L	1	8/12/2016	R36648
Cyclohexane	ND	0.50		µg/L	1	8/12/2016	R36648
Diethyl ether	ND	0.50		µg/L	1	8/12/2016	R36648
Diisopropyl ether	ND	0.50		µg/L	1	8/12/2016	R36648
Epichlorohydrin	ND	5.0		µg/L	1	8/12/2016	R36648
Ethyl acetate	ND	0.50		µg/L	1	8/12/2016	R36648
Ethyl methacrylate	ND	2.5		µg/L	1	8/12/2016	R36648
Ethyl tert-butyl ether	ND	0.50		µg/L	1	8/12/2016	R36648
Freon-113	ND	0.50		µg/L	1	8/12/2016	R36648
Isobutanol	ND	10		µg/L	1	8/12/2016	R36648
Isopropyl acetate	ND	0.50		µg/L	1	8/12/2016	R36648
Methacrylonitrile	ND	2.5		µg/L	1	8/12/2016	R36648
Methyl acetate	ND	0.50		µg/L	1	8/12/2016	R36648
Methyl ethyl ketone	ND	2.5		µg/L	1	8/12/2016	R36648
Methyl isobutyl ketone	ND	2.5		µg/L	1	8/12/2016	R36648
Methyl methacrylate	ND	2.5		µg/L	1	8/12/2016	R36648
Methylcyclohexane	ND	1.0		µg/L	1	8/12/2016	R36648
n-Amyl acetate	ND	0.50		µg/L	1	8/12/2016	R36648
n-Hexane	ND	0.50		µg/L	1	8/12/2016	R36648
Nitrobenzene	ND	5.0		µg/L	1	8/12/2016	R36648
Pentachloroethane	ND	5.0		µg/L	1	8/12/2016	R36648
p-isopropyltoluene	ND	0.50		µg/L	1	8/12/2016	R36648
Propionitrile	ND	2.5		µg/L	1	8/12/2016	R36648
Tetrahydrofuran	ND	0.50		µg/L	1	8/12/2016	R36648
Benzene	ND	0.50		µg/L	1	8/12/2016	R36648
Toluene	ND	0.50		µg/L	1	8/12/2016	R36648
Ethylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
Methyl tert-butyl ether (MTBE)	ND	10		µg/L	1	8/12/2016	R36648
1,2,4-Trimethylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
1,3,5-Trimethylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
1,2-Dichloroethane (EDC)	ND	0.50		µg/L	1	8/12/2016	R36648
1,2-Dibromoethane (EDB)	ND	0.50		µg/L	1	8/12/2016	R36648
Naphthalene	ND	0.50		µg/L	1	8/12/2016	R36648
Acetone	ND	2.5		µg/L	1	8/12/2016	R36648
Bromobenzene	ND	0.50		µg/L	1	8/12/2016	R36648
Bromodichloromethane	ND	0.50		µg/L	1	8/12/2016	R36648
Bromoform	ND	0.50		µg/L	1	8/12/2016	R36648

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1608660

Date Reported: 8/22/2016

CLIENT: Navajo Refining Company

Client Sample ID: TRIP BLANK

Project: Waste Water Effluent

Collection Date:

Lab ID: 1608660-002

Matrix: TRIP BLANK

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
Bromomethane	ND	0.50		µg/L	1	8/12/2016	R36648
2-Butanone	ND	2.5		µg/L	1	8/12/2016	R36648
Carbon disulfide	ND	0.50		µg/L	1	8/12/2016	R36648
Carbon Tetrachloride	ND	0.50		µg/L	1	8/12/2016	R36648
Chlorobenzene	ND	0.50		µg/L	1	8/12/2016	R36648
Chloroethane	ND	0.50		µg/L	1	8/12/2016	R36648
Chloroform	ND	0.50		µg/L	1	8/12/2016	R36648
Chloromethane	ND	0.50		µg/L	1	8/12/2016	R36648
2-Chlorotoluene	ND	0.50		µg/L	1	8/12/2016	R36648
4-Chlorotoluene	ND	0.50		µg/L	1	8/12/2016	R36648
cis-1,2-DCE	ND	0.50		µg/L	1	8/12/2016	R36648
cis-1,3-Dichloropropene	ND	0.50		µg/L	1	8/12/2016	R36648
1,2-Dibromo-3-chloropropane	ND	0.50		µg/L	1	8/12/2016	R36648
Dibromochloromethane	ND	0.50		µg/L	1	8/12/2016	R36648
Dibromomethane	ND	0.50		µg/L	1	8/12/2016	R36648
1,2-Dichlorobenzene	ND	0.50		µg/L	1	8/12/2016	R36648
1,3-Dichlorobenzene	ND	0.50		µg/L	1	8/12/2016	R36648
1,4-Dichlorobenzene	ND	0.50		µg/L	1	8/12/2016	R36648
Dichlorodifluoromethane	ND	0.50		µg/L	1	8/12/2016	R36648
1,1-Dichloroethane	ND	0.50		µg/L	1	8/12/2016	R36648
1,1-Dichloroethene	ND	0.50		µg/L	1	8/12/2016	R36648
1,2-Dichloropropane	ND	0.50		µg/L	1	8/12/2016	R36648
1,3-Dichloropropane	ND	0.50		µg/L	1	8/12/2016	R36648
2,2-Dichloropropane	ND	0.50		µg/L	1	8/12/2016	R36648
1,1-Dichloropropene	ND	0.50		µg/L	1	8/12/2016	R36648
Hexachlorobutadiene	ND	0.50		µg/L	1	8/12/2016	R36648
2-Hexanone	ND	0.50		µg/L	1	8/12/2016	R36648
Isopropylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
Methylene Chloride	ND	2.5		µg/L	1	8/12/2016	R36648
n-Butylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
n-Propylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
sec-Butylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
Styrene	ND	0.50		µg/L	1	8/12/2016	R36648
tert-Butylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
1,1,1,2-Tetrachloroethane	ND	0.50		µg/L	1	8/12/2016	R36648
1,1,2,2-Tetrachloroethane	ND	0.50		µg/L	1	8/12/2016	R36648
Tetrachloroethene (PCE)	ND	0.50		µg/L	1	8/12/2016	R36648
trans-1,2-DCE	ND	0.50		µg/L	1	8/12/2016	R36648
trans-1,3-Dichloropropene	ND	0.50		µg/L	1	8/12/2016	R36648

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1608660

Date Reported: 8/22/2016

CLIENT: Navajo Refining Company

Client Sample ID: TRIP BLANK

Project: Waste Water Effluent

Collection Date:

Lab ID: 1608660-002

Matrix: TRIP BLANK

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
1,2,3-Trichlorobenzene	ND	0.50		µg/L	1	8/12/2016	R36648
1,2,4-Trichlorobenzene	ND	0.50		µg/L	1	8/12/2016	R36648
1,1,1-Trichloroethane	ND	0.50		µg/L	1	8/12/2016	R36648
1,1,2-Trichloroethane	ND	0.50		µg/L	1	8/12/2016	R36648
Trichloroethene (TCE)	ND	0.50		µg/L	1	8/12/2016	R36648
Trichlorofluoromethane	ND	0.50		µg/L	1	8/12/2016	R36648
1,2,3-Trichloropropane	ND	0.50		µg/L	1	8/12/2016	R36648
Vinyl chloride	ND	0.50		µg/L	1	8/12/2016	R36648
mp-Xylenes	ND	1.0		µg/L	1	8/12/2016	R36648
o-Xylene	ND	0.50		µg/L	1	8/12/2016	R36648
tert-Amyl methyl ether	ND	0.50		µg/L	1	8/12/2016	R36648
tert-Butyl alcohol	ND	0.50		µg/L	1	8/12/2016	R36648
Acrolein	ND	2.5		µg/L	1	8/12/2016	R36648
Acrylonitrile	ND	2.5		µg/L	1	8/12/2016	R36648
Bromochloromethane	ND	0.50		µg/L	1	8/12/2016	R36648
2-Chloroethyl vinyl ether	ND	0.50		µg/L	1	8/12/2016	R36648
Iodomethane	ND	0.50		µg/L	1	8/12/2016	R36648
trans-1,4-Dichloro-2-butene	ND	0.50		µg/L	1	8/12/2016	R36648
Vinyl acetate	ND	0.50		µg/L	1	8/12/2016	R36648
1,4-Dioxane	ND	20		µg/L	1	8/12/2016	R36648
Surr: 1,2-Dichlorobenzene-d4	101	70-130		%Rec	1	8/12/2016	R36648
Surr: 4-Bromofluorobenzene	96.4	70-130		%Rec	1	8/12/2016	R36648
Surr: Toluene-d8	101	70-130		%Rec	1	8/12/2016	R36648

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
	R	RPD outside accepted recovery limits	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#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB	SampType:	mblk	TestCode:	EPA Method 300.0: Anions					
Client ID:	PBW	Batch ID:	R36408	RunNo:	36408					
Prep Date:		Analysis Date:	8/11/2016	SeqNo:	1128954	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Fluoride
Chloride
Nitrogen, Nitrite (As N)
Bromide
Nitrogen, Nitrate (As N)
Phosphorus, Orthophosphate (As P)

ND
ND
ND
ND
ND
ND

0.10
0.50
0.10
0.10
0.10
0.50

Sample ID	LCS	SampType:	lcs	TestCode:	EPA Method 300.0: Anions					
Client ID:	LCSW	Batch ID:	R36408	RunNo:	36408					
Prep Date:		Analysis Date:	8/11/2016	SeqNo:	1128955	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Fluoride
Chloride
Nitrogen, Nitrite (As N)
Bromide
Nitrogen, Nitrate (As N)
Phosphorus, Orthophosphate (As P)

0.52
4.8
0.97
2.4
2.5
4.9

0.10
0.50
0.10
0.10
0.10
0.50

0.5000
5.000
1.000
2.500
2.500
5.000

0
0
0
0
0
0

104
96.2
96.8
96.7
99.0
97.2

90
90
90
90
90
90

110
110
110
110
110
110

Sample ID	MB	SampType:	mblk	TestCode:	EPA Method 300.0: Anions					
Client ID:	PBW	Batch ID:	R36593	RunNo:	36593					
Prep Date:		Analysis Date:	8/17/2016	SeqNo:	1133301	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:	R36593	RunNo:	36593					
Prep Date:		Analysis Date:	8/17/2016	SeqNo:	1133302	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Sulfate

9.7

0.50

10.00

0

97.0

90

110

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-R36648		SampType: MBLK		TestCode: EPA Method 8260B: VOLATILES					
Client ID:	PBW		Batch ID: R36648		RunNo: 36648					
Prep Date:			Analysis Date: 8/12/2016		SeqNo: 1135033		Units: µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acetonitrile	ND	0.50								
Allyl chloride	ND	0.50								
Chloroprene	ND	0.50								
Cyclohexane	ND	0.50								
Diethyl ether	ND	0.50								
Diisopropyl ether	ND	0.50								
Epichlorohydrin	ND	0.50								
Ethyl acetate	ND	0.50								
Ethyl methacrylate	ND	2.5								
Ethyl tert-butyl ether	ND	0.50								
Freon-113	ND	0.50								
Isobutanol	ND	10								
Isopropyl acetate	ND	0.50								
Methacrylonitrile	ND	2.5								
Methyl acetate	ND	0.50								
Methyl ethyl ketone	ND	2.5								
Methyl isobutyl ketone	ND	2.5								
Methyl methacrylate	ND	2.5								
Methylcyclohexane	ND	0.50								
n-Amyl acetate	ND	0.50								
n-Hexane	ND	0.50								
Nitrobenzene	ND	0.50								
Pentachloroethane	ND	0.50								
p-isopropyltoluene	ND	0.50								
Propionitrile	ND	2.5								
Tetrahydrofuran	ND	0.50								
Benzene	ND	0.50								
Toluene	ND	0.50								
Ethylbenzene	ND	0.50								
Methyl tert-butyl ether (MTBE)	ND	0.50								
1,2,4-Trimethylbenzene	ND	0.50								
1,3,5-Trimethylbenzene	ND	0.50								
1,2-Dichloroethane (EDC)	ND	0.50								
1,2-Dibromoethane (EDB)	ND	0.50								
Naphthalene	ND	0.50								
Acetone	ND	2.5								
Bromobenzene	ND	0.50								
Bromodichloromethane	ND	0.50								
Bromoform	ND	0.50								

Qualifiers:

* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-R36648		SampType: MBLK		TestCode: EPA Method 8260B: VOLATILES					
Client ID:	PBW		Batch ID: R36648		RunNo: 36648					
Prep Date:			Analysis Date: 8/12/2016		SeqNo: 1135033		Units: µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Bromomethane	ND	0.50								
2-Butanone	ND	2.5								
Carbon disulfide	ND	0.50								
Carbon Tetrachloride	ND	0.50								
Chlorobenzene	ND	0.50								
Chloroethane	ND	0.50								
Chloroform	ND	0.50								
Chloromethane	ND	0.50								
2-Chlorotoluene	ND	0.50								
4-Chlorotoluene	ND	0.50								
cis-1,2-DCE	ND	0.50								
cis-1,3-Dichloropropene	ND	0.50								
1,2-Dibromo-3-chloropropane	ND	0.50								
Dibromochloromethane	ND	0.50								
Dibromomethane	ND	0.50								
1,2-Dichlorobenzene	ND	0.50								
1,3-Dichlorobenzene	ND	0.50								
1,4-Dichlorobenzene	ND	0.50								
Dichlorodifluoromethane	ND	0.50								
1,1-Dichloroethane	ND	0.50								
1,1-Dichloroethene	ND	0.50								
1,2-Dichloropropane	ND	0.50								
1,3-Dichloropropane	ND	0.50								
2,2-Dichloropropane	ND	0.50								
1,1-Dichloropropene	ND	0.50								
Hexachlorobutadiene	ND	0.50								
2-Hexanone	ND	0.50								
Isopropylbenzene	ND	0.50								
Methylene Chloride	ND	2.5								
n-Butylbenzene	ND	0.50								
n-Propylbenzene	ND	0.50								
sec-Butylbenzene	ND	0.50								
Styrene	ND	0.50								
tert-Butylbenzene	ND	0.50								
1,1,1,2-Tetrachloroethane	ND	0.50								
1,1,2,2-Tetrachloroethane	ND	0.50								
Tetrachloroethene (PCE)	ND	0.50								
trans-1,2-DCE	ND	0.50								
trans-1,3-Dichloropropene	ND	0.50								

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-R36648		SampType:	MBLK		TestCode:	EPA Method 8260B: VOLATILES			
Client ID:	PBW		Batch ID:	R36648		RunNo:	36648			
Prep Date:			Analysis Date:	8/12/2016		SeqNo:	1135033	Units:	µg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,2,3-Trichlorobenzene	ND	0.50								
1,2,4-Trichlorobenzene	ND	0.50								
1,1,1-Trichloroethane	ND	0.50								
1,1,2-Trichloroethane	ND	0.50								
Trichloroethene (TCE)	ND	0.50								
Trichlorofluoromethane	ND	0.50								
1,2,3-Trichloropropane	ND	0.50								
Vinyl chloride	ND	0.50								
mp-Xylenes	ND	1.0								
o-Xylene	ND	0.50								
tert-Amyl methyl ether	ND	0.50								
tert-Butyl alcohol	ND	0.50								
Acrolein	ND	2.5								
Acrylonitrile	ND	2.5								
Bromochloromethane	ND	0.50								
2-Chloroethyl vinyl ether	ND	0.50								
Iodomethane	ND	0.50								
trans-1,4-Dichloro-2-butene	ND	0.50								
Vinyl acetate	ND	0.50								
1,4-Dioxane	ND	0.50								

Sample ID	LCS-R36648		SampType:	LCS		TestCode:	EPA Method 8260B: VOLATILES			
Client ID:	LCSW		Batch ID:	R36648		RunNo:	36648			
Prep Date:			Analysis Date:	8/12/2016		SeqNo:	1135034	Units:	µg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	9.1	0	10.00	0	90.7	80	120			
Toluene	9.4	0	10.00	0	94.5	80	120			
Ethylbenzene	9.6	0	10.00	0	96.4	80	120			
Chlorobenzene	9.1	0	10.00	0	91.2	80	120			
1,1-Dichloroethene	9.1	0	10.00	0	91.1	80	120			
Tetrachloroethene (PCE)	8.7	0	10.00	0	87.1	80	120			
Trichloroethene (TCE)	8.9	0	10.00	0	89.0	80	120			
o-Xylene	10	0	10.00	0	100	80	120			

Qualifiers:

* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-R36648		SampType: MBLK		TestCode: EPA 8270C: Semivolatiles/Mod					
Client ID:	PBW		Batch ID: R36648		RunNo: 36648					
Prep Date:			Analysis Date: 8/17/2016		SeqNo: 1135037		Units: µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
N-Nitroso-di-n-butylamine	ND	1.0								
Acetophenone	ND	10								
1-Methylnaphthalene	ND	10								
2,3,4,6-Tetrachlorophenol	ND	10								
2,4,5-Trichlorophenol	ND	10								
2,4,6-Trichlorophenol	ND	10								
2,4-Dichlorophenol	ND	10								
2,4-Dimethylphenol	ND	10								
2,4-Dinitrophenol	ND	10								
2,4-Dinitrotoluene	ND	10								
2,6-Dinitrotoluene	ND	10								
2-Chloronaphthalene	ND	10								
2-Chlorophenol	ND	10								
2-Methylnaphthalene	ND	10								
2-Methylphenol	ND	10								
2-Nitroaniline	ND	10								
2-Nitrophenol	ND	10								
3,3'-Dichlorobenzidine	ND	10								
3-Nitroaniline	ND	10								
4,6-Dinitro-2-methylphenol	ND	10								
4-Bromophenyl phenyl ether	ND	10								
4-Chloro-3-methylphenol	ND	5.0								
4-Chloroaniline	ND	10								
4-Chlorophenyl phenyl ether	ND	10								
4-Nitroaniline	ND	10								
4-Nitrophenol	ND	10								
Acenaphthene	ND	10								
Acenaphthylene	ND	10								
Anthracene	ND	10								
Benzo(g,h,i)perylene	ND	1.0								
Benz(a)anthracene	ND	1.0								
Benzo(a)pyrene	ND	1.0								
Benzo(b)fluoranthene	ND	1.0								
Benzo(k)fluoranthene	ND	1.0								
Bis(2-chloroethoxy)methane	ND	10								
Bis(2-chloroethyl)ether	ND	10								
Bis(2-chloroisopropyl)ether	ND	10								
Bis(2-ethylhexyl)phthalate	ND	5.0								
Butyl benzyl phthalate	ND	10								

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-R36648		SampType: MBLK		TestCode: EPA 8270C: Semivolatiles/Mod					
Client ID:	PBW		Batch ID: R36648		RunNo: 36648					
Prep Date:			Analysis Date: 8/17/2016		SeqNo: 1135037		Units: µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Carbazole	ND	10								
Chrysene	ND	0.10								
Dibenz(a,h)anthracene	ND	1.0								
Dibenzofuran	ND	10								
Diethyl phthalate	ND	10								
Dimethyl phthalate	ND	10								
Di-n-butyl phthalate	ND	10								
Di-n-octyl phthalate	ND	10								
Fluoranthene	ND	10								
Fluorene	ND	10								
Hexachlorobenzene	ND	1.0								
Hexachlorobutadiene	ND	10								
Hexachlorocyclopentadiene	ND	10								
Hexachloroethane	ND	10								
Indeno(1,2,3-cd)pyrene	ND	1.0								
Isophorone	ND	10								
Naphthalene	ND	10								
Nitrobenzene	ND	10								
N-Nitrosodi-n-propylamine	ND	10								
N-Nitrosodiphenylamine	ND	2.0								
Pentachlorophenol	ND	10								
Phenanthrene	ND	10								
Phenol	ND	5.0								
Pyrene	ND	10								
o-Toluidine	ND	1.0								
Pyridine	ND	1.0								
1,2,4,5-Tetrachlorobenzene	ND	10								

Sample ID	LCS-R36648		SampType: LCS		TestCode: EPA 8270C: Semivolatiles/Mod					
Client ID:	LCSW		Batch ID: R36648		RunNo: 36648					
Prep Date:			Analysis Date: 8/17/2016		SeqNo: 1135038		Units: µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2,4-Dinitrotoluene	4.6	0	5.000	0	91.8	49	134			
2-Chlorophenol	4.6	0	5.000	0	93.0	50	131			
4-Chloro-3-methylphenol	5.1	0	5.000	0	102	42	139			
4-Nitrophenol	4.7	0	5.000	0	94.2	19	137			
Acenaphthene	4.5	0	5.000	0	89.8	36	122			
Bis(2-ethylhexyl)phthalate	5.1	0	5.000	0	102	43	142			

Qualifiers:

* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	LCS-R36648			SampType:	LCS			TestCode:	EPA 8270C: Semivolatiles/Mod		
Client ID:	LCSW			Batch ID:	R36648			RunNo:	36648		
Prep Date:				Analysis Date:	8/17/2016			SeqNo:	1135038		
						Units: µg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
N-Nitrosodi-n-propylamine	4.2	0	5.000	0	84.0	46	140				
Pentachlorophenol	2.2	0	5.000	0	45.0	22	138				
Phenol	4.7	0	5.000	0	93.4	45	134				
Pyrene	5.0	0	5.000	0	100	45	138				

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-26894		SampType:	MBLK		TestCode:	EPA Method 7470: Mercury				
Client ID:	PBW		Batch ID:	26894		RunNo:	36465				
Prep Date:	8/10/2016		Analysis Date:	8/12/2016		SeqNo:	1129407		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercury	ND	0.00020									

Sample ID	LCS-26894		SampType: LCS		TestCode: EPA Method 7470: Mercury					
Client ID:	LCSW		Batch ID: 26894		RunNo: 36465					
Prep Date:	8/10/2016		Analysis Date: 8/12/2016		SeqNo: 1129408		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0053	0.00020	0.005000	0	105	80	120			

Sample ID	1608660-001BMS		SampType: MS		TestCode: EPA Method 7470: Mercury					
Client ID:	Wastewater Effluent		Batch ID: 26894		RunNo: 36465					
Prep Date:	8/10/2016		Analysis Date: 8/12/2016		SeqNo: 1129410		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0057	0.00020	0.005000	0	113	75	125			

Sample ID	1608660-001BMSD			SampType:	MSD		TestCode:	EPA Method 7470: Mercury			
Client ID:	Wastewater Effluent			Batch ID:	26894		RunNo:	36465			
Prep Date:	8/10/2016		Analysis Date:	8/12/2016		SeqNo:	1129411		Units: mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercury	0.0057	0.00020	0.005000	0	114	75	125	0.473	20		

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-27020		SampType:	MBLK		TestCode:	MERCURY, TCLP				
Client ID:	PBW		Batch ID:	27020		RunNo:	36563				
Prep Date:	8/16/2016		Analysis Date:	8/17/2016		SeqNo:	1132320		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercurv	ND	0.020									

Sample ID	LCS-27020			SampType:	LCS		TestCode:	MERCURY, TCLP			
Client ID:	LCSW			Batch ID:	27020		RunNo:	36563			
Prep Date:	8/16/2016			Analysis Date:	8/17/2016		SeqNo:	1132321		Units:	mg/L
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercury	ND	0.020	0.005000	0	98.1	80	120				

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-26942		SampType:	MBLK		TestCode:	EPA 6010B: Total Recoverable Metals			
Client ID:	PBW		Batch ID:	26942		RunNo:	36611			
Prep Date:	8/11/2016		Analysis Date:	8/18/2016		SeqNo:	1134113	Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020								
Arsenic	ND	0.020								
Barium	ND	0.020								
Beryllium	ND	0.0030								
Cadmium	ND	0.0020								
Calcium	ND	1.0								
Chromium	ND	0.0060								
Cobalt	ND	0.0060								
Copper	ND	0.0060								
Iron	ND	0.050								
Lead	ND	0.0050								
Magnesium	ND	1.0								
Manganese	ND	0.0020								
Nickel	ND	0.010								
Potassium	ND	1.0								
Selenium	ND	0.050								
Silver	ND	0.0050								
Sodium	ND	1.0								
Strontium	ND	0.010								
Thallium	ND	0.050								
Zinc	ND	0.020								
Silica	ND	1.1								

Sample ID	LCS-26942		SampType:	LCS		TestCode:	EPA 6010B: Total Recoverable Metals			
Client ID:	LCSW		Batch ID:	26942		RunNo:	36611			
Prep Date:	8/11/2016		Analysis Date:	8/18/2016		SeqNo:	1134115	Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.52	0.020	0.5000	0	103	80	120			
Arsenic	0.49	0.020	0.5000	0	97.6	80	120			
Barium	0.48	0.020	0.5000	0	95.1	80	120			
Beryllium	0.51	0.0030	0.5000	0	101	80	120			
Cadmium	0.47	0.0020	0.5000	0	94.9	80	120			
Calcium	50	1.0	50.00	0	99.0	80	120			
Chromium	0.47	0.0060	0.5000	0	94.7	80	120			
Cobalt	0.46	0.0060	0.5000	0	91.2	80	120			
Copper	0.47	0.0060	0.5000	0	94.2	80	120			
Iron	0.47	0.050	0.5000	0	93.1	80	120			
Lead	0.46	0.0050	0.5000	0	92.8	80	120			

Qualifiers:

* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	LCS-26942		SampType: LCS		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	LCSW		Batch ID: 26942		RunNo: 36611					
Prep Date:	8/11/2016		Analysis Date: 8/18/2016		SeqNo: 1134115		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Magnesium	50	1.0	50.00	0	99.0	80	120			
Manganese	0.47	0.0020	0.5000	0	93.4	80	120			
Nickel	0.45	0.010	0.5000	0	90.3	80	120			
Potassium	48	1.0	50.00	0	96.0	80	120			
Selenium	0.50	0.050	0.5000	0	99.0	80	120			
Silver	0.097	0.0050	0.1000	0	96.8	80	120			
Sodium	49	1.0	50.00	0	97.0	80	120			
Strontium	0.11	0.010	0.1000	0	110	80	120			
Thallium	0.49	0.050	0.5000	0	97.0	80	120			
Zinc	0.46	0.020	0.5000	0	91.0	80	120			
Silica	5.4	1.1	5.350	0	101	80	120			

Sample ID	1608660-001BMS		SampType: MS		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	Wastewater Effluent		Batch ID: 26942		RunNo: 36611					
Prep Date:	8/11/2016		Analysis Date: 8/18/2016		SeqNo: 1134120		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.79	0.020	0.5000	0.2561	106	75	125			
Arsenic	0.52	0.020	0.5000	0.03115	98.4	75	125			
Barium	0.48	0.020	0.5000	0.01539	93.1	75	125			
Beryllium	0.49	0.0030	0.5000	0.0002600	97.2	75	125			
Cadmium	0.47	0.0020	0.5000	0	93.5	75	125			
Chromium	0.46	0.0060	0.5000	0	91.1	75	125			
Cobalt	0.45	0.0060	0.5000	0.002780	89.5	75	125			
Copper	0.51	0.0060	0.5000	0	101	75	125			
Lead	0.45	0.0050	0.5000	0	89.7	75	125			
Magnesium	90	1.0	50.00	41.34	97.7	75	125			
Manganese	0.61	0.0020	0.5000	0.1524	91.0	75	125			
Nickel	0.45	0.010	0.5000	0.01016	88.2	75	125			
Selenium	0.52	0.050	0.5000	0.03028	97.3	75	125			
Silver	0.097	0.0050	0.1000	0	97.3	75	125			
Thallium	0.48	0.050	0.5000	0	95.8	75	125			
Zinc	0.47	0.020	0.5000	0.02456	88.1	75	125			

Sample ID	1608660-001BMSD		SampType:	MSD		TestCode:	EPA 6010B: Total Recoverable Metals				
Client ID:	Wastewater Effluent		Batch ID:	26942		RunNo:	36611				
Prep Date:	8/11/2016		Analysis Date:	8/18/2016		SeqNo:	1134122		Units: mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Aluminum	0.80	0.020	0.5000	0.2561	108	75	125	1.20	20		

Qualifiers:

* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	1608660-001BMSD		SampType: MSD		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	Wastewater Effluent		Batch ID: 26942		RunNo: 36611					
Prep Date:	8/11/2016		Analysis Date: 8/18/2016		SeqNo: 1134122		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.54	0.020	0.5000	0.03115	102	75	125	3.44	20	
Barium	0.48	0.020	0.5000	0.01539	93.8	75	125	0.725	20	
Beryllium	0.49	0.0030	0.5000	0.0002600	98.0	75	125	0.895	20	
Cadmium	0.48	0.0020	0.5000	0	95.7	75	125	2.34	20	
Chromium	0.47	0.0060	0.5000	0	93.8	75	125	2.88	20	
Cobalt	0.46	0.0060	0.5000	0.002780	92.2	75	125	2.97	20	
Copper	0.51	0.0060	0.5000	0	102	75	125	1.08	20	
Lead	0.46	0.0050	0.5000	0	92.1	75	125	2.73	20	
Magnesium	91	1.0	50.00	41.34	98.8	75	125	0.587	20	
Manganese	0.61	0.0020	0.5000	0.1524	91.8	75	125	0.656	20	
Nickel	0.46	0.010	0.5000	0.01016	90.5	75	125	2.44	20	
Selenium	0.52	0.050	0.5000	0.03028	97.8	75	125	0.514	20	
Silver	0.097	0.0050	0.1000	0	97.0	75	125	0.216	20	
Thallium	0.48	0.050	0.5000	0	95.2	75	125	0.572	20	
Zinc	0.48	0.020	0.5000	0.02456	90.6	75	125	2.56	20	

Sample ID	1608660-001BMS		SampType: MS		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	Wastewater Effluent		Batch ID: 26942		RunNo: 36611					
Prep Date:	8/11/2016		Analysis Date: 8/18/2016		SeqNo: 1134131		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Potassium	110	5.0	50.00	60.03	97.9	75	125			

Sample ID	1608660-001BMSD		SampType: MSD		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	Wastewater Effluent		Batch ID: 26942		RunNo: 36611					
Prep Date:	8/11/2016		Analysis Date: 8/18/2016		SeqNo: 1134132		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Potassium	110	5.0	50.00	60.03	97.4	75	125	0.257	20	

Sample ID	MB-26942		SampType: MBLK		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	PBW		Batch ID: 26942		RunNo: 36628					
Prep Date:	8/11/2016		Analysis Date: 8/19/2016		SeqNo: 1134578		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	ND	0.050								

Qualifiers:

* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	LCS-26942		SampType: LCS		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	LCSW		Batch ID: 26942		RunNo: 36628					
Prep Date:	8/11/2016		Analysis Date: 8/19/2016		SeqNo: 1134579		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.49	0.050	0.5000	0	97.9	80	120			

Sample ID	1608660-001BMS		SampType: MS		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	Wastewater Effluent		Batch ID: 26942		RunNo: 36628					
Prep Date:	8/11/2016		Analysis Date: 8/19/2016		SeqNo: 1134583		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.49	0.050	0.5000	0	97.2	75	125			

Sample ID	1608660-001BMSD			SampType:	MSD		TestCode:	EPA 6010B: Total Recoverable Metals			
Client ID:	Wastewater Effluent			Batch ID:	26942		RunNo:	36628			
Prep Date:	8/11/2016		Analysis Date:	8/19/2016		SeqNo:	1134584		Units: mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Antimony	0.49	0.050	0.5000	0	98.5	75	125	1.33	20		

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-26961		SampType:	MBLK		TestCode:	EPA 6010B: TCLP Metals			
Client ID:	PBW		Batch ID:	26961		RunNo:	36503			
Prep Date:	8/12/2016		Analysis Date:	8/15/2016		SeqNo:	1130431	Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020								
Antimony	ND	0.050								
Arsenic	ND	0.020								
Barium	ND	0.020								
Beryllium	ND	0.0030								
Cadmium	ND	0.0020								
Chromium	ND	0.0060								
Cobalt	ND	0.0060								
Copper	ND	0.0060								
Lead	ND	0.0050								
Manganese	ND	0.0020								
Nickel	ND	0.010								
Selenium	ND	0.050								
Silver	ND	0.0050								
Thallium	ND	0.050								
Vanadium	ND	0.050								

Sample ID	LCS-26961		SampType:	LCS		TestCode:	EPA 6010B: TCLP Metals			
Client ID:	LCSW		Batch ID:	26961		RunNo:	36503			
Prep Date:	8/12/2016		Analysis Date:	8/15/2016		SeqNo:	1130432	Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.51	0.020	0.5000	0	103	80	120			
Antimony	0.49	0.050	0.5000	0	98.3	80	120			
Arsenic	0.48	0.020	0.5000	0	95.2	80	120			
Barium	0.46	0.020	0.5000	0	93.0	80	120			
Beryllium	0.49	0.0030	0.5000	0	97.7	80	120			
Cadmium	0.47	0.0020	0.5000	0	94.7	80	120			
Chromium	0.47	0.0060	0.5000	0	93.1	80	120			
Cobalt	0.46	0.0060	0.5000	0	91.2	80	120			
Copper	0.48	0.0060	0.5000	0	95.2	80	120			
Lead	0.46	0.0050	0.5000	0	92.1	80	120			
Manganese	0.46	0.0020	0.5000	0	92.3	80	120			
Nickel	0.46	0.010	0.5000	0	92.0	80	120			
Selenium	0.49	0.050	0.5000	0	97.2	80	120			
Silver	0.096	0.0050	0.1000	0	95.6	80	120			
Thallium	0.47	0.050	0.5000	0	93.1	80	120			
Vanadium	0.49	0.050	0.5000	0	98.0	80	120			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	1608660-001CMS		SampType:	MS		TestCode:	EPA 6010B: TCLP Metals			
Client ID:	Wastewater Effluent		Batch ID:	26961		RunNo:	36503			
Prep Date:	8/12/2016		Analysis Date:	8/15/2016		SeqNo:	1130536		Units: mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.78	0.020	0.5000	0.2003	116	75	125			
Antimony	0.50	0.050	0.5000	0	101	75	125			
Arsenic	0.53	0.020	0.5000	0.02818	101	75	125			
Barium	0.48	0.020	0.5000	0.01425	92.4	75	125			
Beryllium	0.49	0.0030	0.5000	0.0004400	97.1	75	125			
Cadmium	0.48	0.0020	0.5000	0	95.8	75	125			
Chromium	0.46	0.0060	0.5000	0	92.3	75	125			
Cobalt	0.46	0.0060	0.5000	0.001460	91.1	75	125			
Copper	0.51	0.0060	0.5000	0	102	75	125			
Lead	0.46	0.0050	0.5000	0.003590	90.5	75	125			
Manganese	0.61	0.0020	0.5000	0.1322	95.0	75	125			
Nickel	0.47	0.010	0.5000	0.009620	92.8	75	125			
Selenium	0.56	0.050	0.5000	0.03775	105	75	125			
Silver	0.098	0.0050	0.1000	0	97.9	75	125			
Vanadium	0.50	0.050	0.5000	0.006750	98.8	75	125			

Sample ID	1608660-001CMSD		SampType:	MSD		TestCode:	EPA 6010B: TCLP Metals			
Client ID:	Wastewater Effluent		Batch ID:	26961		RunNo:	36503			
Prep Date:	8/12/2016		Analysis Date:	8/15/2016		SeqNo:	1130537		Units: mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.79	0.020	0.5000	0.2003	118	75	125	1.17	20	
Antimony	0.47	0.050	0.5000	0	94.6	75	125	6.35	20	
Arsenic	0.53	0.020	0.5000	0.02818	99.4	75	125	1.25	20	
Barium	0.48	0.020	0.5000	0.01425	93.4	75	125	1.05	20	
Beryllium	0.49	0.0030	0.5000	0.0004400	97.9	75	125	0.828	20	
Cadmium	0.48	0.0020	0.5000	0	95.9	75	125	0.169	20	
Chromium	0.46	0.0060	0.5000	0	92.2	75	125	0.119	20	
Cobalt	0.46	0.0060	0.5000	0.001460	91.6	75	125	0.583	20	
Copper	0.52	0.0060	0.5000	0	104	75	125	1.52	20	
Lead	0.46	0.0050	0.5000	0.003590	90.6	75	125	0.0438	20	
Manganese	0.62	0.0020	0.5000	0.1322	97.0	75	125	1.70	20	
Nickel	0.47	0.010	0.5000	0.009620	92.8	75	125	0.0190	20	
Selenium	0.53	0.050	0.5000	0.03775	97.9	75	125	6.15	20	
Silver	0.10	0.0050	0.1000	0	99.8	75	125	2.01	20	
Vanadium	0.51	0.050	0.5000	0.006750	99.9	75	125	1.05	20	

Qualifiers:

* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	1608660-001CMS	SampType:	MS	TestCode:	EPA 6010B: TCLP Metals					
Client ID:	Wastewater Effluent	Batch ID:	26961	RunNo:	36503					
Prep Date:	8/12/2016	Analysis Date:	8/15/2016	SeqNo:	1130575	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Thallium	0.54	0.25	0.5000	0	107	75	125			

Sample ID	1608660-001CMSD			SampType:	MSD		TestCode:	EPA 6010B: TCLP Metals			
Client ID:	Wastewater Effluent			Batch ID:	26961		RunNo:	36503			
Prep Date:	8/12/2016		Analysis Date:	8/15/2016		SeqNo:	1130576		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Thallium	0.50	0.25	0.5000	0	100	75	125	11.2	20		

Sample ID	MB-26961	SampType:	MBLK		TestCode:	EPA 6010B: TCLP Metals				
Client ID:	PBW	Batch ID:	26961		RunNo:	36584				
Prep Date:	8/12/2016	Analysis Date:	8/17/2016		SeqNo:	1132791	Units:	mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	ND	1.0								
Iron	ND	0.050								
Magnesium	ND	1.0								
Potassium	ND	1.0								
Sodium	ND	1.0								

Sample ID	LCS-26961	SampType: LCS			TestCode: EPA 6010B: TCLP Metals					
Client ID:	LCSW	Batch ID: 26961			RunNo: 36584					
Prep Date:	8/12/2016	Analysis Date: 8/17/2016			SeqNo: 1132792		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	50	1.0	50.00	0	101	80	120			
Iron	0.50	0.050	0.5000	0	99.4	80	120			
Magnesium	50	1.0	50.00	0	99.7	80	120			
Potassium	48	1.0	50.00	0	97.0	80	120			
Sodium	49	1.0	50.00	0	98.4	80	120			

Sample ID	1608660-001CMS	SampType:	MS	TestCode:	EPA 6010B: TCLP Metals					
Client ID:	Wastewater Effluent	Batch ID:	26961	RunNo:	36584					
Prep Date:	8/12/2016	Analysis Date:	8/17/2016	SeqNo:	1132798	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Magnesium	90	1.0	50.00	35.08	110	75	125			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	1608660-001CMSD			SampType:	MSD		TestCode:	EPA 6010B: TCLP Metals			
Client ID:	Wastewater Effluent			Batch ID:	26961		RunNo:	36584			
Prep Date:	8/12/2016		Analysis Date:	8/17/2016		SeqNo:	1132799		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Magnesium	87	1.0	50.00	35.08	104	75	125	3.07	20		

Sample ID	1608660-001CMS	SampType:	MS	TestCode:	EPA 6010B: TCLP Metals					
Client ID:	Wastewater Effluent	Batch ID:	26961	RunNo:	36584					
Prep Date:	8/12/2016	Analysis Date:	8/17/2016	SeqNo:	1132804	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Potassium	110	5.0	50.00	59.21	104	75	125			

Sample ID	1608660-001CMSD	SampType:	MSD	TestCode:	EPA 6010B: TCLP Metals					
Client ID:	Wastewater Effluent	Batch ID:	26961	RunNo:	36584					
Prep Date:	8/12/2016	Analysis Date:	8/17/2016	SeqNo:	1132805	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Potassium	110	5.0	50.00	59.21	93.6	75	125	4.76	20	

Sample ID	MB-26961	SampType:	MBLK	TestCode:	EPA 6010B: TCLP Metals					
Client ID:	PBW	Batch ID:	26961	RunNo:	36591					
Prep Date:	8/12/2016	Analysis Date:	8/18/2016	SeqNo:	1133361	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Zinc	ND	0.020								

Sample ID	LCS-26961	SampType:	LCS	TestCode:	EPA 6010B: TCLP Metals					
Client ID:	LCSW	Batch ID:	26961	RunNo:	36591					
Prep Date:	8/12/2016	Analysis Date:	8/18/2016	SeqNo:	1133362	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Zinc	0.47	0.020	0.5000	0	93.6	80	120			

Sample ID	1608660-001CMS	SampType:	MS	TestCode:	EPA 6010B: TCLP Metals					
Client ID:	Wastewater Effluent	Batch ID:	26961	RunNo:	36591					
Prep Date:	8/12/2016	Analysis Date:	8/18/2016	SeqNo:	1133467	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Zinc	0.50	0.020	0.5000	0.02262	95.6	75	125			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID 1608660-001CMSD		SampType: MSD		TestCode: EPA 6010B: TCLP Metals						
Client ID: Wastewater Effluent		Batch ID: 26961		RunNo: 36591						
Prep Date: 8/12/2016		Analysis Date: 8/18/2016		SeqNo: 1133468		Units: mg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Zinc	0.49	0.020	0.5000	0.02262	92.8	75	125	2.78	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
R RPD outside accepted recovery limits	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#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-R36648		SampType:	MBLK		TestCode:	CYANIDE, Reactive				
Client ID:	PBW		Batch ID:	R36648		RunNo:	36648				
Prep Date:			Analysis Date:	8/16/2016		SeqNo:	1135042		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Cyanide, Reactive	ND	1.00									

Sample ID	LCS-R36648			SampType:	LCS		TestCode:	CYANIDE, Reactive			
Client ID:	LCSW			Batch ID:	R36648		RunNo:	36648			
Prep Date:				Analysis Date:	8/16/2016		SeqNo:	1135043	Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Cyanide, Reactive	0.578		0.5000	0	116	80	120				

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-R36648		SampType:	MBLK		TestCode:	SULFIDE, Reactive				
Client ID:	PBW		Batch ID:	R36648		RunNo:	36648				
Prep Date:			Analysis Date:	8/17/2016		SeqNo:	1135045		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Reactive Sulfide	ND	1.0									

Sample ID	LCS-R36648		SampType:	LCS		TestCode:	SULFIDE, Reactive				
Client ID:	LCSW		Batch ID:	R36648		RunNo:	36648				
Prep Date:			Analysis Date:	8/17/2016		SeqNo:	1135046		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Reactive Sulfide	0.20		0.2000	0	100	70	130				

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	mb-1		SampType:	mbk		TestCode:	SM2320B: Alkalinity				
Client ID:	PBW		Batch ID:	R36527		RunNo:	36527				
Prep Date:			Analysis Date:	8/15/2016		SeqNo:	1131152	Units:	mg/L CaCO3		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Total Alkalinity (as CaCO3)	ND	20.00									

Sample ID	Ics-1		SampType: Ics		TestCode: SM2320B: Alkalinity					
Client ID:	LCSW		Batch ID: R36527		RunNo: 36527					
Prep Date:			Analysis Date: 8/15/2016		SeqNo: 1131153		Units: mg/L CaCO3			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	79.40	20.00	80.00	0	99.2	90	110			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-26968		SampType:	MBLK		TestCode:	SM2540C MOD: Total Dissolved Solids				
Client ID:	PBW		Batch ID:	26968		RunNo:	36519				
Prep Date:	8/13/2016		Analysis Date:	8/16/2016		SeqNo:	1130783		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-26968		SampType:	LCS		TestCode:	SM2540C MOD: Total Dissolved Solids				
Client ID:	LCSW		Batch ID:	26968		RunNo:	36519				
Prep Date:	8/13/2016		Analysis Date:	8/16/2016		SeqNo:	1130784		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Total Dissolved Solids	994	20.0	1000	0	99.4	80	120				

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

Sample Log-In Check List

Client Name: **NAVAJO REFINING COM**

Work Order Number: **1608660**

RcptNo: 1

Received by/date:

Logged By: **Lindsay Mangin**

8/11/2016 9:05:00 AM

Completed By: **Lindsay Mangin**

8/11/2016 10:45:24 AM

Reviewed By:

Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☒
2. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
3. How was the sample delivered? Courier

Log In

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

of preserved
bottles checked
for pH: **3 2**
3 or **>12** (unless noted)
Adjusted? **NO**

Checked by: **AS**

Special Handling (if applicable)

16. 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:

17. Additional remarks:

18. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.5	Good	Yes			



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

April 28, 2017

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

RE: 2016 Effluent PL Release

OrderNo.: 1704B56

Dear Robert Combs:

Hall Environmental Analysis Laboratory received 8 sample(s) on 4/27/2017 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,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1704B56**

Date Reported: **4/28/2017**

CLIENT: Navajo Refining Company

Client Sample ID: SP-1 Test 1

Project: 2016 Effluent PL Release

Collection Date: 4/27/2017 8:00:00 AM

Lab ID: 1704B56-005

Matrix: LEACHATE

Received Date: 4/27/2017 8:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: MRA
Fluoride	0.32	0.10		mg/L	1	4/27/2017 3:39:39 PM
Chloride	110	10		mg/L	20	4/27/2017 4:16:53 PM
Sulfate	410	50	*	mg/L	20	4/27/2017 4:16:53 PM
EPA METHOD 6010B: SPLP METALS						Analyst: JLF
Iron	ND	0.050		mg/L	1	4/28/2017 4:02:23 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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1704B56**

Date Reported: **4/28/2017**

CLIENT: Navajo Refining Company

Client Sample ID: SP-2 Test 2

Project: 2016 Effluent PL Release

Collection Date: 4/27/2017 8:00:00 AM

Lab ID: 1704B56-006

Matrix: LEACHATE

Received Date: 4/27/2017 8:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: MRA
Fluoride	0.55	0.10		mg/L	1	4/27/2017 4:29:18 PM
Chloride	91	10		mg/L	20	4/27/2017 4:41:43 PM
Sulfate	260	50	*	mg/L	20	4/27/2017 4:41:43 PM
EPA METHOD 6010B: SPLP METALS						Analyst: JLF
Iron	ND	0.050		mg/L	1	4/28/2017 4:13:32 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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1704B56**

Date Reported: **4/28/2017**

CLIENT: Navajo Refining Company

Client Sample ID: SP-3 Test 3

Project: 2016 Effluent PL Release

Collection Date: 4/27/2017 8:00:00 AM

Lab ID: 1704B56-007

Matrix: LEACHATE

Received Date: 4/27/2017 8:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: MRA
Fluoride	0.62	0.10		mg/L	1	4/27/2017 4:54:07 PM
Chloride	3.5	0.50		mg/L	1	4/27/2017 4:54:07 PM
Sulfate	ND	50		mg/L	20	4/27/2017 5:06:31 PM
EPA METHOD 6010B: SPLP METALS						Analyst: JLF
Iron	3.6	0.050		mg/L	1	4/28/2017 4:15:03 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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1704B56**

Date Reported: **4/28/2017**

CLIENT: Navajo Refining Company

Client Sample ID: SP-3 Test 4

Project: 2016 Effluent PL Release

Collection Date: 4/27/2017 8:00:00 AM

Lab ID: 1704B56-008

Matrix: LEACHATE

Received Date: 4/27/2017 8:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: MRA
Fluoride	0.65	0.10		mg/L	1	4/27/2017 5:43:44 PM
Chloride	82	10		mg/L	20	4/27/2017 5:56:09 PM
Sulfate	64	50		mg/L	20	4/27/2017 5:56:09 PM
EPA METHOD 6010B: SPLP METALS						Analyst: JLF
Iron	0.25	0.050		mg/L	1	4/28/2017 4:16:09 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
	R	RPD outside accepted recovery limits	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#: 1704B56

28-Apr-17

Client: Navajo Refining Company

Project: 2016 Effluent PL Release

Sample ID	MB-SPLP 2996		SampType: mblk		TestCode: EPA Method 300.0: Anions					
Client ID:	PBW		Batch ID: R42410		RunNo: 42410					
Prep Date:			Analysis Date: 4/27/2017		SeqNo: 1333857		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								
Sulfate	ND	2.5								

Sample ID	LCS-SPLP 2996		SampType: lcs		TestCode: EPA Method 300.0: Anions					
Client ID:	LCSW		Batch ID: R42410		RunNo: 42410					
Prep Date:			Analysis Date: 4/27/2017		SeqNo: 1333858		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.49	0.10	0.5000	0	97.7	90	110			
Chloride	4.7	0.50	5.000	0	94.7	90	110			
Sulfate	10	2.5	10.00	0	100	90	110			

Sample ID	1704B56-005AMS		SampType: ms		TestCode: EPA Method 300.0: Anions					
Client ID:	SP-1 Test 1		Batch ID: R42410		RunNo: 42410					
Prep Date:			Analysis Date: 4/27/2017		SeqNo: 1333860		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.89	0.10	0.5000	0.3220	114	70.4	122			

Sample ID	1704B56-005AMSD		SampType: msd		TestCode: EPA Method 300.0: Anions					
Client ID:	SP-1 Test 1		Batch ID: R42410		RunNo: 42410					
Prep Date:			Analysis Date: 4/27/2017		SeqNo: 1333861		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.89	0.10	0.5000	0.3220	114	70.4	122	0.0705	20	

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1704B56

28-Apr-17

Client: Navajo Refining Company

Project: 2016 Effluent PL Release

Sample ID	MB-31484		SampType:	MBLK		TestCode:	EPA Method 6010B: SPLP Metals				
Client ID:	PBW		Batch ID:	31484		RunNo:	42444				
Prep Date:	4/28/2017		Analysis Date:	4/28/2017		SeqNo:	1334411		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Iron	ND	0.050									

Sample ID	LCS-31484		SampType:	LCS		TestCode:	EPA Method 6010B: SPLP Metals				
Client ID:	LCSW		Batch ID:	31484		RunNo:	42444				
Prep Date:	4/28/2017		Analysis Date:	4/28/2017		SeqNo:	1334412		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Iron	0.51	0.050	0.5000	0	101	80	120				

Sample ID	1704B56-005BMSD		SampType:	MSD		TestCode:	EPA Method 6010B: SPLP Metals				
Client ID:	SP-1 Test 1		Batch ID:	31484		RunNo:	42444				
Prep Date:	4/28/2017		Analysis Date:	4/28/2017		SeqNo:	1334415		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Iron	0.50	0.050	0.5000	0	100	75	125	0.405	20		

Sample ID	1704B56-005BMS			SampType:	MS		TestCode:	EPA Method 6010B: SPLP Metals			
Client ID:	SP-1 Test 1			Batch ID:	31484		RunNo:	42444			
Prep Date:	4/28/2017			Analysis Date:	4/28/2017		SeqNo:	1334416		Units:	mg/L
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Iron	0.50	0.050	0.5000	0	101	75	125				

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

Sample Log-In Check List

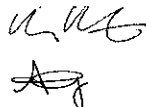
Client Name: **NAVAJO REFINING CO**

Work Order Number: **1704B56**

RcptNo: **1**

Received By: **Erin Melendrez** 4/26/2017 9:35:00 AM

Completed By: **Ashley Gallegos** 4/26/2017 10:02:17 AM

Reviewed By: **SRE 04/26/17**


Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☒
2. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
3. How was the sample delivered? Courier

Log In

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

of preserved
bottles checked
for pH:

(<2 or >12 unless noted)

Adjusted? _____

Checked by: _____

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified:		Date:	
By Whom:		Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:			
Client Instructions:			

17. Additional remarks:

18. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	4.1	Good	Yes			



**HALL ENVIRONMENTAL
ANALYSIS LABORATORY**

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

Analysis Request

Client:		HollyFrontier Navajo Refining LLC	
Mailing Address:		PO Box 159	
Phone #		Artesia, NM 88211-0159	
email or Fax#:		575-308-2718	
QA/QC Package:		X Level 4 (Full Validation)	
Standard			
<input type="checkbox"/> Other			
<input type="checkbox"/> EDD (Type)			
Project Name		2016 Effluent PL Release	
Standard		<input type="checkbox"/> Rush X	
Project #:		PO: 231642	
Project Manager:		Robert Combs Scott Denton	
Sampler:		Dave Boyer	
On Ice:		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Sample Temperature:		4.1	
Date	Time	Matrix	Sample Request ID
4/25/2017	1345	soil	SP-1 Test 1
4/25/2017	1350	soil	SP-2 Test 2
4/25/2017	1355	soil	SP-3 Test 3
4/25/2017	1400	soil	SP-3 Test 4
Container Type and #		Preservative Type	
402.2		Cool	
1		1	
402.2		Cool	
HEAL No.		17043510	
		-001	
		-002	
		-003	
		-004	
Received by:		Date Time	
[Signature]		4/25/17 1500	
Received by:		Date Time	
[Signature]		4/26/17 0935	

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

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Tuesday, November 15, 2016 3:19 PM
To: Combs, Robert (Robert.Combs@hollyfrontier.com)
Cc: Holder, Mike (Michael.Holder@hollyfrontier.com); Denton, Scott (Scott.Denton@HollyFrontier.com); Griswold, Jim, EMNRD
Subject: Artesia Refinery (GW-28) 2015 Effluent Pipeline Release

Robert, et al.:

Good afternoon. The New Mexico Oil Conservation Division (OCD) has re-evaluated the release information from the July 27, 2016 Investigation Report, subsequent to the telephone communication call on Nov. 9th. OCD comments and requirements are provided below based on a review of information to date.

OCD comments:

- 1) The water table is less than 10 ft. bgl and the release location is within the Pecos River Flood Plain Watershed area.
- 2) The soil removed to repair the line is estimated to be 50-60 cubic yards, and were not sampled for waste determination because HF was not convinced that the removed soils were actually waste. The excavated soils are stockpiled on land surface, and clean fill was used to backfill the excavation area.
- 3) Two soil borings were advanced (TMW-WWL1 and TMW-WWL2) in areas believed to have been unimpacted by the pipeline release with soil samples taken at depths of 1, 6 and 12 feet bgs in each boring. The 12 foot samples would have been in the capillary fringe or saturated zone. Those soil samples were analyzed for the constituents provided in Table 2. These "background" soils appear elevated in iron and sulfate, at a minimum. No sampling was done upon the 50 to 60 yards of excavated soils and no sampling was done on the sides or at the base of the excavation.
- 4) The approach used on this 2015 effluent line release appears to be what is also needed on 2016 effluent pipeline release; however, OCD requires sampling along the sidewalls and base of excavations in order to verify soil remediation is acceptable, and the waste must also be sampled for a waste determination. Consequently, HF must not re-embed excavated soils back into the excavation until the analytical data is reviewed and a determination is made by OCD.
- 5) OCD generally relies on soil screening limits DAF1 and DAF20 for evaluation of soil contamination and protection of groundwater when and where feasible. Establishment of background soil quality does simplify the final cleanup criteria for parameters lacking a DAF1 or DAF20.
- 6) For soil reuse proposals related to the effluent pipeline, submittals to OCD is in order. OCD will likely use a similar approach as the NMED for final determination.

OCD requirements:

- 1) OCD requires that the excavated soils be sampled and similarly analyzed for the constituents in Table 2. OCD requires at least 3 discrete grab samples (no composites), one sample for every ~20 yards of material. Environmental analyses shall consist of Organics by Method 8260 full list; Method 8015 extended range; Iron and Manganese by Method 6010; along with Chloride, Fluoride, and Sulfate by Method 300. If the excavation is still open, a sample from the base of excavation should also be collected and analyzed.
- 2) HF shall submit the environmental analytical data with QA/QC to OCD to compare with the background information to decide on the next step (if any) on or before December 31, 2016.

3) HF shall follow EPA QA/QC and DQOs for all field and laboratory work.

Please contact me if you have questions. Thank you.

[illegible]

Chavez, Carl J, EMNRD

From: Combs, Robert <Robert.Combs@HollyFrontier.com>
Sent: Thursday, September 8, 2016 4:23 PM
To: Chavez, Carl J, EMNRD
Cc: Denton, Scott; Dade, Lewis (Randy); Bratcher, Mike, EMNRD; Tsinnajinnie, Leona, NMENV; Orosco, Richard; Griswold, Jim, EMNRD
Subject: RE: 2016-08-12 Initial C-141 Effluent spill 2016-08-09
Attachments: Rpt_1608660_Final_v1.pdf; Wasterwater Results August 2016.xlsx

Carl,

In reference to the treated waste water release on August 9, 2016, we have the following to report:

On the day of the release, during the pipeline repair, a sample of the water was collected from discharge of the pipeline pump. We sent the sample to be analyzed for the same suite as the samples sent for the quarterly effluent monitoring (UIC permits). The lab report and comparison table are attached. The constituents present at concentrations above WQCC standards were chloride (320 mg/L), fluoride (13 mg/L), sulfate (1500 mg/L), iron (2.4 mg/L) and total dissolved solids (TDS, 2800 mg/L).

We propose to collect surface soil samples within the impacted area and topographically upgradient, within 50 feet of the impacted area, and analyze for chloride, fluoride, iron and sulfate (TDS is not applicable). We will collect 3-4 samples in the spill area and 3-4 samples outside of the spill area for baseline. We will present those results in a table, however, since iron and fluoride are the only constituents with approved cleanup standards, we will use the baseline sample concentrations to approximate natural conditions for chloride and sulfate. We can then discuss if further action is necessary.

Please let me know if you have any questions or would like to discuss.

Thanks,
Robert

From: Orosco, Richard
Sent: Friday, August 12, 2016 9:17 AM
To: CarlJ.Chavez@state.nm.us; Leona.Tsinnajinnie@state.nm.us
Cc: Denton, Scott; Dade, Lewis (Randy); Combs, Robert; mike.bratcher@state.nm.us
Subject: 2016-08-12 Initial C-141 Effluent spill 2016-08-09

Carl and Leona,
Please see the attached Initial C-141 form for the effluent spill that occurred on 8/10. Please call or email if you have any questions or would like to discuss.
Thanks,

Richard L. Orosco
Environmental Tech III
HollyFrontier
Navajo Refining LLC
(575) 746-5398 Office
(575) 703-2409 Cell

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

August 22, 2016

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

RE: Waste Water Effluent

OrderNo.: 1608660

Dear Robert Combs:

Hall Environmental Analysis Laboratory received 2 sample(s) on 8/11/2016 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,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1608660**

Date Reported: **8/22/2016**

CLIENT: Navajo Refining Company

Client Sample ID: Wastewater Effluent 8-10-16

Project: Waste Water Effluent

Collection Date: 8/10/2016 10:55:00 AM

Lab ID: 1608660-001

Matrix: AQUEOUS

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
IGNITABILITY METHOD 1010							Analyst: SUB
Ignitability	>200	0		°F	1	8/17/2016	R36648
SULFIDE, REACTIVE							Analyst: SUB
Reactive Sulfide	ND	0.20		mg/L	1	8/17/2016	R36648
SPECIFIC GRAVITY							Analyst: LGT
Specific Gravity	1.002	0			1	8/15/2016 4:29:00 PM	R36512
EPA METHOD 300.0: ANIONS							Analyst: MRA
Fluoride	13	0.50	*	mg/L	5	8/11/2016 3:26:00 PM	R36408
Chloride	320	10		mg/L	20	8/11/2016 3:38:24 PM	R36408
Nitrogen, Nitrite (As N)	0.96	0.50		mg/L	5	8/11/2016 3:26:00 PM	R36408
Bromide	1.6	0.50		mg/L	5	8/11/2016 3:26:00 PM	R36408
Nitrogen, Nitrate (As N)	ND	0.50		mg/L	5	8/11/2016 3:26:00 PM	R36408
Phosphorus, Orthophosphate (As P)	ND	2.5		mg/L	5	8/11/2016 3:26:00 PM	R36408
Sulfate	1500	25		mg/L	50	8/18/2016 2:24:04 AM	R36593
SM2510B: SPECIFIC CONDUCTANCE							Analyst: JRR
Conductivity	4400	1.0		µmhos/cm	1	8/15/2016 3:14:28 PM	R36527
SM2320B: ALKALINITY							Analyst: JRR
Bicarbonate (As CaCO3)	289.3	20.00		mg/L CaCO3	1	8/15/2016 4:49:30 PM	R36527
Carbonate (As CaCO3)	ND	2.000		mg/L CaCO3	1	8/15/2016 4:49:30 PM	R36527
Total Alkalinity (as CaCO3)	289.3	20.00		mg/L CaCO3	1	8/15/2016 4:49:30 PM	R36527
SM2540C MOD: TOTAL DISSOLVED SOLIDS							Analyst: KS
Total Dissolved Solids	2800	40.0	*	mg/L	1	8/16/2016 8:21:00 AM	26968
CORROSIVITY							Analyst: SUB
pH	6.99			pH Units	1	8/17/2016	R36648
CYANIDE, REACTIVE							Analyst: SUB
Cyanide, Reactive	0.120	0.0100		mg/L	1	8/16/2016	R36648
SM4500-H+B: PH							Analyst: JRR
pH	7.49	1.68	H	pH units	1	8/15/2016 3:14:28 PM	R36527
EPA METHOD 7470: MERCURY							Analyst: pmf
Mercury	ND	0.00020		mg/L	1	8/12/2016 11:14:45 AM	26894
MERCURY, TCLP							Analyst: pmf
Mercury	ND	0.020		mg/L	1	8/17/2016 10:49:54 AM	27020
EPA 6010B: TOTAL RECOVERABLE METALS							Analyst: MED
Aluminum	0.26	0.020		mg/L	1	8/18/2016 5:02:57 PM	26942

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1608660**

Date Reported: **8/22/2016**

CLIENT: Navajo Refining Company

Client Sample ID: Wastewater Effluent 8-10-16

Project: Waste Water Effluent

Collection Date: 8/10/2016 10:55:00 AM

Lab ID: 1608660-001

Matrix: AQUEOUS

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA 6010B: TOTAL RECOVERABLE METALS				Analyst: MED			
Antimony	ND	0.050		mg/L	1	8/19/2016 10:36:34 AM	26942
Arsenic	0.031	0.020		mg/L	1	8/18/2016 5:02:57 PM	26942
Barium	ND	0.020		mg/L	1	8/18/2016 5:02:57 PM	26942
Beryllium	ND	0.0030		mg/L	1	8/18/2016 5:02:57 PM	26942
Cadmium	ND	0.0020		mg/L	1	8/18/2016 5:02:57 PM	26942
Calcium	130	5.0		mg/L	5	8/18/2016 5:10:17 PM	26942
Chromium	ND	0.0060		mg/L	1	8/18/2016 5:02:57 PM	26942
Cobalt	ND	0.0060		mg/L	1	8/18/2016 5:02:57 PM	26942
Copper	ND	0.0060		mg/L	1	8/18/2016 5:02:57 PM	26942
Iron	2.4	0.25		mg/L	5	8/18/2016 5:10:17 PM	26942
Lead	ND	0.0050		mg/L	1	8/18/2016 5:02:57 PM	26942
Magnesium	41	1.0		mg/L	1	8/18/2016 5:02:57 PM	26942
Manganese	0.15	0.0020		mg/L	1	8/18/2016 5:02:57 PM	26942
Nickel	0.010	0.010		mg/L	1	8/18/2016 5:02:57 PM	26942
Potassium	60	5.0		mg/L	5	8/18/2016 5:10:17 PM	26942
Selenium	ND	0.050		mg/L	1	8/18/2016 5:02:57 PM	26942
Silver	ND	0.0050		mg/L	1	8/18/2016 5:02:57 PM	26942
Sodium	630	10		mg/L	10	8/18/2016 5:21:39 PM	26942
Strontium	1.9	0.10		mg/L	10	8/18/2016 5:21:39 PM	26942
Thallium	ND	0.050		mg/L	1	8/18/2016 5:02:57 PM	26942
Zinc	0.025	0.020		mg/L	1	8/18/2016 5:02:57 PM	26942
Silica	14	5.4		mg/L	5	8/18/2016 5:10:17 PM	26942
EPA 6010B: TCLP METALS				Analyst: MED			
Arsenic	ND	5.0		mg/L	1	8/15/2016 1:30:42 PM	26961
Barium	ND	100		mg/L	1	8/15/2016 1:30:42 PM	26961
Cadmium	ND	1.0		mg/L	1	8/15/2016 1:30:42 PM	26961
Chromium	ND	5.0		mg/L	1	8/15/2016 1:30:42 PM	26961
Lead	ND	5.0		mg/L	1	8/15/2016 1:30:42 PM	26961
Selenium	ND	1.0		mg/L	1	8/15/2016 1:30:42 PM	26961
Silver	ND	5.0		mg/L	1	8/15/2016 1:30:42 PM	26961
EPA METHOD 8260B: VOLATILES				Analyst: SUB			
Acetonitrile	ND	2.5		µg/L	1	8/12/2016	R36648
Allyl chloride	ND	2.5		µg/L	1	8/12/2016	R36648
Chloroprene	ND	2.5		µg/L	1	8/12/2016	R36648
Cyclohexane	ND	2.5		µg/L	1	8/12/2016	R36648
Diethyl ether	ND	2.5		µg/L	1	8/12/2016	R36648
Diisopropyl ether	ND	2.5		µg/L	1	8/12/2016	R36648
Epichlorohydrin	ND	25		µg/L	1	8/12/2016	R36648

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

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	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1608660**

Date Reported: **8/22/2016**

CLIENT: Navajo Refining Company

Client Sample ID: Wastewater Effluent 8-10-16

Project: Waste Water Effluent

Collection Date: 8/10/2016 10:55:00 AM

Lab ID: 1608660-001

Matrix: AQUEOUS

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
Ethyl acetate	ND	2.5		µg/L	1	8/12/2016	R36648
Ethyl methacrylate	ND	12		µg/L	1	8/12/2016	R36648
Ethyl tert-butyl ether	ND	2.5		µg/L	1	8/12/2016	R36648
Freon-113	ND	2.5		µg/L	1	8/12/2016	R36648
Isobutanol	ND	50		µg/L	1	8/12/2016	R36648
Isopropyl acetate	ND	2.5		µg/L	1	8/12/2016	R36648
Methacrylonitrile	ND	12		µg/L	1	8/12/2016	R36648
Methyl acetate	ND	2.5		µg/L	1	8/12/2016	R36648
Methyl ethyl ketone	ND	12		µg/L	1	8/12/2016	R36648
Methyl isobutyl ketone	ND	12		µg/L	1	8/12/2016	R36648
Methyl methacrylate	ND	12		µg/L	1	8/12/2016	R36648
Methylcyclohexane	ND	5.0		µg/L	1	8/12/2016	R36648
n-Amyl acetate	ND	2.5		µg/L	1	8/12/2016	R36648
n-Hexane	ND	2.5		µg/L	1	8/12/2016	R36648
Nitrobenzene	ND	25		µg/L	1	8/12/2016	R36648
Pentachloroethane	ND	25		µg/L	1	8/12/2016	R36648
p-isopropyltoluene	ND	2.5		µg/L	1	8/12/2016	R36648
Propionitrile	ND	12		µg/L	1	8/12/2016	R36648
Tetrahydrofuran	ND	2.5		µg/L	1	8/12/2016	R36648
Benzene	ND	2.5		µg/L	1	8/12/2016	R36648
Toluene	12	2.5		µg/L	1	8/12/2016	R36648
Ethylbenzene	ND	2.5		µg/L	1	8/12/2016	R36648
Methyl tert-butyl ether (MTBE)	ND	50		µg/L	1	8/12/2016	R36648
1,2,4-Trimethylbenzene	2.8	2.5		µg/L	1	8/12/2016	R36648
1,3,5-Trimethylbenzene	4.5	2.5		µg/L	1	8/12/2016	R36648
1,2-Dichloroethane (EDC)	ND	2.5		µg/L	1	8/12/2016	R36648
1,2-Dibromoethane (EDB)	ND	2.5		µg/L	1	8/12/2016	R36648
Naphthalene	ND	2.5		µg/L	1	8/12/2016	R36648
Acetone	350	12		µg/L	1	8/12/2016	R36648
Bromobenzene	ND	2.5		µg/L	1	8/12/2016	R36648
Bromodichloromethane	ND	2.5		µg/L	1	8/12/2016	R36648
Bromoform	ND	2.5		µg/L	1	8/12/2016	R36648
Bromomethane	ND	2.5		µg/L	1	8/12/2016	R36648
2-Butanone	47	12		µg/L	1	8/12/2016	R36648
Carbon disulfide	ND	2.5		µg/L	1	8/12/2016	R36648
Carbon Tetrachloride	ND	2.5		µg/L	1	8/12/2016	R36648
Chlorobenzene	ND	2.5		µg/L	1	8/12/2016	R36648
Chloroethane	ND	2.5		µg/L	1	8/12/2016	R36648
Chloroform	ND	2.5		µg/L	1	8/12/2016	R36648

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1608660

Date Reported: 8/22/2016

CLIENT: Navajo Refining Company

Client Sample ID: Wastewater Effluent 8-10-16

Project: Waste Water Effluent

Collection Date: 8/10/2016 10:55:00 AM

Lab ID: 1608660-001

Matrix: AQUEOUS

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
Chloromethane	ND	2.5		µg/L	1	8/12/2016	R36648
2-Chlorotoluene	ND	2.5		µg/L	1	8/12/2016	R36648
4-Chlorotoluene	ND	2.5		µg/L	1	8/12/2016	R36648
cis-1,2-DCE	ND	2.5		µg/L	1	8/12/2016	R36648
cis-1,3-Dichloropropene	ND	2.5		µg/L	1	8/12/2016	R36648
1,2-Dibromo-3-chloropropane	ND	2.5		µg/L	1	8/12/2016	R36648
Dibromochloromethane	ND	2.5		µg/L	1	8/12/2016	R36648
Dibromomethane	ND	2.5		µg/L	1	8/12/2016	R36648
1,2-Dichlorobenzene	ND	2.5		µg/L	1	8/12/2016	R36648
1,3-Dichlorobenzene	ND	2.5		µg/L	1	8/12/2016	R36648
1,4-Dichlorobenzene	ND	2.5		µg/L	1	8/12/2016	R36648
Dichlorodifluoromethane	ND	2.5		µg/L	1	8/12/2016	R36648
1,1-Dichloroethane	ND	2.5		µg/L	1	8/12/2016	R36648
1,1-Dichloroethene	ND	2.5		µg/L	1	8/12/2016	R36648
1,2-Dichloropropane	ND	2.5		µg/L	1	8/12/2016	R36648
1,3-Dichloropropane	ND	2.5		µg/L	1	8/12/2016	R36648
2,2-Dichloropropane	ND	2.5		µg/L	1	8/12/2016	R36648
1,1-Dichloropropene	ND	2.5		µg/L	1	8/12/2016	R36648
Hexachlorobutadiene	ND	2.5		µg/L	1	8/12/2016	R36648
2-Hexanone	28	2.5		µg/L	1	8/12/2016	R36648
Isopropylbenzene	ND	2.5		µg/L	1	8/12/2016	R36648
Methylene Chloride	ND	12		µg/L	1	8/12/2016	R36648
n-Butylbenzene	ND	2.5		µg/L	1	8/12/2016	R36648
n-Propylbenzene	ND	2.5		µg/L	1	8/12/2016	R36648
sec-Butylbenzene	ND	2.5		µg/L	1	8/12/2016	R36648
Styrene	ND	2.5		µg/L	1	8/12/2016	R36648
tert-Butylbenzene	ND	2.5		µg/L	1	8/12/2016	R36648
1,1,1,2-Tetrachloroethane	ND	2.5		µg/L	1	8/12/2016	R36648
1,1,2,2-Tetrachloroethane	ND	2.5		µg/L	1	8/12/2016	R36648
Tetrachloroethene (PCE)	ND	2.5		µg/L	1	8/12/2016	R36648
trans-1,2-DCE	ND	2.5		µg/L	1	8/12/2016	R36648
trans-1,3-Dichloropropene	ND	2.5		µg/L	1	8/12/2016	R36648
1,2,3-Trichlorobenzene	ND	2.5		µg/L	1	8/12/2016	R36648
1,2,4-Trichlorobenzene	ND	2.5		µg/L	1	8/12/2016	R36648
1,1,1-Trichloroethane	ND	2.5		µg/L	1	8/12/2016	R36648
1,1,2-Trichloroethane	ND	2.5		µg/L	1	8/12/2016	R36648
Trichloroethene (TCE)	ND	2.5		µg/L	1	8/12/2016	R36648
Trichlorofluoromethane	ND	2.5		µg/L	1	8/12/2016	R36648
1,2,3-Trichloropropane	ND	2.5		µg/L	1	8/12/2016	R36648

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
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	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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Analytical Report

Lab Order 1608660

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CLIENT: Navajo Refining Company

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Project: Waste Water Effluent

Collection Date: 8/10/2016 10:55:00 AM

Lab ID: 1608660-001

Matrix: AQUEOUS

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
Vinyl chloride	ND	2.5		µg/L	1	8/12/2016	R36648
mp-Xylenes	ND	5.0		µg/L	1	8/12/2016	R36648
o-Xylene	ND	2.5		µg/L	1	8/12/2016	R36648
tert-Amyl methyl ether	ND	2.5		µg/L	1	8/12/2016	R36648
tert-Butyl alcohol	ND	2.5		µg/L	1	8/12/2016	R36648
Acrolein	ND	12		µg/L	1	8/12/2016	R36648
Acrylonitrile	ND	12		µg/L	1	8/12/2016	R36648
Bromochloromethane	ND	2.5		µg/L	1	8/12/2016	R36648
2-Chloroethyl vinyl ether	ND	2.5		µg/L	1	8/12/2016	R36648
Iodomethane	ND	2.5		µg/L	1	8/12/2016	R36648
trans-1,4-Dichloro-2-butene	ND	2.5		µg/L	1	8/12/2016	R36648
Vinyl acetate	ND	2.5		µg/L	1	8/12/2016	R36648
1,4-Dioxane	ND	100		µg/L	1	8/12/2016	R36648
Surr: 1,2-Dichlorobenzene-d4	101	70-130		%Rec	1	8/12/2016	R36648
Surr: 4-Bromofluorobenzene	99.6	70-130		%Rec	1	8/12/2016	R36648
Surr: Toluene-d8	102	70-130		%Rec	1	8/12/2016	R36648
EPA 8270C: SEMIVOLATILES/MOD							Analyst: SUB
1,1-Biphenyl	ND	5.0		µg/L	1	8/17/2016	R36648
Atrazine	ND	5.0		µg/L	1	8/17/2016	R36648
Benzaldehyde	ND	5.0		µg/L	1	8/17/2016	R36648
Caprolactam	ND	5.0		µg/L	1	8/17/2016	R36648
N-Nitroso-di-n-butylamine	ND	5.0		µg/L	1	8/17/2016	R36648
Acetophenone	ND	10		µg/L	1	8/17/2016	R36648
1-Methylnaphthalene	ND	10		µg/L	1	8/17/2016	R36648
2,3,4,6-Tetrachlorophenol	ND	10		µg/L	1	8/17/2016	R36648
2,4,5-Trichlorophenol	ND	10		µg/L	1	8/17/2016	R36648
2,4,6-Trichlorophenol	ND	10		µg/L	1	8/17/2016	R36648
2,4-Dichlorophenol	ND	10		µg/L	1	8/17/2016	R36648
2,4-Dimethylphenol	ND	10		µg/L	1	8/17/2016	R36648
2,4-Dinitrophenol	ND	10		µg/L	1	8/17/2016	R36648
2,4-Dinitrotoluene	ND	10		µg/L	1	8/17/2016	R36648
2,6-Dinitrotoluene	ND	10		µg/L	1	8/17/2016	R36648
2-Chloronaphthalene	ND	10		µg/L	1	8/17/2016	R36648
2-Chlorophenol	ND	10		µg/L	1	8/17/2016	R36648
2-Methylnaphthalene	ND	10		µg/L	1	8/17/2016	R36648
2-Methylphenol	ND	10		µg/L	1	8/17/2016	R36648
2-Nitroaniline	ND	10		µg/L	1	8/17/2016	R36648
2-Nitrophenol	ND	10		µg/L	1	8/17/2016	R36648
3,3'-Dichlorobenzidine	ND	10		µg/L	1	8/17/2016	R36648

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1608660

Date Reported: 8/22/2016

CLIENT: Navajo Refining Company

Client Sample ID: Wastewater Effluent 8-10-16

Project: Waste Water Effluent

Collection Date: 8/10/2016 10:55:00 AM

Lab ID: 1608660-001

Matrix: AQUEOUS

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA 8270C: SEMIVOLATILES/MOD							Analyst: SUB
3-Nitroaniline	ND	10		µg/L	1	8/17/2016	R36648
4,6-Dinitro-2-methylphenol	ND	10		µg/L	1	8/17/2016	R36648
4-Bromophenyl phenyl ether	ND	10		µg/L	1	8/17/2016	R36648
4-Chloro-3-methylphenol	ND	10		µg/L	1	8/17/2016	R36648
4-Chloroaniline	ND	10		µg/L	1	8/17/2016	R36648
4-Chlorophenyl phenyl ether	ND	10		µg/L	1	8/17/2016	R36648
4-Nitroaniline	ND	10		µg/L	1	8/17/2016	R36648
4-Nitrophenol	ND	10		µg/L	1	8/17/2016	R36648
Acenaphthene	ND	10		µg/L	1	8/17/2016	R36648
Acenaphthylene	ND	10		µg/L	1	8/17/2016	R36648
Anthracene	ND	10		µg/L	1	8/17/2016	R36648
Benzo(g,h,i)perylene	ND	10		µg/L	1	8/17/2016	R36648
Benz(a)anthracene	ND	0.20		µg/L	1	8/17/2016	R36648
Benzo(a)pyrene	ND	0.20		µg/L	1	8/17/2016	R36648
Benzo(b)fluoranthene	ND	0.20		µg/L	1	8/17/2016	R36648
Benzo(k)fluoranthene	ND	0.20		µg/L	1	8/17/2016	R36648
Bis(2-chloroethoxy)methane	ND	10		µg/L	1	8/17/2016	R36648
Bis(2-chloroethyl)ether	ND	10		µg/L	1	8/17/2016	R36648
Bis(2-chloroisopropyl)ether	ND	10		µg/L	1	8/17/2016	R36648
Bis(2-ethylhexyl)phthalate	ND	10		µg/L	1	8/17/2016	R36648
Butyl benzyl phthalate	ND	10		µg/L	1	8/17/2016	R36648
Carbazole	ND	10		µg/L	1	8/17/2016	R36648
Chrysene	ND	0.20		µg/L	1	8/17/2016	R36648
Dibenz(a,h)anthracene	ND	0.20		µg/L	1	8/17/2016	R36648
Dibenzofuran	ND	10		µg/L	1	8/17/2016	R36648
Diethyl phthalate	ND	10		µg/L	1	8/17/2016	R36648
Dimethyl phthalate	ND	10		µg/L	1	8/17/2016	R36648
Di-n-butyl phthalate	ND	10		µg/L	1	8/17/2016	R36648
Di-n-octyl phthalate	ND	10		µg/L	1	8/17/2016	R36648
Fluoranthene	ND	10		µg/L	1	8/17/2016	R36648
Fluorene	ND	10		µg/L	1	8/17/2016	R36648
Hexachlorobenzene	ND	2.0		µg/L	1	8/17/2016	R36648
Hexachlorobutadiene	ND	10		µg/L	1	8/17/2016	R36648
Hexachlorocyclopentadiene	ND	10		µg/L	1	8/17/2016	R36648
Hexachloroethane	ND	10		µg/L	1	8/17/2016	R36648
Indeno(1,2,3-cd)pyrene	ND	0.20		µg/L	1	8/17/2016	R36648
Isophorone	ND	10		µg/L	1	8/17/2016	R36648
Naphthalene	ND	10		µg/L	1	8/17/2016	R36648
Nitrobenzene	ND	10		µg/L	1	8/17/2016	R36648

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order **1608660**

Date Reported: **8/22/2016**

CLIENT: Navajo Refining Company

Client Sample ID: Wastewater Effluent 8-10-16

Project: Waste Water Effluent

Collection Date: 8/10/2016 10:55:00 AM

Lab ID: 1608660-001

Matrix: AQUEOUS

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA 8270C: SEMIVOLATILES/MOD							Analyst: SUB
N-Nitrosodi-n-propylamine	ND	4.0		µg/L	1	8/17/2016	R36648
N-Nitrosodiphenylamine	ND	10		µg/L	1	8/17/2016	R36648
Pentachlorophenol	ND	10		µg/L	1	8/17/2016	R36648
Phenanthrene	ND	10		µg/L	1	8/17/2016	R36648
Phenol	ND	10		µg/L	1	8/17/2016	R36648
Pyrene	ND	10		µg/L	1	8/17/2016	R36648
o-Toluidine	ND	4.0		µg/L	1	8/17/2016	R36648
Pyridine	ND	10		µg/L	1	8/17/2016	R36648
1,2,4,5-Tetrachlorobenzene	ND	10		µg/L	1	8/17/2016	R36648
Surr: 2,4,6-Tribromophenol	90.0	63-110		%Rec	1	8/17/2016	R36648
Surr: 2-Fluorobiphenyl	60.4	58-112		%Rec	1	8/17/2016	R36648
Surr: 2-Fluorophenol	69.0	47-109		%Rec	1	8/17/2016	R36648
Surr: Nitrobenzene-d5	72.0	58-110		%Rec	1	8/17/2016	R36648
Surr: Phenol-d5	67.8	52-105		%Rec	1	8/17/2016	R36648
Surr: Terphenyl-d14	28.7	22-133		%Rec	1	8/17/2016	R36648

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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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1608660

Date Reported: 8/22/2016

CLIENT: Navajo Refining Company

Client Sample ID: TRIP BLANK

Project: Waste Water Effluent

Collection Date:

Lab ID: 1608660-002

Matrix: TRIP BLANK

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
Acetonitrile	ND	0.50		µg/L	1	8/12/2016	R36648
Allyl chloride	ND	0.50		µg/L	1	8/12/2016	R36648
Chloroprene	ND	0.50		µg/L	1	8/12/2016	R36648
Cyclohexane	ND	0.50		µg/L	1	8/12/2016	R36648
Diethyl ether	ND	0.50		µg/L	1	8/12/2016	R36648
Diisopropyl ether	ND	0.50		µg/L	1	8/12/2016	R36648
Epichlorohydrin	ND	5.0		µg/L	1	8/12/2016	R36648
Ethyl acetate	ND	0.50		µg/L	1	8/12/2016	R36648
Ethyl methacrylate	ND	2.5		µg/L	1	8/12/2016	R36648
Ethyl tert-butyl ether	ND	0.50		µg/L	1	8/12/2016	R36648
Freon-113	ND	0.50		µg/L	1	8/12/2016	R36648
Isobutanol	ND	10		µg/L	1	8/12/2016	R36648
Isopropyl acetate	ND	0.50		µg/L	1	8/12/2016	R36648
Methacrylonitrile	ND	2.5		µg/L	1	8/12/2016	R36648
Methyl acetate	ND	0.50		µg/L	1	8/12/2016	R36648
Methyl ethyl ketone	ND	2.5		µg/L	1	8/12/2016	R36648
Methyl isobutyl ketone	ND	2.5		µg/L	1	8/12/2016	R36648
Methyl methacrylate	ND	2.5		µg/L	1	8/12/2016	R36648
Methylcyclohexane	ND	1.0		µg/L	1	8/12/2016	R36648
n-Amyl acetate	ND	0.50		µg/L	1	8/12/2016	R36648
n-Hexane	ND	0.50		µg/L	1	8/12/2016	R36648
Nitrobenzene	ND	5.0		µg/L	1	8/12/2016	R36648
Pentachloroethane	ND	5.0		µg/L	1	8/12/2016	R36648
p-isopropyltoluene	ND	0.50		µg/L	1	8/12/2016	R36648
Propionitrile	ND	2.5		µg/L	1	8/12/2016	R36648
Tetrahydrofuran	ND	0.50		µg/L	1	8/12/2016	R36648
Benzene	ND	0.50		µg/L	1	8/12/2016	R36648
Toluene	ND	0.50		µg/L	1	8/12/2016	R36648
Ethylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
Methyl tert-butyl ether (MTBE)	ND	10		µg/L	1	8/12/2016	R36648
1,2,4-Trimethylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
1,3,5-Trimethylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
1,2-Dichloroethane (EDC)	ND	0.50		µg/L	1	8/12/2016	R36648
1,2-Dibromoethane (EDB)	ND	0.50		µg/L	1	8/12/2016	R36648
Naphthalene	ND	0.50		µg/L	1	8/12/2016	R36648
Acetone	ND	2.5		µg/L	1	8/12/2016	R36648
Bromobenzene	ND	0.50		µg/L	1	8/12/2016	R36648
Bromodichloromethane	ND	0.50		µg/L	1	8/12/2016	R36648
Bromoform	ND	0.50		µg/L	1	8/12/2016	R36648

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1608660

Date Reported: 8/22/2016

CLIENT: Navajo Refining Company

Client Sample ID: TRIP BLANK

Project: Waste Water Effluent

Collection Date:

Lab ID: 1608660-002

Matrix: TRIP BLANK

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
Bromomethane	ND	0.50		µg/L	1	8/12/2016	R36648
2-Butanone	ND	2.5		µg/L	1	8/12/2016	R36648
Carbon disulfide	ND	0.50		µg/L	1	8/12/2016	R36648
Carbon Tetrachloride	ND	0.50		µg/L	1	8/12/2016	R36648
Chlorobenzene	ND	0.50		µg/L	1	8/12/2016	R36648
Chloroethane	ND	0.50		µg/L	1	8/12/2016	R36648
Chloroform	ND	0.50		µg/L	1	8/12/2016	R36648
Chloromethane	ND	0.50		µg/L	1	8/12/2016	R36648
2-Chlorotoluene	ND	0.50		µg/L	1	8/12/2016	R36648
4-Chlorotoluene	ND	0.50		µg/L	1	8/12/2016	R36648
cis-1,2-DCE	ND	0.50		µg/L	1	8/12/2016	R36648
cis-1,3-Dichloropropene	ND	0.50		µg/L	1	8/12/2016	R36648
1,2-Dibromo-3-chloropropane	ND	0.50		µg/L	1	8/12/2016	R36648
Dibromochloromethane	ND	0.50		µg/L	1	8/12/2016	R36648
Dibromomethane	ND	0.50		µg/L	1	8/12/2016	R36648
1,2-Dichlorobenzene	ND	0.50		µg/L	1	8/12/2016	R36648
1,3-Dichlorobenzene	ND	0.50		µg/L	1	8/12/2016	R36648
1,4-Dichlorobenzene	ND	0.50		µg/L	1	8/12/2016	R36648
Dichlorodifluoromethane	ND	0.50		µg/L	1	8/12/2016	R36648
1,1-Dichloroethane	ND	0.50		µg/L	1	8/12/2016	R36648
1,1-Dichloroethene	ND	0.50		µg/L	1	8/12/2016	R36648
1,2-Dichloropropane	ND	0.50		µg/L	1	8/12/2016	R36648
1,3-Dichloropropane	ND	0.50		µg/L	1	8/12/2016	R36648
2,2-Dichloropropane	ND	0.50		µg/L	1	8/12/2016	R36648
1,1-Dichloropropene	ND	0.50		µg/L	1	8/12/2016	R36648
Hexachlorobutadiene	ND	0.50		µg/L	1	8/12/2016	R36648
2-Hexanone	ND	0.50		µg/L	1	8/12/2016	R36648
Isopropylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
Methylene Chloride	ND	2.5		µg/L	1	8/12/2016	R36648
n-Butylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
n-Propylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
sec-Butylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
Styrene	ND	0.50		µg/L	1	8/12/2016	R36648
tert-Butylbenzene	ND	0.50		µg/L	1	8/12/2016	R36648
1,1,1,2-Tetrachloroethane	ND	0.50		µg/L	1	8/12/2016	R36648
1,1,2,2-Tetrachloroethane	ND	0.50		µg/L	1	8/12/2016	R36648
Tetrachloroethene (PCE)	ND	0.50		µg/L	1	8/12/2016	R36648
trans-1,2-DCE	ND	0.50		µg/L	1	8/12/2016	R36648
trans-1,3-Dichloropropene	ND	0.50		µg/L	1	8/12/2016	R36648

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
	R	RPD outside accepted recovery limits	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.

Analytical Report

Lab Order 1608660

Date Reported: 8/22/2016

CLIENT: Navajo Refining Company

Client Sample ID: TRIP BLANK

Project: Waste Water Effluent

Collection Date:

Lab ID: 1608660-002

Matrix: TRIP BLANK

Received Date: 8/11/2016 9:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
1,2,3-Trichlorobenzene	ND	0.50		µg/L	1	8/12/2016	R36648
1,2,4-Trichlorobenzene	ND	0.50		µg/L	1	8/12/2016	R36648
1,1,1-Trichloroethane	ND	0.50		µg/L	1	8/12/2016	R36648
1,1,2-Trichloroethane	ND	0.50		µg/L	1	8/12/2016	R36648
Trichloroethene (TCE)	ND	0.50		µg/L	1	8/12/2016	R36648
Trichlorofluoromethane	ND	0.50		µg/L	1	8/12/2016	R36648
1,2,3-Trichloropropane	ND	0.50		µg/L	1	8/12/2016	R36648
Vinyl chloride	ND	0.50		µg/L	1	8/12/2016	R36648
mp-Xylenes	ND	1.0		µg/L	1	8/12/2016	R36648
o-Xylene	ND	0.50		µg/L	1	8/12/2016	R36648
tert-Amyl methyl ether	ND	0.50		µg/L	1	8/12/2016	R36648
tert-Butyl alcohol	ND	0.50		µg/L	1	8/12/2016	R36648
Acrolein	ND	2.5		µg/L	1	8/12/2016	R36648
Acrylonitrile	ND	2.5		µg/L	1	8/12/2016	R36648
Bromochloromethane	ND	0.50		µg/L	1	8/12/2016	R36648
2-Chloroethyl vinyl ether	ND	0.50		µg/L	1	8/12/2016	R36648
Iodomethane	ND	0.50		µg/L	1	8/12/2016	R36648
trans-1,4-Dichloro-2-butene	ND	0.50		µg/L	1	8/12/2016	R36648
Vinyl acetate	ND	0.50		µg/L	1	8/12/2016	R36648
1,4-Dioxane	ND	20		µg/L	1	8/12/2016	R36648
Surr: 1,2-Dichlorobenzene-d4	101	70-130		%Rec	1	8/12/2016	R36648
Surr: 4-Bromofluorobenzene	96.4	70-130		%Rec	1	8/12/2016	R36648
Surr: Toluene-d8	101	70-130		%Rec	1	8/12/2016	R36648

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
	R	RPD outside accepted recovery limits	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#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB	SampType:	mblk	TestCode:	EPA Method 300.0: Anions					
Client ID:	PBW	Batch ID:	R36408	RunNo:	36408					
Prep Date:		Analysis Date:	8/11/2016	SeqNo:	1128954	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Fluoride
Chloride
Nitrogen, Nitrite (As N)
Bromide
Nitrogen, Nitrate (As N)
Phosphorus, Orthophosphate (As P)

ND
ND
ND
ND
ND
ND

0.10
0.50
0.10
0.10
0.10
0.50

Sample ID	LCS	SampType:	lcs	TestCode:	EPA Method 300.0: Anions					
Client ID:	LCSW	Batch ID:	R36408	RunNo:	36408					
Prep Date:		Analysis Date:	8/11/2016	SeqNo:	1128955	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Fluoride
Chloride
Nitrogen, Nitrite (As N)
Bromide
Nitrogen, Nitrate (As N)
Phosphorus, Orthophosphate (As P)

0.52
4.8
0.97
2.4
2.5
4.9

0.10
0.50
0.10
0.10
0.10
0.50

0.5000
5.000
1.000
2.500
2.500
5.000

0
0
0
0
0
0

104
96.2
96.8
96.7
99.0
97.2

90
90
90
90
90
90

110
110
110
110
110
110

Sample ID	MB	SampType:	mblk	TestCode:	EPA Method 300.0: Anions					
Client ID:	PBW	Batch ID:	R36593	RunNo:	36593					
Prep Date:		Analysis Date:	8/17/2016	SeqNo:	1133301	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:	R36593	RunNo:	36593					
Prep Date:		Analysis Date:	8/17/2016	SeqNo:	1133302	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Sulfate

9.7

0.50

10.00

0

97.0

90

110

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-R36648		SampType:	MBLK		TestCode:	EPA Method 8260B: VOLATILES			
Client ID:	PBW		Batch ID:	R36648		RunNo:	36648			
Prep Date:			Analysis Date:	8/12/2016		SeqNo:	1135033	Units:	µg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acetonitrile	ND	0.50								
Allyl chloride	ND	0.50								
Chloroprene	ND	0.50								
Cyclohexane	ND	0.50								
Diethyl ether	ND	0.50								
Diisopropyl ether	ND	0.50								
Epichlorohydrin	ND	0.50								
Ethyl acetate	ND	0.50								
Ethyl methacrylate	ND	2.5								
Ethyl tert-butyl ether	ND	0.50								
Freon-113	ND	0.50								
Isobutanol	ND	10								
Isopropyl acetate	ND	0.50								
Methacrylonitrile	ND	2.5								
Methyl acetate	ND	0.50								
Methyl ethyl ketone	ND	2.5								
Methyl isobutyl ketone	ND	2.5								
Methyl methacrylate	ND	2.5								
Methylcyclohexane	ND	0.50								
n-Amyl acetate	ND	0.50								
n-Hexane	ND	0.50								
Nitrobenzene	ND	0.50								
Pentachloroethane	ND	0.50								
p-isopropyltoluene	ND	0.50								
Propionitrile	ND	2.5								
Tetrahydrofuran	ND	0.50								
Benzene	ND	0.50								
Toluene	ND	0.50								
Ethylbenzene	ND	0.50								
Methyl tert-butyl ether (MTBE)	ND	0.50								
1,2,4-Trimethylbenzene	ND	0.50								
1,3,5-Trimethylbenzene	ND	0.50								
1,2-Dichloroethane (EDC)	ND	0.50								
1,2-Dibromoethane (EDB)	ND	0.50								
Naphthalene	ND	0.50								
Acetone	ND	2.5								
Bromobenzene	ND	0.50								
Bromodichloromethane	ND	0.50								
Bromoform	ND	0.50								

Qualifiers:

* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-R36648		SampType:	MBLK		TestCode:	EPA Method 8260B: VOLATILES			
Client ID:	PBW		Batch ID:	R36648		RunNo:	36648			
Prep Date:			Analysis Date:	8/12/2016		SeqNo:	1135033	Units:	µg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Bromomethane	ND	0.50								
2-Butanone	ND	2.5								
Carbon disulfide	ND	0.50								
Carbon Tetrachloride	ND	0.50								
Chlorobenzene	ND	0.50								
Chloroethane	ND	0.50								
Chloroform	ND	0.50								
Chloromethane	ND	0.50								
2-Chlorotoluene	ND	0.50								
4-Chlorotoluene	ND	0.50								
cis-1,2-DCE	ND	0.50								
cis-1,3-Dichloropropene	ND	0.50								
1,2-Dibromo-3-chloropropane	ND	0.50								
Dibromochloromethane	ND	0.50								
Dibromomethane	ND	0.50								
1,2-Dichlorobenzene	ND	0.50								
1,3-Dichlorobenzene	ND	0.50								
1,4-Dichlorobenzene	ND	0.50								
Dichlorodifluoromethane	ND	0.50								
1,1-Dichloroethane	ND	0.50								
1,1-Dichloroethene	ND	0.50								
1,2-Dichloropropane	ND	0.50								
1,3-Dichloropropane	ND	0.50								
2,2-Dichloropropane	ND	0.50								
1,1-Dichloropropene	ND	0.50								
Hexachlorobutadiene	ND	0.50								
2-Hexanone	ND	0.50								
Isopropylbenzene	ND	0.50								
Methylene Chloride	ND	2.5								
n-Butylbenzene	ND	0.50								
n-Propylbenzene	ND	0.50								
sec-Butylbenzene	ND	0.50								
Styrene	ND	0.50								
tert-Butylbenzene	ND	0.50								
1,1,1,2-Tetrachloroethane	ND	0.50								
1,1,2,2-Tetrachloroethane	ND	0.50								
Tetrachloroethene (PCE)	ND	0.50								
trans-1,2-DCE	ND	0.50								
trans-1,3-Dichloropropene	ND	0.50								

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-R36648		SampType:	MBLK		TestCode:	EPA Method 8260B: VOLATILES			
Client ID:	PBW		Batch ID:	R36648		RunNo:	36648			
Prep Date:			Analysis Date:	8/12/2016		SeqNo:	1135033	Units:	µg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,2,3-Trichlorobenzene	ND	0.50								
1,2,4-Trichlorobenzene	ND	0.50								
1,1,1-Trichloroethane	ND	0.50								
1,1,2-Trichloroethane	ND	0.50								
Trichloroethene (TCE)	ND	0.50								
Trichlorofluoromethane	ND	0.50								
1,2,3-Trichloropropane	ND	0.50								
Vinyl chloride	ND	0.50								
mp-Xylenes	ND	1.0								
o-Xylene	ND	0.50								
tert-Amyl methyl ether	ND	0.50								
tert-Butyl alcohol	ND	0.50								
Acrolein	ND	2.5								
Acrylonitrile	ND	2.5								
Bromochloromethane	ND	0.50								
2-Chloroethyl vinyl ether	ND	0.50								
Iodomethane	ND	0.50								
trans-1,4-Dichloro-2-butene	ND	0.50								
Vinyl acetate	ND	0.50								
1,4-Dioxane	ND	0.50								

Sample ID	LCS-R36648		SampType:	LCS		TestCode:	EPA Method 8260B: VOLATILES			
Client ID:	LCSW		Batch ID:	R36648		RunNo:	36648			
Prep Date:			Analysis Date:	8/12/2016		SeqNo:	1135034	Units:	µg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	9.1	0	10.00	0	90.7	80	120			
Toluene	9.4	0	10.00	0	94.5	80	120			
Ethylbenzene	9.6	0	10.00	0	96.4	80	120			
Chlorobenzene	9.1	0	10.00	0	91.2	80	120			
1,1-Dichloroethene	9.1	0	10.00	0	91.1	80	120			
Tetrachloroethene (PCE)	8.7	0	10.00	0	87.1	80	120			
Trichloroethene (TCE)	8.9	0	10.00	0	89.0	80	120			
o-Xylene	10	0	10.00	0	100	80	120			

Qualifiers:

* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-R36648		SampType: MBLK		TestCode: EPA 8270C: Semivolatiles/Mod					
Client ID:	PBW		Batch ID: R36648		RunNo: 36648					
Prep Date:			Analysis Date: 8/17/2016		SeqNo: 1135037		Units: µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
N-Nitroso-di-n-butylamine	ND	1.0								
Acetophenone	ND	10								
1-Methylnaphthalene	ND	10								
2,3,4,6-Tetrachlorophenol	ND	10								
2,4,5-Trichlorophenol	ND	10								
2,4,6-Trichlorophenol	ND	10								
2,4-Dichlorophenol	ND	10								
2,4-Dimethylphenol	ND	10								
2,4-Dinitrophenol	ND	10								
2,4-Dinitrotoluene	ND	10								
2,6-Dinitrotoluene	ND	10								
2-Chloronaphthalene	ND	10								
2-Chlorophenol	ND	10								
2-Methylnaphthalene	ND	10								
2-Methylphenol	ND	10								
2-Nitroaniline	ND	10								
2-Nitrophenol	ND	10								
3,3'-Dichlorobenzidine	ND	10								
3-Nitroaniline	ND	10								
4,6-Dinitro-2-methylphenol	ND	10								
4-Bromophenyl phenyl ether	ND	10								
4-Chloro-3-methylphenol	ND	5.0								
4-Chloroaniline	ND	10								
4-Chlorophenyl phenyl ether	ND	10								
4-Nitroaniline	ND	10								
4-Nitrophenol	ND	10								
Acenaphthene	ND	10								
Acenaphthylene	ND	10								
Anthracene	ND	10								
Benzo(g,h,i)perylene	ND	1.0								
Benz(a)anthracene	ND	1.0								
Benzo(a)pyrene	ND	1.0								
Benzo(b)fluoranthene	ND	1.0								
Benzo(k)fluoranthene	ND	1.0								
Bis(2-chloroethoxy)methane	ND	10								
Bis(2-chloroethyl)ether	ND	10								
Bis(2-chloroisopropyl)ether	ND	10								
Bis(2-ethylhexyl)phthalate	ND	5.0								
Butyl benzyl phthalate	ND	10								

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-R36648		SampType: MBLK		TestCode: EPA 8270C: Semivolatiles/Mod					
Client ID:	PBW		Batch ID: R36648		RunNo: 36648					
Prep Date:			Analysis Date: 8/17/2016		SeqNo: 1135037		Units: µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Carbazole	ND	10								
Chrysene	ND	0.10								
Dibenz(a,h)anthracene	ND	1.0								
Dibenzofuran	ND	10								
Diethyl phthalate	ND	10								
Dimethyl phthalate	ND	10								
Di-n-butyl phthalate	ND	10								
Di-n-octyl phthalate	ND	10								
Fluoranthene	ND	10								
Fluorene	ND	10								
Hexachlorobenzene	ND	1.0								
Hexachlorobutadiene	ND	10								
Hexachlorocyclopentadiene	ND	10								
Hexachloroethane	ND	10								
Indeno(1,2,3-cd)pyrene	ND	1.0								
Isophorone	ND	10								
Naphthalene	ND	10								
Nitrobenzene	ND	10								
N-Nitrosodi-n-propylamine	ND	10								
N-Nitrosodiphenylamine	ND	2.0								
Pentachlorophenol	ND	10								
Phenanthrene	ND	10								
Phenol	ND	5.0								
Pyrene	ND	10								
o-Toluidine	ND	1.0								
Pyridine	ND	1.0								
1,2,4,5-Tetrachlorobenzene	ND	10								

Sample ID	LCS-R36648		SampType: LCS		TestCode: EPA 8270C: Semivolatiles/Mod					
Client ID:	LCSW		Batch ID: R36648		RunNo: 36648					
Prep Date:			Analysis Date: 8/17/2016		SeqNo: 1135038		Units: µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2,4-Dinitrotoluene	4.6	0	5.000	0	91.8	49	134			
2-Chlorophenol	4.6	0	5.000	0	93.0	50	131			
4-Chloro-3-methylphenol	5.1	0	5.000	0	102	42	139			
4-Nitrophenol	4.7	0	5.000	0	94.2	19	137			
Acenaphthene	4.5	0	5.000	0	89.8	36	122			
Bis(2-ethylhexyl)phthalate	5.1	0	5.000	0	102	43	142			

Qualifiers:

* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	LCS-R36648			SampType:	LCS			TestCode:	EPA 8270C: Semivolatiles/Mod		
Client ID:	LCSW			Batch ID:	R36648			RunNo:	36648		
Prep Date:				Analysis Date:	8/17/2016			SeqNo:	1135038		
									Units: µg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
N-Nitrosodi-n-propylamine	4.2	0	5.000	0	84.0	46	140				
Pentachlorophenol	2.2	0	5.000	0	45.0	22	138				
Phenol	4.7	0	5.000	0	93.4	45	134				
Pyrene	5.0	0	5.000	0	100	45	138				

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-26894		SampType:	MBLK		TestCode:	EPA Method 7470: Mercury				
Client ID:	PBW		Batch ID:	26894		RunNo:	36465				
Prep Date:	8/10/2016		Analysis Date:	8/12/2016		SeqNo:	1129407		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercury	ND	0.00020									

Sample ID	LCS-26894			SampType:	LCS		TestCode:	EPA Method 7470: Mercury			
Client ID:	LCSW			Batch ID:	26894		RunNo:	36465			
Prep Date:	8/10/2016			Analysis Date:	8/12/2016		SeqNo:	1129408		Units:	mg/L
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercury	0.0053	0.00020	0.005000	0	105	80	120				

Sample ID	1608660-001BMS		SampType: MS		TestCode: EPA Method 7470: Mercury					
Client ID:	Wastewater Effluent		Batch ID: 26894		RunNo: 36465					
Prep Date:	8/10/2016		Analysis Date: 8/12/2016		SeqNo: 1129410		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0057	0.00020	0.005000	0	113	75	125			

Sample ID	1608660-001BMSD			SampType:	MSD		TestCode:	EPA Method 7470: Mercury			
Client ID:	Wastewater Effluent			Batch ID:	26894		RunNo:	36465			
Prep Date:	8/10/2016		Analysis Date:	8/12/2016		SeqNo:	1129411		Units: mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercury	0.0057	0.00020	0.005000	0	114	75	125	0.473	20		

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-27020		SampType:	MBLK		TestCode:	MERCURY, TCLP				
Client ID:	PBW		Batch ID:	27020		RunNo:	36563				
Prep Date:	8/16/2016		Analysis Date:	8/17/2016		SeqNo:	1132320		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercurv	ND	0.020									

Sample ID	LCS-27020			SampType:	LCS		TestCode:	MERCURY, TCLP			
Client ID:	LCSW			Batch ID:	27020		RunNo:	36563			
Prep Date:	8/16/2016			Analysis Date:	8/17/2016		SeqNo:	1132321		Units:	mg/L
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercury	ND	0.020	0.005000	0	98.1	80	120				

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-26942		SampType:	MBLK		TestCode:	EPA 6010B: Total Recoverable Metals			
Client ID:	PBW		Batch ID:	26942		RunNo:	36611			
Prep Date:	8/11/2016		Analysis Date:	8/18/2016		SeqNo:	1134113	Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020								
Arsenic	ND	0.020								
Barium	ND	0.020								
Beryllium	ND	0.0030								
Cadmium	ND	0.0020								
Calcium	ND	1.0								
Chromium	ND	0.0060								
Cobalt	ND	0.0060								
Copper	ND	0.0060								
Iron	ND	0.050								
Lead	ND	0.0050								
Magnesium	ND	1.0								
Manganese	ND	0.0020								
Nickel	ND	0.010								
Potassium	ND	1.0								
Selenium	ND	0.050								
Silver	ND	0.0050								
Sodium	ND	1.0								
Strontium	ND	0.010								
Thallium	ND	0.050								
Zinc	ND	0.020								
Silica	ND	1.1								

Sample ID	LCS-26942		SampType:	LCS		TestCode:	EPA 6010B: Total Recoverable Metals			
Client ID:	LCSW		Batch ID:	26942		RunNo:	36611			
Prep Date:	8/11/2016		Analysis Date:	8/18/2016		SeqNo:	1134115	Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.52	0.020	0.5000	0	103	80	120			
Arsenic	0.49	0.020	0.5000	0	97.6	80	120			
Barium	0.48	0.020	0.5000	0	95.1	80	120			
Beryllium	0.51	0.0030	0.5000	0	101	80	120			
Cadmium	0.47	0.0020	0.5000	0	94.9	80	120			
Calcium	50	1.0	50.00	0	99.0	80	120			
Chromium	0.47	0.0060	0.5000	0	94.7	80	120			
Cobalt	0.46	0.0060	0.5000	0	91.2	80	120			
Copper	0.47	0.0060	0.5000	0	94.2	80	120			
Iron	0.47	0.050	0.5000	0	93.1	80	120			
Lead	0.46	0.0050	0.5000	0	92.8	80	120			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	LCS-26942		SampType: LCS		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	LCSW		Batch ID: 26942		RunNo: 36611					
Prep Date:	8/11/2016		Analysis Date: 8/18/2016		SeqNo: 1134115		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Magnesium	50	1.0	50.00	0	99.0	80	120			
Manganese	0.47	0.0020	0.5000	0	93.4	80	120			
Nickel	0.45	0.010	0.5000	0	90.3	80	120			
Potassium	48	1.0	50.00	0	96.0	80	120			
Selenium	0.50	0.050	0.5000	0	99.0	80	120			
Silver	0.097	0.0050	0.1000	0	96.8	80	120			
Sodium	49	1.0	50.00	0	97.0	80	120			
Strontium	0.11	0.010	0.1000	0	110	80	120			
Thallium	0.49	0.050	0.5000	0	97.0	80	120			
Zinc	0.46	0.020	0.5000	0	91.0	80	120			
Silica	5.4	1.1	5.350	0	101	80	120			

Sample ID	1608660-001BMS		SampType: MS		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	Wastewater Effluent		Batch ID: 26942		RunNo: 36611					
Prep Date:	8/11/2016		Analysis Date: 8/18/2016		SeqNo: 1134120		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.79	0.020	0.5000	0.2561	106	75	125			
Arsenic	0.52	0.020	0.5000	0.03115	98.4	75	125			
Barium	0.48	0.020	0.5000	0.01539	93.1	75	125			
Beryllium	0.49	0.0030	0.5000	0.0002600	97.2	75	125			
Cadmium	0.47	0.0020	0.5000	0	93.5	75	125			
Chromium	0.46	0.0060	0.5000	0	91.1	75	125			
Cobalt	0.45	0.0060	0.5000	0.002780	89.5	75	125			
Copper	0.51	0.0060	0.5000	0	101	75	125			
Lead	0.45	0.0050	0.5000	0	89.7	75	125			
Magnesium	90	1.0	50.00	41.34	97.7	75	125			
Manganese	0.61	0.0020	0.5000	0.1524	91.0	75	125			
Nickel	0.45	0.010	0.5000	0.01016	88.2	75	125			
Selenium	0.52	0.050	0.5000	0.03028	97.3	75	125			
Silver	0.097	0.0050	0.1000	0	97.3	75	125			
Thallium	0.48	0.050	0.5000	0	95.8	75	125			
Zinc	0.47	0.020	0.5000	0.02456	88.1	75	125			

Sample ID	1608660-001BMSD		SampType:	MSD		TestCode:	EPA 6010B: Total Recoverable Metals				
Client ID:	Wastewater Effluent		Batch ID:	26942		RunNo:	36611				
Prep Date:	8/11/2016		Analysis Date:	8/18/2016		SeqNo:	1134122		Units: mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Aluminum	0.80	0.020	0.5000	0.2561	108	75	125	1.20	20		

Qualifiers:

* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	1608660-001BMSD		SampType: MSD		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	Wastewater Effluent		Batch ID: 26942		RunNo: 36611					
Prep Date:	8/11/2016		Analysis Date: 8/18/2016		SeqNo: 1134122		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.54	0.020	0.5000	0.03115	102	75	125	3.44	20	
Barium	0.48	0.020	0.5000	0.01539	93.8	75	125	0.725	20	
Beryllium	0.49	0.0030	0.5000	0.0002600	98.0	75	125	0.895	20	
Cadmium	0.48	0.0020	0.5000	0	95.7	75	125	2.34	20	
Chromium	0.47	0.0060	0.5000	0	93.8	75	125	2.88	20	
Cobalt	0.46	0.0060	0.5000	0.002780	92.2	75	125	2.97	20	
Copper	0.51	0.0060	0.5000	0	102	75	125	1.08	20	
Lead	0.46	0.0050	0.5000	0	92.1	75	125	2.73	20	
Magnesium	91	1.0	50.00	41.34	98.8	75	125	0.587	20	
Manganese	0.61	0.0020	0.5000	0.1524	91.8	75	125	0.656	20	
Nickel	0.46	0.010	0.5000	0.01016	90.5	75	125	2.44	20	
Selenium	0.52	0.050	0.5000	0.03028	97.8	75	125	0.514	20	
Silver	0.097	0.0050	0.1000	0	97.0	75	125	0.216	20	
Thallium	0.48	0.050	0.5000	0	95.2	75	125	0.572	20	
Zinc	0.48	0.020	0.5000	0.02456	90.6	75	125	2.56	20	

Sample ID	1608660-001BMS		SampType: MS		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	Wastewater Effluent		Batch ID: 26942		RunNo: 36611					
Prep Date:	8/11/2016		Analysis Date: 8/18/2016		SeqNo: 1134131		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Potassium	110	5.0	50.00	60.03	97.9	75	125			

Sample ID	1608660-001BMSD		SampType: MSD		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	Wastewater Effluent		Batch ID: 26942		RunNo: 36611					
Prep Date:	8/11/2016		Analysis Date: 8/18/2016		SeqNo: 1134132		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Potassium	110	5.0	50.00	60.03	97.4	75	125	0.257	20	

Sample ID	MB-26942		SampType: MBLK		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	PBW		Batch ID: 26942		RunNo: 36628					
Prep Date:	8/11/2016		Analysis Date: 8/19/2016		SeqNo: 1134578		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	ND	0.050								

Qualifiers:

* Value exceeds Maximum Contaminant Level.

D Sample Diluted Due to Matrix

H Holding times for preparation or analysis exceeded

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank

E Value above quantitation range

J Analyte detected below quantitation limits

P Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	LCS-26942		SampType: LCS		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	LCSW		Batch ID: 26942		RunNo: 36628					
Prep Date:	8/11/2016		Analysis Date: 8/19/2016		SeqNo: 1134579		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.49	0.050	0.5000	0	97.9	80	120			

Sample ID	1608660-001BMS		SampType: MS		TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	Wastewater Effluent		Batch ID: 26942		RunNo: 36628					
Prep Date:	8/11/2016		Analysis Date: 8/19/2016		SeqNo: 1134583		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.49	0.050	0.5000	0	97.2	75	125			

Sample ID	1608660-001BMSD		SampType:	MSD		TestCode:	EPA 6010B: Total Recoverable Metals				
Client ID:	Wastewater Effluent		Batch ID:	26942		RunNo:	36628				
Prep Date:	8/11/2016		Analysis Date:	8/19/2016		SeqNo:	1134584		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Antimony	0.49	0.050	0.5000	0	98.5	75	125	1.33	20		

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-26961		SampType:	MBLK		TestCode:	EPA 6010B: TCLP Metals			
Client ID:	PBW		Batch ID:	26961		RunNo:	36503			
Prep Date:	8/12/2016		Analysis Date:	8/15/2016		SeqNo:	1130431	Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020								
Antimony	ND	0.050								
Arsenic	ND	0.020								
Barium	ND	0.020								
Beryllium	ND	0.0030								
Cadmium	ND	0.0020								
Chromium	ND	0.0060								
Cobalt	ND	0.0060								
Copper	ND	0.0060								
Lead	ND	0.0050								
Manganese	ND	0.0020								
Nickel	ND	0.010								
Selenium	ND	0.050								
Silver	ND	0.0050								
Thallium	ND	0.050								
Vanadium	ND	0.050								

Sample ID	LCS-26961		SampType:	LCS		TestCode:	EPA 6010B: TCLP Metals			
Client ID:	LCSW		Batch ID:	26961		RunNo:	36503			
Prep Date:	8/12/2016		Analysis Date:	8/15/2016		SeqNo:	1130432	Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.51	0.020	0.5000	0	103	80	120			
Antimony	0.49	0.050	0.5000	0	98.3	80	120			
Arsenic	0.48	0.020	0.5000	0	95.2	80	120			
Barium	0.46	0.020	0.5000	0	93.0	80	120			
Beryllium	0.49	0.0030	0.5000	0	97.7	80	120			
Cadmium	0.47	0.0020	0.5000	0	94.7	80	120			
Chromium	0.47	0.0060	0.5000	0	93.1	80	120			
Cobalt	0.46	0.0060	0.5000	0	91.2	80	120			
Copper	0.48	0.0060	0.5000	0	95.2	80	120			
Lead	0.46	0.0050	0.5000	0	92.1	80	120			
Manganese	0.46	0.0020	0.5000	0	92.3	80	120			
Nickel	0.46	0.010	0.5000	0	92.0	80	120			
Selenium	0.49	0.050	0.5000	0	97.2	80	120			
Silver	0.096	0.0050	0.1000	0	95.6	80	120			
Thallium	0.47	0.050	0.5000	0	93.1	80	120			
Vanadium	0.49	0.050	0.5000	0	98.0	80	120			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	1608660-001CMS		SampType:	MS		TestCode:	EPA 6010B: TCLP Metals			
Client ID:	Wastewater Effluent		Batch ID:	26961		RunNo:	36503			
Prep Date:	8/12/2016		Analysis Date:	8/15/2016		SeqNo:	1130536		Units: mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.78	0.020	0.5000	0.2003	116	75	125			
Antimony	0.50	0.050	0.5000	0	101	75	125			
Arsenic	0.53	0.020	0.5000	0.02818	101	75	125			
Barium	0.48	0.020	0.5000	0.01425	92.4	75	125			
Beryllium	0.49	0.0030	0.5000	0.0004400	97.1	75	125			
Cadmium	0.48	0.0020	0.5000	0	95.8	75	125			
Chromium	0.46	0.0060	0.5000	0	92.3	75	125			
Cobalt	0.46	0.0060	0.5000	0.001460	91.1	75	125			
Copper	0.51	0.0060	0.5000	0	102	75	125			
Lead	0.46	0.0050	0.5000	0.003590	90.5	75	125			
Manganese	0.61	0.0020	0.5000	0.1322	95.0	75	125			
Nickel	0.47	0.010	0.5000	0.009620	92.8	75	125			
Selenium	0.56	0.050	0.5000	0.03775	105	75	125			
Silver	0.098	0.0050	0.1000	0	97.9	75	125			
Vanadium	0.50	0.050	0.5000	0.006750	98.8	75	125			

Sample ID	1608660-001CMSD		SampType:	MSD		TestCode:	EPA 6010B: TCLP Metals			
Client ID:	Wastewater Effluent		Batch ID:	26961		RunNo:	36503			
Prep Date:	8/12/2016		Analysis Date:	8/15/2016		SeqNo:	1130537		Units: mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.79	0.020	0.5000	0.2003	118	75	125	1.17	20	
Antimony	0.47	0.050	0.5000	0	94.6	75	125	6.35	20	
Arsenic	0.53	0.020	0.5000	0.02818	99.4	75	125	1.25	20	
Barium	0.48	0.020	0.5000	0.01425	93.4	75	125	1.05	20	
Beryllium	0.49	0.0030	0.5000	0.0004400	97.9	75	125	0.828	20	
Cadmium	0.48	0.0020	0.5000	0	95.9	75	125	0.169	20	
Chromium	0.46	0.0060	0.5000	0	92.2	75	125	0.119	20	
Cobalt	0.46	0.0060	0.5000	0.001460	91.6	75	125	0.583	20	
Copper	0.52	0.0060	0.5000	0	104	75	125	1.52	20	
Lead	0.46	0.0050	0.5000	0.003590	90.6	75	125	0.0438	20	
Manganese	0.62	0.0020	0.5000	0.1322	97.0	75	125	1.70	20	
Nickel	0.47	0.010	0.5000	0.009620	92.8	75	125	0.0190	20	
Selenium	0.53	0.050	0.5000	0.03775	97.9	75	125	6.15	20	
Silver	0.10	0.0050	0.1000	0	99.8	75	125	2.01	20	
Vanadium	0.51	0.050	0.5000	0.006750	99.9	75	125	1.05	20	

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	1608660-001CMS	SampType:	MS	TestCode:	EPA 6010B: TCLP Metals					
Client ID:	Wastewater Effluent	Batch ID:	26961	RunNo:	36503					
Prep Date:	8/12/2016	Analysis Date:	8/15/2016	SeqNo:	1130575	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Thallium	0.54	0.25	0.5000	0	107	75	125			

Sample ID	1608660-001CMSD			SampType:	MSD		TestCode:	EPA 6010B: TCLP Metals			
Client ID:	Wastewater Effluent		Batch ID:	26961		RunNo:	36503				
Prep Date:	8/12/2016		Analysis Date:	8/15/2016		SeqNo:	1130576		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Thallium	0.50	0.25	0.5000	0	100	75	125	11.2	20		

Sample ID	MB-26961	SampType:	MBLK		TestCode:	EPA 6010B: TCLP Metals				
Client ID:	PBW	Batch ID:	26961		RunNo:	36584				
Prep Date:	8/12/2016	Analysis Date:	8/17/2016		SeqNo:	1132791	Units:	mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	ND	1.0								
Iron	ND	0.050								
Magnesium	ND	1.0								
Potassium	ND	1.0								
Sodium	ND	1.0								

Sample ID	LCS-26961	SampType: LCS			TestCode: EPA 6010B: TCLP Metals					
Client ID:	LCSW	Batch ID: 26961			RunNo: 36584					
Prep Date:	8/12/2016	Analysis Date: 8/17/2016			SeqNo: 1132792		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	50	1.0	50.00	0	101	80	120			
Iron	0.50	0.050	0.5000	0	99.4	80	120			
Magnesium	50	1.0	50.00	0	99.7	80	120			
Potassium	48	1.0	50.00	0	97.0	80	120			
Sodium	49	1.0	50.00	0	98.4	80	120			

Sample ID	1608660-001CMS	SampType:	MS	TestCode:	EPA 6010B: TCLP Metals					
Client ID:	Wastewater Effluent	Batch ID:	26961	RunNo:	36584					
Prep Date:	8/12/2016	Analysis Date:	8/17/2016	SeqNo:	1132798	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Magnesium	90	1.0	50.00	35.08	110	75	125			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	1608660-001CMSD	SampType:	MSD	TestCode:	EPA 6010B: TCLP Metals					
Client ID:	Wastewater Effluent	Batch ID:	26961	RunNo:	36584					
Prep Date:	8/12/2016	Analysis Date:	8/17/2016	SeqNo:	1132799	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Magnesium	87	1.0	50.00	35.08	104	75	125	3.07	20	

Sample ID	1608660-001CMS	SampType:	MS	TestCode:	EPA 6010B: TCLP Metals					
Client ID:	Wastewater Effluent	Batch ID:	26961	RunNo:	36584					
Prep Date:	8/12/2016	Analysis Date:	8/17/2016	SeqNo:	1132804	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Potassium	110	5.0	50.00	59.21	104	75	125			

Sample ID	1608660-001CMSD		SampType:	MSD		TestCode:	EPA 6010B: TCLP Metals				
Client ID:	Wastewater Effluent		Batch ID:	26961		RunNo:	36584				
Prep Date:	8/12/2016		Analysis Date:	8/17/2016		SeqNo:	1132805		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Potassium	110	5.0	50.00	59.21	93.6	75	125	4.76	20		

Sample ID	MB-26961	SampType:	MBLK	TestCode:	EPA 6010B: TCLP Metals					
Client ID:	PBW	Batch ID:	26961	RunNo:	36591					
Prep Date:	8/12/2016	Analysis Date:	8/18/2016	SeqNo:	1133361	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Zinc	ND	0.020								

Sample ID	LCS-26961	SampType:	LCS	TestCode:	EPA 6010B: TCLP Metals					
Client ID:	LCSW	Batch ID:	26961	RunNo:	36591					
Prep Date:	8/12/2016	Analysis Date:	8/18/2016	SeqNo:	1133362	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Zinc	0.47	0.020	0.5000	0	93.6	80	120			

Sample ID	1608660-001CMS	SampType:	MS	TestCode:	EPA 6010B: TCLP Metals					
Client ID:	Wastewater Effluent	Batch ID:	26961	RunNo:	36591					
Prep Date:	8/12/2016	Analysis Date:	8/18/2016	SeqNo:	1133467	Units:	mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Zinc	0.50	0.020	0.5000	0.02262	95.6	75	125			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID 1608660-001CMSD		SampType: MSD		TestCode: EPA 6010B: TCLP Metals						
Client ID: Wastewater Effluent		Batch ID: 26961		RunNo: 36591						
Prep Date: 8/12/2016		Analysis Date: 8/18/2016		SeqNo: 1133468		Units: mg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Zinc	0.49	0.020	0.5000	0.02262	92.8	75	125	2.78	20	

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-R36648		SampType:	MBLK		TestCode:	CYANIDE, Reactive				
Client ID:	PBW		Batch ID:	R36648		RunNo:	36648				
Prep Date:			Analysis Date:	8/16/2016		SeqNo:	1135042		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Cyanide, Reactive	ND	1.00									

Sample ID	LCS-R36648			SampType:	LCS			TestCode:	CYANIDE, Reactive		
Client ID:	LCSW			Batch ID:	R36648			RunNo:	36648		
Prep Date:				Analysis Date:	8/16/2016			SeqNo:	1135043	Units:	mg/L
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Cyanide, Reactive	0.578		0.5000	0	116	80	120				

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-R36648		SampType:	MBLK		TestCode:	SULFIDE, Reactive				
Client ID:	PBW		Batch ID:	R36648		RunNo:	36648				
Prep Date:			Analysis Date:	8/17/2016		SeqNo:	1135045		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Reactive Sulfide	ND	1.0									

Sample ID	LCS-R36648		SampType:	LCS		TestCode:	SULFIDE, Reactive				
Client ID:	LCSW		Batch ID:	R36648		RunNo:	36648				
Prep Date:			Analysis Date:	8/17/2016		SeqNo:	1135046	Units:	mg/L		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Reactive Sulfide	0.20		0.2000	0	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
R	RPD outside accepted recovery limits	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#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	mb-1		SampType: mblk		TestCode: SM2320B: Alkalinity					
Client ID:	PBW		Batch ID: R36527		RunNo: 36527					
Prep Date:			Analysis Date: 8/15/2016		SeqNo: 1131152		Units: mg/L CaCO3			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	ND	20.00								

Sample ID	Ics-1		SampType: Ics		TestCode: SM2320B: Alkalinity					
Client ID:	LCSW		Batch ID: R36527		RunNo: 36527					
Prep Date:			Analysis Date: 8/15/2016		SeqNo: 1131153		Units: mg/L CaCO3			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	79.40	20.00	80.00	0	99.2	90	110			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
R RPD outside accepted recovery limits
S % Recovery outside of range due to dilution or matrix

B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Detection Limit
W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1608660

22-Aug-16

Client: Navajo Refining Company

Project: Waste Water Effluent

Sample ID	MB-26968		SampType:	MBLK		TestCode:	SM2540C MOD: Total Dissolved Solids				
Client ID:	PBW		Batch ID:	26968		RunNo:	36519				
Prep Date:	8/13/2016		Analysis Date:	8/16/2016		SeqNo:	1130783		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-26968		SampType: LCS		TestCode: SM2540C MOD: Total Dissolved Solids					
Client ID:	LCSW		Batch ID: 26968		RunNo: 36519					
Prep Date:	8/13/2016		Analysis Date: 8/16/2016		SeqNo: 1130784		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	994	20.0	1000	0	99.4	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
R RPD outside accepted recovery limits	RL Reporting Detection Limit
S % Recovery outside of range due to dilution or matrix	W Sample container temperature is out of limit as specified

Sample Log-In Check List

Client Name: **NAVAJO REFINING COM**

Work Order Number: **1608660**

RcptNo: 1

Received by/date:

Logged By: **Lindsay Mangin**

8/11/2016 9:05:00 AM

Completed By: **Lindsay Mangin**

8/11/2016 10:45:24 AM

Reviewed By:

Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☒
2. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
3. How was the sample delivered? Courier

Log In

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

of preserved
bottles checked
for pH: **3 2**
3 or **>12** (unless noted)
Adjusted? **NO**

Checked by: **AS**

Special Handling (if applicable)

16. 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:

17. Additional remarks:

18. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.5	Good	Yes			

Well: MW

Date: 2/3/2013 #####

Analyte	CGWSL	CGWSL Source	Result	Result
Dissolved Metals (mg/L)				
Aluminum, Dissolved	5.00E+00	NMED GW Irrigation (20.6.2.3103.C)	0.0265	
Arsenic, Dissolved	1.00E-02	EPA MCL	0.00561	0.00437
Barium, Dissolved	1.00E+00	NMED GW Human Health (20.6.2.3103.A)	0.0204	0.0129
Boron, Dissolved	7.50E-01	NMED GW Irrigation (20.6.2.3103.C)	0.139	0.101
Cadmium, Dissolved	5.00E-03	EPA MCL		
Calcium, Dissolved	--		600	576
Chromium, Dissolved	5.00E-02	NMED GW Human Health (20.6.2.3103.A)		
Cobalt, Dissolved	5.00E-02	NMED GW Irrigation (20.6.2.3103.C)	0.00738	0.00451
Copper, Dissolved	1.00E+00	NMED GW Irrigation (20.6.2.3103.C)		
Iron, Dissolved	1.00E+00	NMED GW Irrigation (20.6.2.3103.C)		
Lead, Dissolved	1.50E-02	EPA MCL		
Manganese, Dissolved	2.00E-01	NMED GW Domestic (20.6.2.3103.B)	1.51	0.844
Mercury, Dissolved	2.00E-03	NMED GW Human Health (20.6.2.3103.A)		
Molybdenum, Dissolved	1.00E+00	NMED GW Irrigation (20.6.2.3103.C)	0.0103	0.00978
Nickel, Dissolved	2.00E-01	NMED GW Irrigation (20.6.2.3103.C)	0.00651	0.0041
Potassium, Dissolved	--		2.86	2.76
Selenium, Dissolved	5.00E-02	NMED GW Human Health (20.6.2.3103.A)	0.00222	0.00636
Silver, Dissolved	5.00E-02	NMED GW Human Health (20.6.2.3103.A)		
Sodium, Dissolved	--		146	123
Uranium	3.00E-02	NMED GW Human Health (20.6.2.3103.A)	0.0156	0.0108
Zinc, Dissolved	1.00E+01	NMED GW Domestic (20.6.2.3103.B)	0.00343	
Anions (mg/L)				
Chloride	2.50E+02	NMED GW Domestic (20.6.2.3103.B)	158	150
Fluoride (F-, Anion)	1.60E+00	NMED GW Human Health (20.6.2.3103.A)	1.76	1.91
Nitrate/Nitrite	--			
Nitrate-N	1.00E+00	NMED GW Human Health (20.6.2.3103.A)	1.43	
Nitrite	--			
Sulfate	6.00E+02	NMED GW Domestic (20.6.2.3103.B)	2200	1800
Cyanide	2.00E-01	EPA MCL		0.00432
Radium (pCi/L)				
Radium-226	--		0.43	
Radium-228	--		0.74	
Radium-226 & Radium-228	5.00E+00	USEPA MCL	1.17	
Total Dissolved Solids (mg/L)				
Total Dissolved Solids	1.00E+03	NMED GW Domestic (20.6.2.3103.B)	3760	3990
TPH (mg/L)				
Gasoline Range Organics	--			
TPH Diesel Range	2.00E-01	NMED TPH		
Oil	2.00E-01	NMED TPH		
VOCs (mg/L)				
1,1,1-Trichloroethane	6.00E-02	NMED GW Human Health (20.6.2.3103.A)		
1,1,2,2-Tetrachloroethane	1.00E-02	NMED GW Human Health (20.6.2.3103.A)		
1,1,2-Trichloroethane	5.00E-03	EPA MCL		
1,1-Dichloroethane	2.50E-02	NMED GW Human Health (20.6.2.3103.A)		
1,1-Dichloroethene	7.00E-03	USEPA MCL		

1,2-Dibromoethane	5.00E-05	EPA MCL		
1,2-Dichloroethane	5.00E-03	EPA MCL		
Benzene	5.00E-03	EPA MCL		
Carbon Tetrachloride	5.00E-03	EPA MCL		
Chloroform	8.00E-02	NMED GW Human Health (20.6.2.3103.A)		
Dichloromethane	5.00E-03	EPA MCL		
Ethylbenzene	7.00E-01	EPA MCL		
Tetrachloroethene	5.00E-03	EPA MCL		
Toluene	7.50E-01	NMED GW Human Health (20.6.2.3103.A)		
Total Xylenes	6.20E-01	NMED GW Human Health (20.6.2.3103.A)		
Trichloroethene	5.00E-03	EPA MCL		
Vinyl Chloride	1.00E-03	NMED GW Human Health (20.6.2.3103.A)		

SVOCs (mg/L)

1-Methylnaphthalene	--			
2-Methylnaphthalene	--			
Naphthalene	3.00E-02	NMED GW Human Health (20.6.2.3103.A)		
Benzo(a)Pyrene	2.00E-04	EPA MCL		

pH	6 to 9	NMED GW Domestic (20.6.2.3103.B)		
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-114		MW-115						
9/5/2013	11/21/2013	2/3/2013	5/15/2013	5/15/2013	9/4/2013	#####	2/3/2013	5/16/2013
Result	Result	Result	Result	Result	Result	Result	Result	Result
0.00848	0.00813	0.00888	0.00865	0.00816	0.00648	0.00714		0.349
0.00502	0.00539	0.00499	0.00427	0.00478	0.00467	0.00616	0.00274	0.00502
0.017	0.0112	0.0309	0.011	0.0107	0.0106	0.011	0.0161	0.0111
0.132	0.816	0.865	0.635	0.605	0.782	0.858	0.22	0.238
672	558	518	495	511	622	606	624	578
	0.00119							0.00119
0.00718		0.0029						
0.00197		0.00704	0.00151					0.00176
	0.167							0.201
1.42	0.035	0.255	0.023	0.0267	0.0362	0.0249	0.0437	0.0342
							0.000131	0.000046
0.0116	0.00815	0.00877	0.00723	0.0075	0.00663	0.00738	0.00348	0.00308
0.00558	0.00369	0.00483	0.00225		0.00208	0.00206	0.0012	0.00204
2.94	0.678	1.78	0.766	0.78	0.782	0.709	1.06	1.38
0.00245	0.00451	0.0081	0.00734	0.00654	0.00568	0.00506	0.00203	0.00733
138	250	199	201	206	247	261	206	194
0.0138	0.0856	0.0843	0.0731	0.0825	0.0936	0.0874	0.0331	0.0343
	0.0806	0.00973		0.00821		0.0257		

199	422	422	364	373	530	428	389	330
1.82	1.37	1.1	1.15	1.18	0.845	1.36	1.31	1.19
		0.821					1.37	
		0.141						
1950	3060	2790	2420	2490	2900	3090	2250	2080

		0					0	

3870	5390	4960	4990	5510	6130	5370	3650	4480
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7.07	6.73				7.07	6.73		
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MW-116				MW-117				MW-	
9/4/2013	9/4/2013	#####	#####	2/3/2013	#####	9/4/2013	#####	2/5/2013	5/15/2013
Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
0.0118	0.0126	0.0073	0.00814	0.0289	0.0184	0.0169	0.0298		0.00796
0.00467	0.00535	0.00526	0.00525	0.00498	0.00367	0.00559	0.00347	0.011	0.0146
0.00946	0.00928	0.011	0.00989	0.0235	0.0113	0.0108	0.0108	0.0145	0.00919
0.281	0.304	0.307	0.312	0.207	0.175	0.202	0.204	0.226	0.23
631	588	616	606	568	524	550	556	563	530
				0.00256					
				0.0141			0.00345	0.00156	0.00156
		0.132					0.11		
							0.00125		
0.00366	0.00478	0.00576	0.0092	0.108	0.00978	0.00502	0.00982	0.0232	
0.00006	0.000061							0.000042	
0.003	0.00304	0.00336	0.0035	0.0112	0.00664	0.014	0.0114	0.0195	0.0179
0.00112	0.00115	0.00144	0.00245	0.00413		0.00189	0.00305	0.00173	0.00184
1.22	1.21	1.37	1.3	6.92	4.37	8.92	7.54	7.95	7.2
0.00558	0.00493	0.00582	0.00611	0.00427	0.00585	0.00316	0.0038	0.00861	0.0127
230	235	235	235	176	160	118	115	218	229
0.0388	0.04	0.0387	0.0391	0.0263	0.0247	0.0224	0.0182	0.037	0.033
		0.0218	0.0311	0.0123		0.00266	0.0343		

[illegible]

				0.54				0.38	
				0.89				0.87	
				1.43				1.25	

4470	4440	4210	4570	3910	4260	3970	4150	4610	5090
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[illegible][illegible]

								0.0042	
								0.0024	
								0.0033	
								0.0047	

7.19	7.2	6.86	6.81			7.1	6.75		
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118		MW-119				RO Discharge			
9/4/2013	#####	2/5/2013	#####	9/4/2013	#####	2/3/2013	5/16/2013	9/5/2013	#####
Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
0.00992	0.0103		0.0296	0.0113	0.0149	0.00668	0.00529	0.00809	0.0567
0.0156	0.0125	0.00294	0.00537	0.00595	0.00438	0.00494	0.0025	0.00244	0.00125
0.0099	0.00964	0.00981	0.00625	0.00864	0.00973	0.0628	0.0464	0.0553	0.0533
0.307	0.288	0.0987	0.13	0.183	0.219	0.143	0.104	0.0934	0.109
543	532	494	491	635	551	625	397	410	459
	0.00105				0.00116			0.00114	
		0.000871							
	0.00338	0.00309	0.00137		0.00311	0.00177			0.00218
	0.179				0.185				0.113
	0.00107								
	0.00526	0.0424			0.00459				0.0111
0.0162	0.0141	0.0083	0.00745	0.00846	0.00861	0.0125	0.00622	0.00604	0.00815
0.00131	0.00214	0.00174	0.00163	0.0014	0.00222	0.00264		0.00329	0.00127
7.69	6.92	0.87	0.794	0.993	1.1	4.41	2.91	2.72	3.04
0.0129	0.00327	0.00246	0.00506	0.0066	0.00144	0.013	0.0075	0.00669	0.00481
215	163	127	120	133	98.8	65.4	40.4	45.7	83.9
0.0395	0.0311	0.0244	0.0222	0.0275	0.0213	0.00601			
	0.0407				0.0241	0.0132	0.00516	0.00672	0.00909

[illegible]

		0							

4550	4640	3670	4030	4030	4130	3150	2410	2290	2770
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		0.0371							
						0.17			

[illegible]

		0.0036							
		0.0021							
		0.0027							
		0.0037							

7.1	6.5			7.3	6.87			7.82	7.54
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Sampled	Detected xceedances		
			Dissolved Metals (mg/L)
31	27	0	Aluminum, Dissolved
31	31	4	Arsenic, Dissolved
31	31	0	Barium, Dissolved
31	31	4	Boron, Dissolved
31	0	0	Cadmium, Dissolved
31	31	0	Calcium, Dissolved
31	5	0	Chromium, Dissolved
31	6	0	Cobalt, Dissolved
31	14	0	Copper, Dissolved
31	7	0	Iron, Dissolved
31	2	0	Lead, Dissolved
31	24	4	Manganese, Dissolved
31	5	0	Mercury, Dissolved
31	31	0	Molybdenum, Dissolved
31	28	0	Nickel, Dissolved
31	31	0	Potassium, Dissolved
31	31	0	Selenium, Dissolved
31	0	0	Silver, Dissolved
31	31	0	Sodium, Dissolved
31	28	16	Uranium
31	16	0	Zinc, Dissolved
			Anions (mg/L)
31	31	14	Chloride
31	31	20	Fluoride (F-, Anion)
31	6	0	Nitrate/Nitrite
31	6	5	Nitrate-N
31	1	0	Nitrite
31	31	31	Sulfate
31	2	0	Cyanide
			Radium (pCi/L)
31	3	0	Radium-226
31	3	0	Radium-228
31	6	0	Radium-226 & Radium-228
			Total Dissolved Solids (mg/L)
31	31	31	Total Dissolved Solids
			TPH (mg/L)
31	2	0	Gasoline Range Organics
31	0	0	TPH Diesel Range
31	1	0	Oil
			VOCs (mg/L)
31	0	0	1,1,1-Trichloroethane
31	0	0	1,1,2,2-Tetrachloroethane
31	0	0	1,1,2-Trichloroethane
31	0	0	1,1-Dichloroethane
31	0	0	1,1-Dichloroethene

31	0	0	1,2-Dibromoethane
31	0	0	1,2-Dichloroethane
31	2	0	Benzene
31	0	0	Carbon Tetrachloride
31	0	0	Chloroform
31	0	0	Dichloromethane
31	2	0	Ethylbenzene
31	0	0	Tetrachloroethene
31	2	0	Toluene
31	2	0	Total Xylenes
31	0	0	Trichloroethene
31	0	0	Vinyl Chloride
			SVOCs (mg/L)
31	0	0	1-Methylnaphthalene
31	0	0	2-Methylnaphthalene
31	0	0	Naphthalene
31	0	0	Benzo(a)Pyrene
31	16	0	pH

Chavez, Carl J, EMNRD

From: Orosco, Richard <Richard.Orosco@HollyFrontier.com>
Sent: Friday, August 12, 2016 9:17 AM
To: Chavez, Carl J, EMNRD; Tsinnajinnie, Leona, NMENV
Cc: Denton, Scott; Dade, Lewis (Randy); Combs, Robert; Bratcher, Mike, EMNRD
Subject: 2016-08-12 Initial C-141 Effluent spill 2016-08-09
Attachments: 2016-08-09 Spill Effluent Pipeline.pdf

Carl and Leona,
Please see the attached Initial C-141 form for the effluent spill that occurred on 8/10. Please call or email if you have any questions or would like to discuss.
Thanks,

Richard L. Orosco
Environmental Tech III
HollyFrontier
Navajo Refining LLC
(575) 746-5398 Office
(575) 703-2409 Cell

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District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources
Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised August 8, 2011

Submit 1 Copy to appropriate District Office in
accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company: Navajo Refining Company, L.L.C.	Contact: Robert Combs	
Address: 501 E. Main St., Artesia, NM 88210	Telephone No.: 575-746-5382	
Facility Name: Navajo Refining Company, L.L.C.	Facility Type: Petroleum Refinery	
Surface Owner: Navajo Refining Company, L.L.C.	Mineral Owner N/A	API No. N/A

LOCATION OF RELEASE

Unit Letter	Section 18	Township 17S	Range 27E	Feet from the	North/South Line	Feet from the	East/West Line	County
-------------	---------------	-----------------	--------------	---------------	------------------	---------------	----------------	--------

Latitude_32°50'5.66"N Longitude_104°19'8.12"W

NATURE OF RELEASE

Type of Release: Non-hazardous treated wastewater effluent	Volume of Release: Est. 10 bbls	Volume Recovered 40 bbls
Source of Release: Failed collar on pipeline approximately 5 miles east of Artesia	Date and Hour of Occurrence: 08/09/16, 18:00	Date and Hour of Discovery: 08/09/16, 18:00
Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not Required	If YES, To Whom? NM Oil Conservation Division Santa Fe- Left message to Carl Chavez NM Oil Conservation Division Artesia - Left message NMED Hazardous Waste Bureau - Spoke with Leona Tsinnajinnie	
By Whom? Richard Orosco, Robert Combs	Date and Hour 08/09/16 21:00, 8/10/16 10:00, 8/10/16 16:15	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse. None	
If a Watercourse was Impacted, Describe Fully.* N/A		
Describe Cause of Problem and Remedial Action Taken.* Pipeline leak was discovered after change in pipeline flow/pressure parameters. Wastewater effluent discharge pumps located at the refinery were shut down and in-line valves were blocked-in to minimize flow back. A field crew was dispatched to repair the line and a vacuum truck was dispatched to the scene to remove the water which had accumulated in the immediate vicinity. The vacuumed water was returned to the refinery wastewater treatment unit.		
Describe Area Affected and Cleanup Action Taken.* Pooled water was removed by vacuum truck. Samples of the water were collected from the pipeline and submitted to a third-party lab for analysis. Any further corrective actions will be documented in a final C-141 report.		
I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.		
Signature: <i>Richard L Orosco</i>	<u>OIL CONSERVATION DIVISION</u>	
Printed Name: Richard Orosco	Approved by Environmental Specialist:	
Title: Environmental Technician III	Approval Date:	Expiration Date:
E-mail Address: Richard.orosco@hollyfrontier.com	Conditions of Approval:	Attached <input type="checkbox"/>
Date: 8/12/16 Phone: 575-746-3311		

* Attach Additional Sheets If Necessary



July 28, 2016

Mr. Carl Chavez
Oil Conservation Division-Environmental Bureau
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

**RE: Investigation of the June 2015 Wastewater Pipeline Break near the Former Evaporation Ponds Area
HollyFrontier Navajo Refining LLC – Artesia Refinery
GW-028**

Dear Mr. Chavez:

Enclosed is a letter describing the investigation performed in response to the HollyFrontier Navajo Refining LLC (Navajo) Artesia Refinery June 2015 wastewater pipeline break near the former evaporation ponds. The investigation was performed according to the approved work plan for this investigation.

If you have any questions or comments regarding this request, 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

c: Robert Combs, Navajo

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
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1000 Rio Brazos Road, Aztec, NM 87410
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State of New Mexico
Energy Minerals and Natural Resources

Form C-141
Revised August 8, 2011

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Submit 1 Copy to appropriate District Office in
accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☐ Initial Report ☒ Final Report

Name of Company: Navajo Refining Company, L.L.C.	Contact: Robert Combs	
Address: 501 E. Main St., Artesia, NM 88210	Telephone No.: 575-746-5382	
Facility Name: Navajo Refining Company, L.L.C.	Facility Type: Petroleum Refinery	
Surface Owner: Navajo Refining Company, L.L.C.	Mineral Owner N/A	API No. N/A

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
-------------	---------	----------	-------	---------------	------------------	---------------	----------------	--------

Latitude_32°51'0.32"N Longitude_104°20'20.03"W

NATURE OF RELEASE

Type of Release: Non-hazardous treated wastewater effluent	Volume of Release: > 25 bbls	Volume Recovered: 75 bbls
Source of Release: Small hole in pipeline approximately 3 miles east of Artesia	Date and Hour of Occurrence: 04/12/15, Unknown time	Date and Hour of Discovery: 04/12/15 10:30 am
Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required	If YES, To Whom? NM Oil Conservation Division Santa Fe- Left message to Carl Chavez NM Oil Conservation Division Artesia - Left message, return call by Randy Dade NMED Hazardous Waste Bureau - Left message National Response Center - Incident report # 1113386	
By Whom? Ray Smalts	Date and Hour 04/12/15 ~13:15 - 13:30	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse. None	
If a Watercourse was Impacted, Describe Fully.* N/A		
Describe Cause of Problem and Remedial Action Taken.* Pipeline leak was discovered during daily visual monitoring of the pipeline route. Wastewater effluent discharge pumps located at the refinery were shut down and a vacuum truck was dispatched to the scene to remove the water which had accumulated with rain water in a low-lying depression in the pipeline path across a field. The vacuumed water was returned to the refinery wastewater treatment unit.		
Describe Area Affected and Cleanup Action Taken.* The release area is located approximately 3 miles from the refinery in a vacant field in the flood plane of the Pecos River. Pooled water was removed by vacuum truck and the pipeline was repaired. Investigation of the soil and groundwater in the vicinity of the release was performed, including the installation and sampling of two soil borings, conversion to temporary monitor wells and collection groundwater samples. The temporary wells were plugged after sampling was complete. The investigation report is attached. No further action for soil or groundwater was recommended.		
I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.		
Signature: 	<u>OIL CONSERVATION DIVISION</u>	
Printed Name: Robert Combs	Approved by Environmental Specialist:	
Title: Environmental Specialist	Approval Date:	Expiration Date:
E-mail Address:	Conditions of Approval:	
Date: 7/28/16 Phone: 575-746-5382	Attached <input type="checkbox"/>	

* Attach Additional Sheets If Necessary

July 27, 2016



Mr. Robert Combs
HollyFrontier Navajo LLC
510 East Main Street
Artesia, New Mexico 88210

**Investigation of the June 2015 Wastewater Pipeline Break near the
Former Evaporation Ponds Area
HollyFrontier Navajo Refinery, Artesia, New Mexico
Discharge Permit GW-028**

Dear Robert:

This release response report describes investigation of the soil and shallow groundwater near a wastewater pipeline break that occurred near the former evaporation ponds located east of the HollyFrontier Navajo LLC (Navajo) Refinery in Artesia, New Mexico. This investigation was performed according to the revised work plan¹ submitted to the New Mexico Energy, Minerals and Natural Resources Department Oil Conservation Division (OCD) in October 2015.

Release History

The release occurred due to a break in the pipeline that conveys treated wastewater from the Refinery to injection wells located approximately 12 miles east of the Refinery. The break occurred approximately three miles east of the Refinery, and south of the Evaporation Ponds (Figure 1).

The wastewater that is conveyed through the pipeline is sampled quarterly and analyzed for waste characterization purposes. A copy of the first quarter 2015 wastewater analytical report was provided in Attachment 1 to the work plan. The sample was analyzed for total metals, anions, cations, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), corrosivity, reactivity, ignitability, specific conductance, specific gravity, total dissolved solids (TDS), and pH. In addition, the sample was analyzed for eight metals using the toxicity characteristic leaching procedure (TCLP). The analytical suite includes the majority of the constituents of concern (COCs) listed in the New Mexico Water Quality Control Commission (WQCC) standards found at New Mexico Administrative Code 20.6.2.3013 and additional analyses required for waste characterization purposes.

¹ Arcadis. *Final Work Plan for the Soil and Groundwater Investigation at the Wastewater Pipeline Break near the Evaporation Ponds Area, Navajo Refining Company Artesia Refinery*. October 14, 2015.

The analytical results indicate that the wastewater is not corrosive, not reactive, not ignitable, not toxic (no TCLP metals detected), and contains no VOCs above the WQCC standards. The following compounds were reported above the WQCC standards:

- ▶ Phenol was reported at 0.0081 mg/L, above the WQCC standard of 0.005mg/L
- ▶ Iron was reported at 3.7 mg/L, above the WQCC standard of 1.0 mg/L
- ▶ Manganese was reported at 0.25 mg/L, above the WQCC standard of 0.2 mg/L
- ▶ Chloride was reported at 300 mg/L, above the WQCC standard of 250 mg/L
- ▶ Fluoride was reported at 11 mg/L, above the WQCC standard of 1.6 mg/L
- ▶ Sulfate was reported at 2,100 mg/L, above the WQCC standard of 600 mg/L
- ▶ TDS was reported at 3,710 mg/L, above the WQCC standard of 1,000 mg/L

Based on the analytical results of the wastewater, OCD requested that soil and shallow groundwater samples be collected from the vicinity of the pipeline break to evaluate whether impacts had occurred as a result of the break. An initial work plan was submitted in June 2015 and a final work plan, incorporating requested revisions from OCD, was submitted in October 2015.

Scope of Work Performed

Sample Locations

Two soil borings were advanced at the locations specified in the work plan and were converted to temporary monitoring wells. Figure 2 shows the locations of the two borings/temporary wells. Location TMW-WWL2 was located northwest of the pipeline break, in the upgradient direction, while TMW-WWL1 was located as close as possible to the pipeline break location, within the spill area in the downgradient direction. The borings/temporary wells were located a minimum of 25 feet from the pipeline due to subsurface clearance policies.

Prior to initiating the investigation, well drilling permits were obtained from the Office of the State Engineer (OSE) and a plugging plan for the temporary wells was filed with the OSE. A copy of the permits and plugging plan is provided in Attachment A to this letter.

Soil Samples

Soil samples were collected continuously by advancing a sample collection tool lined with acetate sleeves using a convertible Geoprobe™ 9520 rig, followed by the use of a hollow-stem auger to enlarge the boring. The soil samples were screened using a photo-ionization detector (PID) and were visually inspected. Field observations were recorded on boring logs, which are provided in Attachment B to this letter.

Soil samples were collected at depths of 1, 5, and 12 feet below ground surface (ft bgs) in both borings. The soil samples were placed in containers provided by the analytical laboratory, labelled, and placed into a sample cooler. The samples were shipped by overnight courier to the laboratory under proper chain of custody to be analyzed for the following:

- ▶ Total Petroleum Hydrocarbons (TPH):
 - Gasoline Range Organics (GRO)
 - Diesel Range Organics (DRO)
 - Oil Range Organics (ORO)
- ▶ Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)
- ▶ Chloride
- ▶ Fluoride
- ▶ Sulfate
- ▶ Iron
- ▶ Manganese
- ▶ Phenol

One field duplicate sample was collected and one equipment blank was collected during the soil sampling effort. A copy of the laboratory report is provided, in electronic format, in Attachment C to this letter. Analytical results are discussed below.

Groundwater Samples

Shallow groundwater was encountered at a depth of 12 ft bgs in each boring. Each boring was advanced to a depth of approximately 16 ft bgs and a temporary well screen was installed from 15 ft bgs to 5 ft bgs. The well screen was schedule 40 polyvinyl chloride (PVC) with 0.010 inch slots. A solid PVC riser was installed from 5 ft bgs to slightly above the ground surface. Silica sand, grade 20/40, was installed in the annular space around the well screen, extending 2 feet above the well screen. A 2-foot thick bentonite seal was placed above the sand pack.

The temporary wells were developed by pumping, with the intention of purging the wells until the water quality parameters stabilized. During the initial development efforts on May 10, 2016, both wells pumped dry. The wells were developed by allowing the groundwater to recover overnight, then purging them dry two more times each on May 11, 2016. The wells were then allowed to settle overnight prior to sample collection on May 12, 2016. Table 1 provides a summary of the well development process.

Groundwater samples were collected from each well and placed into containers provided by the laboratory. A duplicate sample was collected from TMW-WWL2, located on the eastern (downgradient) side of the pipeline break. The normal and duplicate samples were analyzed for the same parameters as the soil samples. A copy of the laboratory report is provided, in electronic format, in Attachment C to this letter. Analytical results are discussed below.

Data Evaluation

Soil Screening Values

Table 2 provides a summary of the soil analytical results, along with screening levels used in the soil data evaluation. The three sources of screening levels included:

- ▶ OCD Spill Guidance document²
- ▶ New Mexico Environment Department (NMED) Soil Screening Levels (SSLs) for the soil leaching to groundwater pathway with a diffusion attenuation factor of 20 (DAF 20)³
- ▶ Background threshold values (BTVs) developed from background soil samples collected near the former evaporation ponds⁴

As discussed in the work plan, previous investigations of the former evaporation ponds performed under the guidance of the NMED Hazardous Waste Bureau (HWB) included collection and analysis of shallow soil samples for inorganic parameters from background areas not affected by historical operations associated with the Refinery, including operation of the evaporation ponds. These background soil samples were used to determine BTVs for inorganics that are known to be present naturally in the soils in this area. The background soil sample locations are shown in Figure 2 and are within similar soil types to those observed in the borings installed as part of this investigation. The Phase IV Corrective Action Investigation Report – Revised⁴ contained the results of the background soil investigation and statistical evaluation of those results, including calculation of upper tolerance limits (UTLs) to be used as BTVs for this area. Because these BTVs are from similar soil types located within 1,000 to 5,000 feet of the investigation area, it is appropriate to apply these BTVs as a screening level for this investigation. OCD had previously stated that the BTVs would not be accepted because they had not yet been approved; however, subsequent to that discussion, the NMED approved the report⁵. Therefore, the BTVs for inorganic compounds are shown in Table 2 along with the NMED SSLs.

Soil Analytical Results

TPH: The analytical results for TPH were either not detectable or were significantly below the OCD Spill Guidance screening value of 100 mg/kg.

BTEX: None of the soil samples contained BTEX above the method detection limits and all method detection limits were at least one order of magnitude below the SSLs.

Phenol: None of the soil samples contained phenol above the method detection limit and the method detection limit was four orders of magnitude below the SSL.

² New Mexico Oil Conservation Division. *Guidelines for Remediation of Leaks, Spills and Releases*. August 13, 1993.

³ New Mexico Environment Department. *Risk Assessment Guidance for Site Investigations and Remediation*. July 2015.

⁴ Arcadis. *Evaporation Ponds Phase IV Corrective Action Investigation Report – Revised*. May 2015.

⁵ New Mexico Environment Department. *Approval with Modifications: Evaporation Ponds Phase IV Corrective Action Investigation Report – Revised*, May 2015. October 6, 2015.

Iron: All of the soil samples contained iron at concentrations above the method detection limits. The samples collected from 1 ft bgs at both locations, and from 5 ft bgs from TMW-WWL1, contained iron at a concentration above the DAF 20 SSL, but below the BTV. The concentrations from the 1 and 5 ft bgs intervals were slightly higher from locations TMW-WWL1 than from location TMW-WWL2. Because the iron concentrations are below the BTV, this constituent is not considered to indicate the presence of impacts from the wastewater pipeline break.

Manganese: All of the soil samples contained manganese at concentrations above the method detection limits. All of the reported manganese concentrations were below both the DAF 20 SSL and the BTV for manganese. Therefore, there does not appear to have been any impact to the shallow soil.

Chloride: All of the soil samples contained chloride at concentrations above the method detection limits. All of the reported chloride concentrations were below the BTV for chloride and there is no DAF 20 SSL for chloride. Therefore, there does not appear to have been a significant impact to the shallow soil.

Fluoride: All of the soil samples contained fluoride at concentrations above the method detection limits. All of the reported fluoride concentrations were below both the DAF 20 SSL and the BTV for fluoride. Therefore, there does not appear to have been any impact to the shallow soil.

Sulfate: All of the soil samples contained sulfate at concentrations above the method detection limits. All of the reported sulfate concentrations were below the BTV for sulfate and there is no DAF 20 SSL for sulfate. Therefore, there does not appear to have been an impact to the shallow soil.

Groundwater Screening Values

Table 3 provides a summary of the groundwater analytical results, along with screening levels used in the groundwater data evaluation. The screening levels include the NMED TPH screening levels for TPH in groundwater³, the WQCC standards for groundwater with total dissolved solids (TDS) less than 10,000 milligrams per liter (mg/L).

Groundwater Analytical Results

TPH: The analytical results for TPH were either not detectable or were below the NMED TPH screening level of 0.2 mg/L.

BTEX: None of the groundwater samples contained BTEX above the method detection limits and all method detection limits were at least two orders of magnitude below the WQCC standards.

Phenol: None of the groundwater samples contained phenol above the method detection limit and the method detection limit was five orders of magnitude below the WQCC standard.

Iron: All of the groundwater samples contained iron at concentrations above the method detection limits; however, all of the concentrations were below the WQCC standard.

Manganese: All of the groundwater samples contained manganese at concentrations above the method detection limits and all of the concentrations were above the WQCC standard for manganese.

Chloride: All of the groundwater samples contained chloride at concentrations above the method detection limits. All of the reported chloride concentrations were above the WQCC standard. However, the chloride concentrations in the groundwater are three orders of magnitude higher than the chloride concentration in the wastewater sample. Thus, the wastewater could not have caused the elevated concentrations of chloride in the groundwater.

Fluoride: All of the groundwater samples contained fluoride at concentrations above the method detection limits. All of the reported fluoride concentrations were above the WQCC standard.

Sulfate: All of the groundwater samples contained sulfate at concentrations above the method detection limits. All of the reported sulfate concentrations were above the WQCC standard. However, the sulfate concentrations in the groundwater are an order of magnitude above the concentration of sulfate in the wastewater sample. Thus, the wastewater could not have caused the elevated concentrations of sulfate in the groundwater.

Comparison of Groundwater Analytical Results to Nearby Monitoring Wells

A comparison of the reported concentrations of manganese, chloride, fluoride and sulfate in the temporary wells to the reported concentrations in nearby permanent groundwater monitoring wells was performed to further evaluate the potential impacts from the wastewater pipeline break. The shallow groundwater flow direction in the vicinity of the former Evaporation Ponds and the wastewater pipeline break is to the south-southeast at a gradient of approximately 0.0012 feet per foot. The following monitoring wells were selected for comparison to the temporary wells:

- ▶ MW-120, located outside of the former Evaporation Ponds, near the termination of Three Mile Ditch, approximately 1600 feet north of the pipeline break
- ▶ MW-6A, located approximately 330 feet downgradient from MW-120, approximately 1430 feet north of the pipeline break
- ▶ MW-4A, located approximately 800 feet downgradient and slightly cross-gradient from MW-6A, approximately 1460 feet northeast of the pipeline break
- ▶ MW-88, located approximately 1270 feet downgradient of MW-6A, approximately 1250 feet east of the pipeline break
- ▶ MW-10, located approximately 1035 feet downgradient of MW-88, approximately 2100 east-southeast of the pipeline break
- ▶ MW-123, located approximately 780 feet south of MW-10, approximately 2560 feet southeast of the pipeline break

Trend charts were constructed using the reported concentrations of manganese, chloride, fluoride, and sulfate for each of these wells from the spring sampling event of 2012 through the spring sampling event of 2016. The trend charts are provided in Attachment D to this letter. As can be seen in the trend charts, the concentrations of these compounds fluctuate over time;

however, no obvious increasing trend in concentrations is observed in the well closest to the pipeline break area (MW-88) or in the downgradient direction (MW-10 and MW-123) following the June 2015 release.

In addition to the trend charts, a plot of the concentration reported from the April 2016 sampling for the wells listed above was constructed as a function of distance along a line connecting the wells from northwest to southeast. The locations of the temporary wells were projected onto the line between MW-4A and MW-88 and the concentrations reported from the May 2016 samples from the temporary wells were added to the plots. A concentration versus distance plot was constructed for manganese, chloride, fluoride, and sulfate and are included in Attachment D to this letter.

The comparisons of the temporary well sample results to the nearby monitoring well data (plots of concentration versus distance and trend plots over time) demonstrate that the manganese concentrations from the temporary wells are similar to the manganese concentrations in the general area. The concentrations of chloride, fluoride, and sulfate in the temporary wells appear to be elevated in one or both of the temporary wells when compared to the concentrations in the general area. Based on the concentrations of the chloride and sulfate in the wastewater sample, the wastewater is not the source of the elevated inorganic compounds in this area.

Conclusions and Recommendations

The investigation results indicate that no significant impact to soil has occurred. Although the reported concentrations of iron in the shallow soil samples are above the DAF 20 SSL, the concentrations are below the BTV for shallow soil in this area. The concentrations of chloride and sulfate in the shallow soil at location TMW-WWL1 are higher than those observed at location TMW-WWL2, but are below the BTV for shallow soil in this area. Therefore, no further action is recommended for soils.

The investigation results indicate that no impact from organic COCs has been observed in shallow groundwater; however, chloride, fluoride, and sulfate concentrations appear to be elevated in the temporary wells samples when compared to nearby downgradient monitoring wells. Based on the concentrations of the chloride and sulfate in the wastewater sample, the wastewater is not the source of the elevated inorganic compounds in this area. Because the wastewater is not a likely source for the elevated concentrations observed in the shallow groundwater, it is recommended that monitoring of the existing downgradient permanent monitoring wells continue according to the facility-wide monitoring program.

Mr. Robert Combs
July 27, 2016
Page 8

If you have any questions or comments, please feel free to contact me at 713-929-5674 or 713-249-8548.

Sincerely,
Amec Foster Wheeler Environment & Infrastructure, Inc.



Pamela R. Krueger
Senior Associate

c: David R. Hoffman, PE, Amec Foster Wheeler

Figures:

- 1 – Site Location Map
- 2 – Boring/Temporary Well Location Map

Tables:

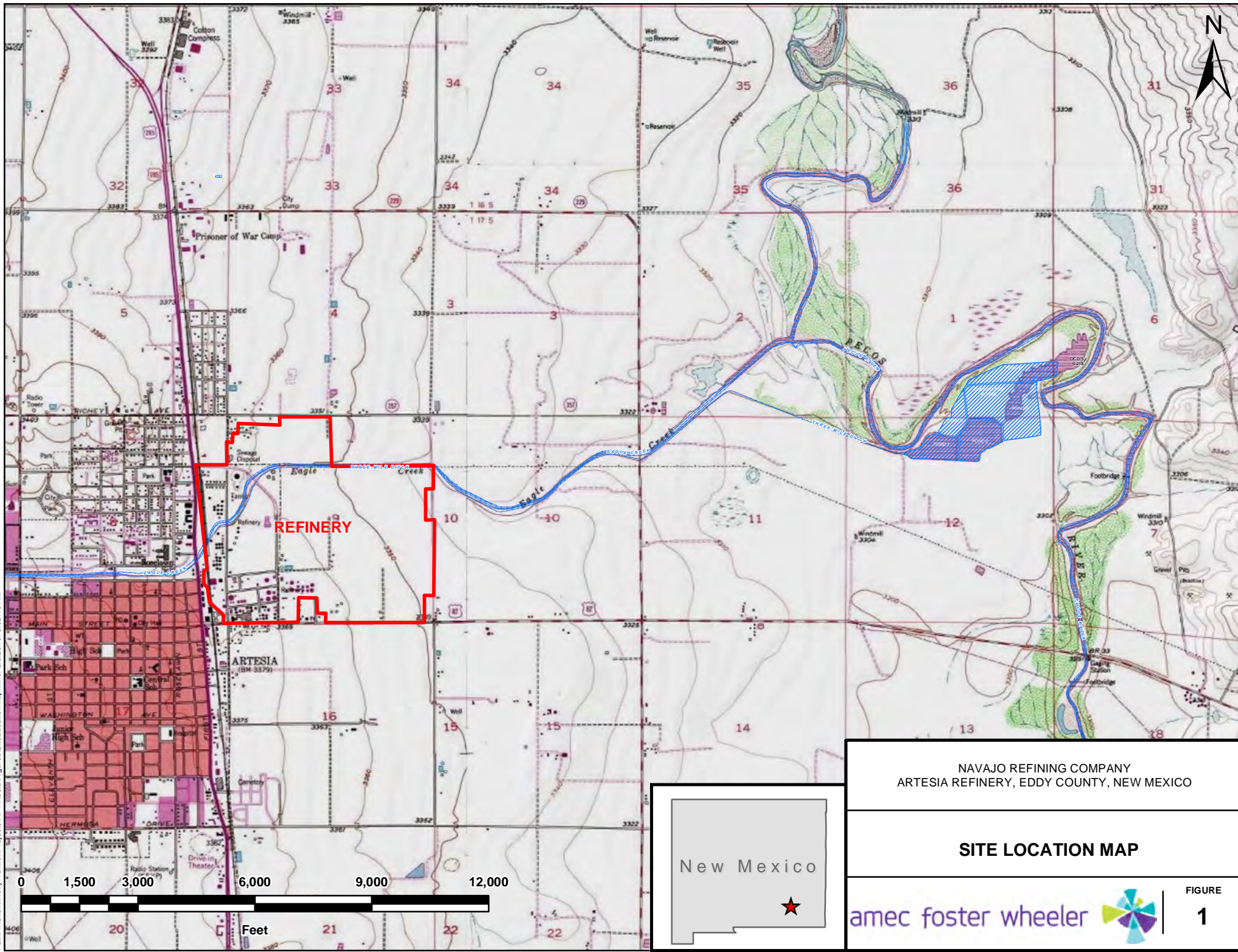
- 1 – Temporary Well Development Purge Parameters
- 2 – Soil Analytical Results from the Wastewater Pipeline Investigation
- 3 – Groundwater Analytical Results from the Wastewater Pipeline Investigation

Attachments:

- A – Well Installation Permits and Plugging Plan
- B – Boring and Temporary Well Completion Logs
- C – Laboratory Reports (electronic format)
- D – Trend Plots of Inorganic in Nearby Monitoring Wells

FIGURES

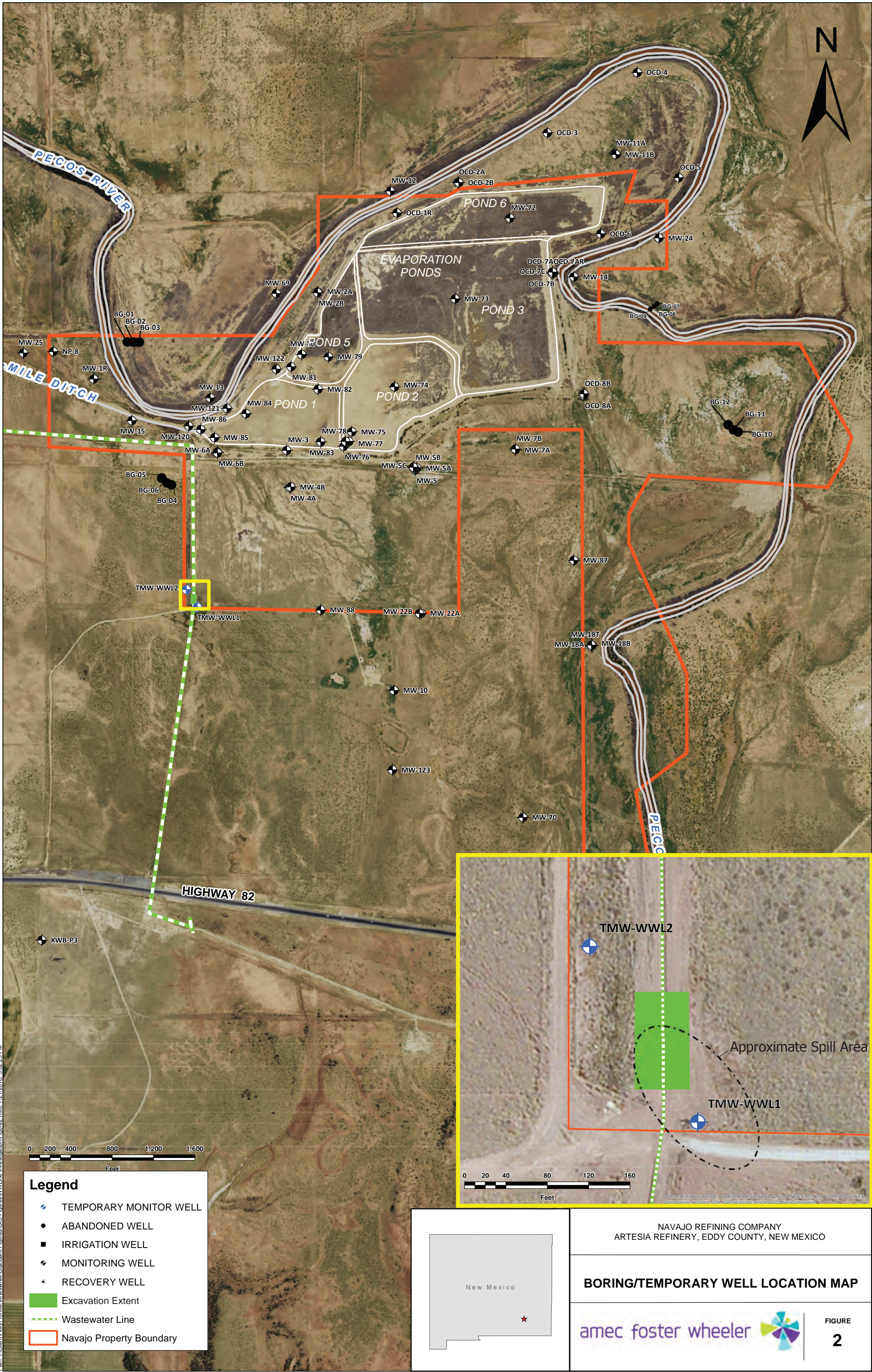
DB: C RICHARDS PM: P KRUEGER Project (Project #) 6703160002
Path: I:\Client\HollyFrontier\Projects\HF Artesia\Figures\SiteLocationMap.mxd: 6/9/2016: 8:02:49 AM



NAVAJO REFINING COMPANY
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

SITE LOCATION MAP

DB: C RICHARDS PM: P KRUEGER Project (Project # 6703160002
Path: h:\Client\HollyFrontier\Artesia\MM\Standard Figures\GIS Figures\WWLine Investigation\Figure2.mxd, 7/21/2016, 3:02:25 PM



TABLES

Table 1 - Temporary Well Development Purge Parameters
HollyFrontier Navajo Refining LLC - Artesia, New Mexico

Location	TOC (ft msl)	Date	Time	Depth to Water (feet)	GW Elevation (ft msl)	Volume Purged (gallons)	Temperature (°C)	pH (SU)	Comments
TMW-WWL1	3284.25	5/10/2016	5:10 PM	6.95	3277.30	10	--	--	Purged dry
		5/11/2016	1:10 PM	6.98	3277.27	--	18.8	7.19	Slightly cloudy, no odor, fines
			1:12 PM	--	--	--	18.3	7.15	
			1:14 PM	--	--	--	18.2	7.20	
			1:15 PM	9.60	3274.65	5	18.1	7.17	Dry, rising
			5:25 PM	6.98	3277.27	--	18.8	7.23	Slow recovery
			5:27 PM	--	--	--	18.0	7.21	
			5:29 PM	9.00	3275.25	5	17.9	7.20	
		5/12/2016	8:30 AM	7.02	3277.23	--	--	--	Sampled
TMW-WWL2	3284.36	5/10/2016	5:10 PM	7.00	3277.36	10	--	--	Purged dry
		5/11/2016	1:00 PM	7.12	3277.24	--	19.1	7.15	Cloudy, fines
			1:01 PM	--	--	--	17.9	7.20	
			1:03 PM	--	--	--	17.6	7.21	
			1:05 PM	7.85	3276.51	5	17.5	7.17	
			5:14 PM	7.12	3277.24	--	18.0	7.25	Slow recovery
			5:16 PM	--	--	--	17.9	7.17	
			5:19 PM	7.50	3276.86	5	17.9	7.16	
		5/12/2016	9:00 AM	7.16	3277.20	--	--	--	Sampled

Definitions

°C = degrees Celsius
ft msl = feet mean sea level
GW = groundwater
SU = standard units

Table 2 - Soil Analytical Results from the Wastewater Line Investigation
HollyFrontier Navajo Refining LLC - Artesia, New Mexico

Location: Depth (ft bgs): Date:					TMW-WWL1			TMW-WWL2			
					1	5	12	1	5	12	12 (Duplicate)
					05/10/2016	05/10/2016	05/10/2016	05/10/2016	05/10/2016	05/10/2016	05/10/2016
Analyte	Units	Screening Levels									
		OCD Spill Guidance	NMED DAF 20 SSL	Former EP BTV							
GRO	mg/kg	100	--	--	< 0.108	< 0.108	< 0.108	0.255 J	< 0.108	< 0.108 J3 J6	< 0.108
DRO	mg/kg	100	--	--	7.31	< 1.61	< 1.61	< 1.61	< 1.61	< 1.61	< 1.61
ORO	mg/kg	100	--	--	3.15 J	< 0.274	< 0.274	0.687 J	< 0.274	< 0.274	< 0.274
Benzene	mg/kg	10	0.038	--	< 0.00135	< 0.00135	< 0.00135	< 0.00135	< 0.00135	< 0.00135	< 0.00135
Ethylbenzene	mg/kg	--	0.262	--	< 0.00148	< 0.00148	< 0.00148	< 0.00148	< 0.00148	< 0.00148	< 0.00148
Toluene	mg/kg	--	12.1	--	< 0.00217	< 0.00217	< 0.00217	< 0.00217	< 0.00217	< 0.00217	< 0.00148
Total Xylenes	mg/kg	--	2.98	--	< 0.00349	< 0.00349	< 0.00349	< 0.00349	< 0.00349	< 0.00349	< 0.00349
Phenol	mg/kg	--	52.3	--	< 0.00695	< 0.00695	< 0.00695	< 0.00695	< 0.00695	< 0.00695	< 0.00695
Iron	mg/kg	--	6,960	17,344	12,200	7,850	2,710	10,500	5,580	2,880	3,950
Manganese	mg/kg	--	2,630	488	388	162	65	344	71	80	95
Chloride	mg/kg	--	--	5,264	1,730	1,070	1,690	113	712	712	899
Fluoride	mg/kg	--	3,560	17.9	5.61	16.1	11.8	4.56	15.8	8.01	11.2
Sulfate	mg/kg	--	--	21,620	7,580	18,300	18,300	2,590	18,300	17,200	18,200

Notes and Definitions:

< X = Result reported as not detectable with a method detection limit equal to X
Values shown in bold font with blue shading indicate that the result was above the lower of the DAF 20 SSL or BTV, but less than the higher of the DAF 20 SSL or BTV.
Values shown in bold italics font with lavendar shading indicate that the result was above both the DAF 20 SSL and the BTV. No results met this screening criteria.

BTV = Background Threshold Value
DAF 20 = Soil leaching to groundwater pathway with dilution attenuation factor of 20
DRO = Diesel Range Organics
EP = Evaporation Ponds
GRO = Gasoline Range Organics
J = Estimated result reported at a concentration above the method detection limit but below the reporting limit.
J3 = Associated laboratory batch quality control sample was outsided the established control range for precision.
J6 = Sample matrix interfered with the ability to make an accurate determination of concentration; spike value is low.
mg/kg = milligrams per kilogram
NMED = New Mexico Environment Department
OCD = Oil Conservation Division
ORO = Motor Oil Range Organics
SSL = Soil Screening Level

Table 3 - Groundwater Analytical Results from the Wastewater Line Investigation

HollyFrontier Navajo Refining LLC - Artesia, New Mexico

Analyte	Units	NMED TPH	WQCC	Wastewater	TMW-WWL1	TMW-WWL2	
				2/23/2105	5/12/2016	5/12/2016	5/12/2016 (Duplicate)
GRO	mg/L	--	--	--	< 0.0314	< 0.0314	< 0.0314
DRO	mg/L	0.2	--	--	0.0851 J	0.182	0.0892 J
ORO	mg/L	0.2	--	--	0.0419 J	0.175	0.0898 J
Benzene	mg/L	--	0.01	< 0.0005	< 0.000331	< 0.000331	< 0.000331
Ethylbenzene	mg/L	--	0.75	< 0.0005	< 0.000384	< 0.000384	< 0.000384
Toluene	mg/L	--	0.75	< 0.0005	< 0.000780	< 0.000780	< 0.000780
Total Xylenes	mg/L	--	0.62	0.0041	< 0.00106	< 0.00106	< 0.00106
Phenol	mg/L	--	0.005	0.0081	< 0.000297	< 0.000297	< 0.000297
Iron	mg/L	--	1.0	3.7	0.234 J	0.169 J	0.981
Manganese	mg/L	--	0.2	0.25	0.954	0.836	0.910
Chloride	mg/L	--	250	300	12,200	7,130	7,100
Fluoride	mg/L	--	1.6	11	6.21	2.59	3.10
Sulfate	mg/L	--	600	2,100	18,800	14,600	16,800

Notes and Definitions:

< X = Result reported as not detectable with a method detection limit equal to X

Values shown in bold font with blue shading indicate that the result was above the lower of the WQCC or BTV, but less than the higher of the WQCC or BTV.

Values shown in bold italics font with lavender shading indicate that the result was above both the WQCC and the BTV.

DRO = Diesel Range Organics

GRO = Gasoline Range Organics

J = Estimated result reported at a concentration above the method detection limit but below the reporting limit.

mg/L = milligrams per liter

NMED = New Mexico Environment Department

ORO = Motor Oil Range Organics

TPH = Total Petroleum Hydrocarbons

WQCC = Water Quality Control Commission



ATTACHMENTS



ATTACHMENT A

Tom Blaine, P.E.
State Engineer



Roswell Office
1900 WEST SECOND STREET
ROSWELL, NM 88201

**STATE OF NEW MEXICO
OFFICE OF THE STATE ENGINEER**

Trn Nbr: 586987
File Nbr: RA 12403

May. 10, 2016

SCOTT DENTON
HOLLYFRONTIER NAVAJO REFINING
501 EAST MAIN STREET
ARTESIA, NM 88210


Greetings:

Enclosed is your copy of the above numbered permit that has been approved subject to the conditions set forth on the approval page. In accordance with the conditions of approval, the well can only be tested for 10 cumulative days, and the well is to be plugged on or before 05/31/2017, unless a permit to use the water is acquired from this office.

A Well Record & Log (OSE Form wr-20) shall be filed in this office within twenty (20) days after completion of drilling, but no later than 05/31/2017.

Appropriate forms can be downloaded from the OSE website www.ose.state.nm.us or will be mailed upon request.

Sincerely,


Juan Hernandez
(575) 622-6521

Enclosure

explore

File No.

RA-12403



NEW MEXICO OFFICE OF THE STATE ENGINEER

APPLICATION FOR PERMIT TO DRILL A WELL
WITH NO CONSUMPTIVE USE OF WATER

(check applicable box):

For fees, see State Engineer website: <http://www.ose.state.nm.us/>

- Purpose:
- ☐ Pollution Control And / Or Recovery ☐ Geo-Thermal
- ☐ Exploratory ☐ Construction Site De-Watering ☐ Other (Describe):
- ☒ Monitoring ☐ Mineral De-Watering

A separate permit will be required to apply water to beneficial use.

☒ Temporary Request - Requested Start Date: 5/1/2016

Requested End Date: 6/1/2016

Plugging Plan of Operations Submitted? ☒ Yes ☐ No

1. APPLICANT(S)

Name: HollyFrontier Navajo Refining LLC	Name:
Contact or Agent: check here if Agent <input type="checkbox"/> Scott Denton	Contact or Agent: check here if Agent <input type="checkbox"/>
Mailing Address: 501 East Main Street	Mailing Address:
City: Artesia	City:
State: NM Zip Code: 88210	State: Zip Code:
Phone: <input checked="" type="checkbox"/> Home <input type="checkbox"/> Cell Phone (Work): 575-746-5487	Phone: <input type="checkbox"/> Home <input type="checkbox"/> Cell Phone (Work): 575-746-5487
E-mail (optional): Scott.Denton@HollyFrontier.com	E-mail (optional):

FOR OSE INTERNAL USE

Application for Permit, Form wr-07, Rev 6/14/12

File No.: RA-12403	Trn. No.: 586987	Receipt No.:
Trans Description (optional): POD 1,2		
Sub-Basin:	PCW/LOG Due Date: 5-31-17	

2. WELL(S) Describe the well(s) applicable to this application.

Location Required: Coordinate location must be reported in NM State Plane (NAD 83), UTM (NAD 83), or Latitude/Longitude (Lat/Long - WGS84). District II (Roswell) and District VII (Cimarron) customers, provide a PLSS location in addition to above.

☐ NM State Plane (NAD83) (Feet)
 ☐ UTM (NAD83) (Meters)
 ☒ Lat/Long (WGS84) (to the nearest 1/10th of second)

☐ NM West Zone
 ☐ Zone 12N

☐ NM East Zone
 ☐ Zone 13N

☐ NM Central Zone

Well Number (if known):	X or Easting or Longitude:	Y or Northing or Latitude:	Provide if known: -Public Land Survey System (PLSS) (Quarters or Halves, Section, Township, Range) OR - Hydrographic Survey Map & Tract; OR - Lot, Block & Subdivision; OR - Land Grant Name
TMW-WWLine1	104 20' 20.1" W	32 51' 0.1" N	T17S, R26E, S12, Q4 1, Q16 3
TMW-WWLine2	104 20' 20.3" W	32 51' 0.7" N	T17S, R26E, S12, Q4 1, Q16 3

NOTE: If more well locations need to be described, complete form WR-08 (Attachment 1 – POD Descriptions)

Additional well descriptions are attached: ☐ Yes ☒ No If yes, how many _____

Other description relating well to common landmarks, streets, or other:
Temporary wells to be installed on either side of underground wastewater line south of former evaporation ponds, north of US Highway 82.

Well is on land owned by: HollyFrontier Navajo Refining, LLC

Well Information: **NOTE: If more than one (1) well needs to be described, provide attachment.** Attached? ☐ Yes ☒ No
If yes, how many _____

Approximate depth of well (feet): 10 to 12 feet Outside diameter of well casing (inches): 2

Driller Name: Envirotech Drilling Services LLC Driller License Number: WD-1757

3. ADDITIONAL STATEMENTS OR EXPLANATIONS

Temporary monitoring wells will be installed and developed, allowed to rest for 24 hours, sampled (once only), then plugged and abandoned. The purpose of the temporary monitoring wells is to determine whether wastewater released from an identified line break may have impacted the shallow groundwater beneath the pipeline.

2016 MAY -2 PM 4:20

FOR USE INTERNAL USE

Application for Permit, Form wr-07

File No.: RA-12403

Trn No.: 586987

4. SPECIFIC REQUIREMENTS: The applicant must include the following, as applicable to each well type. Please check the appropriate boxes, to indicate the information has been included and/or attached to this application:

Exploratory: <input type="checkbox"/> Include a description of any proposed pump test, if applicable.	Pollution Control and/or Recovery: <input type="checkbox"/> Include a plan for pollution control/recovery, that includes the following: <input type="checkbox"/> A description of the need for the pollution control or recovery operation. <input type="checkbox"/> The estimated maximum period of time for completion of the operation. <input type="checkbox"/> The annual diversion amount. <input type="checkbox"/> The annual consumptive use amount. <input type="checkbox"/> The maximum amount of water to be diverted and injected for the duration of the operation. <input type="checkbox"/> The method and place of discharge. <input type="checkbox"/> The method of measurement of water produced and discharged. <input type="checkbox"/> The source of water to be injected. <input type="checkbox"/> The method of measurement of water injected. <input type="checkbox"/> The characteristics of the aquifer. <input type="checkbox"/> The method of determining the resulting annual consumptive use of water and depletion from any related stream system. <input type="checkbox"/> Proof of any permit required from the New Mexico Environment Department. <input type="checkbox"/> An access agreement if the applicant is not the owner of the land on which the pollution plume control or recovery well is to be located.	Construction De-Watering: <input type="checkbox"/> Include a description of the proposed dewatering operation, <input type="checkbox"/> The estimated duration of the operation, <input type="checkbox"/> The maximum amount of water to be diverted, <input type="checkbox"/> A description of the need for the dewatering operation, and, <input type="checkbox"/> A description of how the diverted water will be disposed of.	Mine De-Watering: <input type="checkbox"/> Include a plan for pollution control/recovery, that includes the following: <input type="checkbox"/> A description of the need for mine dewatering. <input type="checkbox"/> The estimated maximum period of time for completion of the operation. <input type="checkbox"/> The source(s) of the water to be diverted. <input type="checkbox"/> The geohydrologic characteristics of the aquifer(s). <input type="checkbox"/> The maximum amount of water to be diverted per annum. <input type="checkbox"/> The maximum amount of water to be diverted for the duration of the operation. <input type="checkbox"/> The quality of the water. <input type="checkbox"/> The method of measurement of water diverted. <input type="checkbox"/> The recharge of water to the aquifer. <input type="checkbox"/> Description of the estimated area of hydrologic effect of the project. <input type="checkbox"/> The method and place of discharge. <input type="checkbox"/> An estimation of the effects on surface water rights and underground water rights from the mine dewatering project. <input type="checkbox"/> A description of the methods employed to estimate effects on surface water rights and underground water rights. <input type="checkbox"/> Information on existing wells, rivers, springs, and wetlands within the area of hydrologic effect.
Monitoring: <input checked="" type="checkbox"/> Include the reason for the monitoring well, and, <input checked="" type="checkbox"/> The duration of the planned monitoring.		Geo-Thermal: <input type="checkbox"/> Include a description of the geothermal heat exchange project, <input type="checkbox"/> The amount of water to be diverted and re-injected for the project, <input type="checkbox"/> The time frame for constructing the geothermal heat exchange project, and, <input type="checkbox"/> The duration of the project. <input type="checkbox"/> Preliminary surveys, design data, and additional information shall be included to provide all essential facts relating to the request.	

ACKNOWLEDGEMENT

I, We (name of applicant(s)), Scott Denton on behalf of HollyFrontier Navajo Refining LLC

Print Name(s)

affirm that the foregoing statements are true to the best of (my, our) knowledge and belief.

Robert Combs for Scott M. Denton

Applicant Signature

Applicant Signature

ACTION OF THE STATE ENGINEER

This application is:

☒ approved

☐ partially approved

☐ denied

provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare and further subject to the attached conditions of approval.

Witness my hand and seal this 10th day of May 20 16, for the State Engineer,

Tom Blaine, P.E.

State Engineer

By:

Signature

Print

Title: Juan Hernandez, Engr Specialist Supervisor

Print

FOR USE INTERNAL USE

Application for Permit, Form wr-07

File No.:

RA-12403

Trn No.:

586987

**NEW MEXICO STATE ENGINEER OFFICE
PERMIT TO EXPLORE**

SPECIFIC CONDITIONS OF APPROVAL

- 1A Depth of the well shall not exceed the thickness of the valley fill.
- 4 No water shall be appropriated and beneficially used under this permit.
- 6 The well shall be plugged upon completion of the permitted use, and a plugging report shall be filed with the State Engineer within 10 days.
- 7 The Permittee shall utilize the highest and best technology available to ensure conservation of water to the maximum extent practical.
- B The well shall be drilled by a driller licensed in the State of New Mexico in accordance with Section 72-12-12 New Mexico Statutes Annotated.
- C Driller's well record must be filed with the State Engineer within 20 days after the well is drilled or driven. Well record forms will be provided by the State Engineer upon request.
- C2 No water shall be diverted from this well except for testing purposes which shall not exceed ten (10) cumulative days, and well shall be plugged or capped on or before , unless a permit to use water from this well is acquired from the Office of the State Engineer.
- P The well shall be constructed, maintained, and operated to prevent inter-aquifer exchange of water and to prevent loss of hydraulic head between geologic zones.

**NEW MEXICO STATE ENGINEER OFFICE
PERMIT TO EXPLORE**

SPECIFIC CONDITIONS OF APPROVAL (Continued)

Q The State Engineer retains jurisdiction over this permit.

LOG The Point of Diversion RA 12403 POD1 must be completed and the Well Log filed on or before 05/31/2017.

LOG The Point of Diversion RA 12403 POD2 must be completed and the Well Log filed on or before 05/31/2017.

IT IS THE PERMITTEES RESPONSIBILITY TO OBTAIN ALL AUTHORIZATIONS AND PERMISSIONS TO DRILL ON PROPERTY OF OTHER OWNERSHIP BEFORE COMMENCING ACTIVITIES UNDER THIS PERMIT.

SHOULD THE PERMITTEE CHANGE THE PURPOSE OF USE TO OTHER THAN MONITORING PURPOSES, AN APPLICATION SHALL BE ACQUIRED FROM THE OFFICE OF THE STATE ENGINEER.

ACTION OF STATE ENGINEER

Notice of Intention Rcvd:	Date Rcvd. Corrected:
Formal Application Rcvd: 05/02/2016	Pub. of Notice Ordered:
Date Returned - Correction:	Affidavit of Pub. Filed:

This application is approved provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare of the state; and further subject to the specific conditions listed previously.

Witness my hand and seal this 10 day of May A.D., 2016

Tom Blaine, P.E., State Engineer

By: 

Juan Hernandez

Trn Desc: RA 12403 POD1,2

File Number: RA 12403

Trn Number: 586987

Locator Tool Report

General Information:

Application ID: 29 Date: 05-10-2016 Time: 08:42:10

WR File Number: RA
Purpose: POINT OF DIVERSION

Applicant First Name: HOLLY FRONTIER NAVAJO REFINING LC
Applicant Last Name: TMW-WWLINE2

GW Basin: ROSWELL ARTESIAN
County: EDDY

Critical Management Area Name(s): NONE
Special Condition Area Name(s): NONE
Land Grant Name: NON GRANT

PLSS Description (New Mexico Principal Meridian):

SW 1/4 of SW 1/4 of SE 1/4 of NW 1/4 of Section 12, Township 17S, Range 26E.

Coordinate System Details:

Geographic Coordinates:

Latitude: 32 Degrees 51 Minutes 0.7 Seconds N
Longitude: 104 Degrees 20 Minutes 20.3 Seconds W

Universal Transverse Mercator Zone: 13N

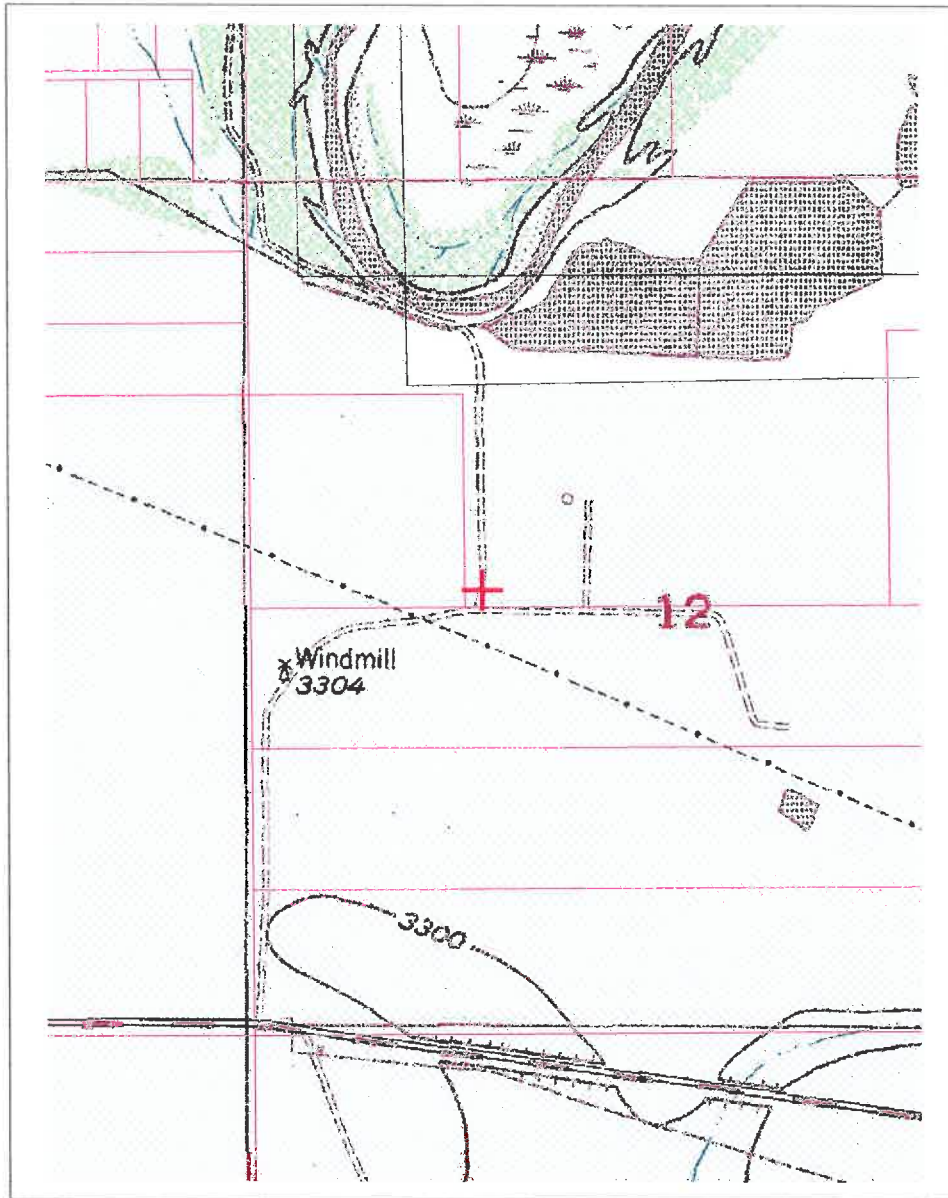
NAD 1983(92) (Meters)	N: 3,634,873	E: 561,855
NAD 1983(92) (Survey Feet)	N: 11,925,413	E: 1,843,353
NAD 1927 (Meters)	N: 3,634,670	E: 561,905
NAD 1927 (Survey Feet)	N: 11,924,748	E: 1,843,516

State Plane Coordinate System Zone: New Mexico East

NAD 1983(92) (Meters)	N: 205,141	E: 164,472
NAD 1983(92) (Survey Feet)	N: 673,034	E: 539,606
NAD 1927 (Meters)	N: 205,122	E: 151,921
NAD 1927 (Survey Feet)	N: 672,971	E: 498,427

NEW MEXICO OFFICE OF STATE ENGINEER

Locator Tool Report



WR File Number: RA

Scale: 1:14,368

Northing/Easting: UTM83(92) (Meter): N: 3,634,873

E: 561,855

Northing/Easting: SPCS83(92) (Feet): N: 673,034

E: 539,606

GW Basin: Roswell Artesian

Locator Tool Report

General Information:

Application ID:29 Date: 05-10-2016 Time: 08:40:32

WR File Number: RA
Purpose: POINT OF DIVERSION

Applicant First Name: HOLLY FRONTIER NAVAJO REFINING LC
Applicant Last Name: TMW-WWLINE1

GW Basin: ROSWELL ARTESIAN
County: EDDY

Critical Management Area Name(s): NONE
Special Condition Area Name(s): NONE
Land Grant Name: NON GRANT

PLSS Description (New Mexico Principal Meridian):

SW 1/4 of SW 1/4 of SE 1/4 of NW 1/4 of Section 12, Township 17S, Range 26E.

Coordinate System Details:

Geographic Coordinates:

Latitude: 32 Degrees 51 Minutes 0.1 Seconds N
Longitude: 104 Degrees 20 Minutes 20.1 Seconds W

Universal Transverse Mercator Zone: 13N

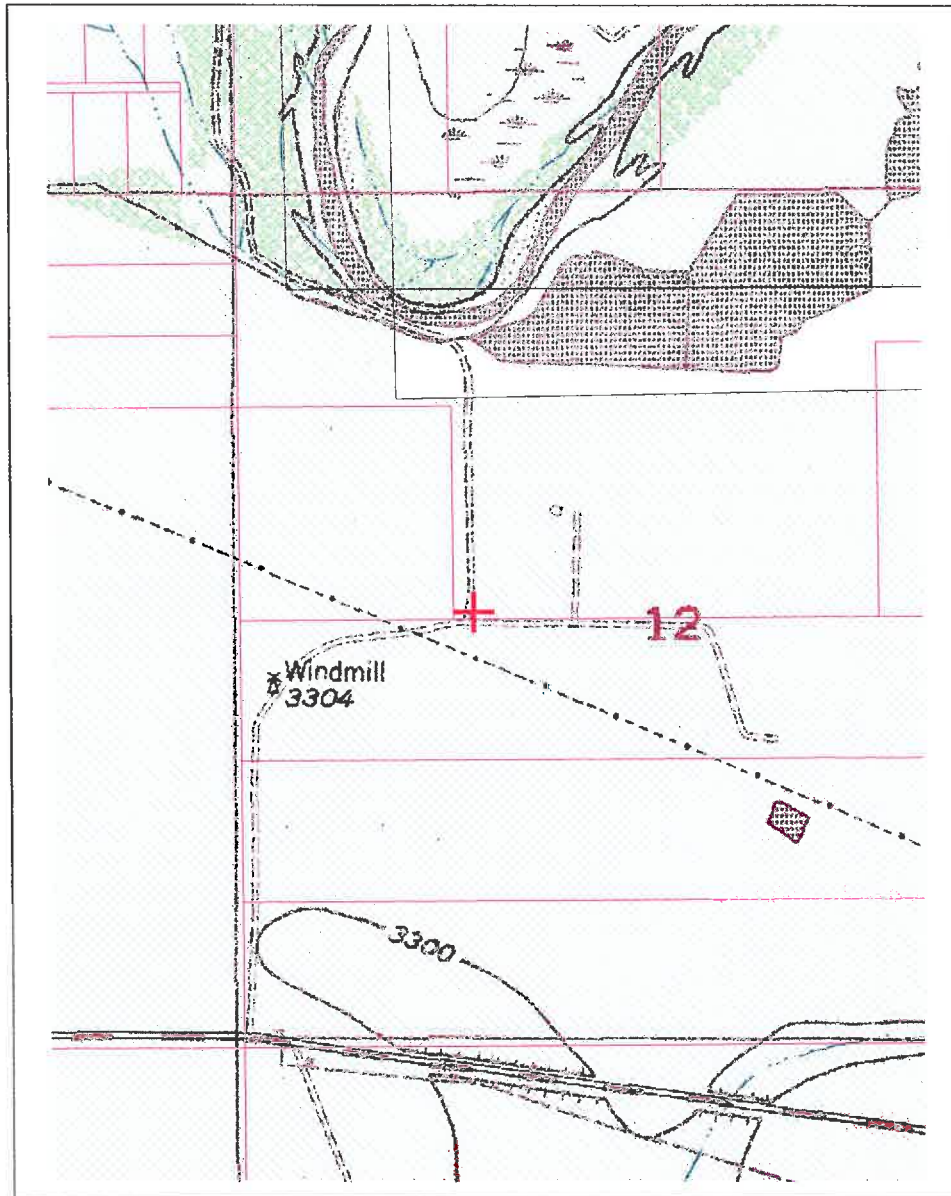
NAD 1983(92) (Meters)	N: 3,634,855	E: 561,860
NAD 1983(92) (Survey Feet)	N: 11,925,353	E: 1,843,371
NAD 1927 (Meters)	N: 3,634,652	E: 561,910
NAD 1927 (Survey Feet)	N: 11,924,687	E: 1,843,534

State Plane Coordinate System Zone: New Mexico East

NAD 1983(92) (Meters)	N: 205,123	E: 164,477
NAD 1983(92) (Survey Feet)	N: 672,973	E: 539,623
NAD 1927 (Meters)	N: 205,103	E: 151,926
NAD 1927 (Survey Feet)	N: 672,910	E: 498,444

NEW MEXICO OFFICE OF STATE ENGINEER

Locator Tool Report



WR File Number: RA

Scale: 1:14,368

Northing/Easting: UTM83(92) (Meter): N: 3,634,855

E: 561,860

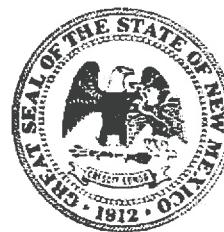
Northing/Easting: SPCS83(92) (Feet): N: 672,973

E: 539,623

GW Basin: Roswell Artesian



WELL PLUGGING PLAN OF OPERATIONS



NOTE: A Well Plugging Plan of Operations shall be filed with and accepted by the Office of the State Engineer prior to plugging.

I. FILING FEE: There is no filing fee for this form.

II. GENERAL / WELL OWNERSHIP:

Existing Office of the State Engineer POD Number (Well Number) for well to be plugged: RA-12403
Name of well owner: HollyFrontier Navajo Refining, LLC
Mailing address: 501 East Main Street
City: Artesia State: NM Zip code: 88210
Phone number: 575-746-5487 E-mail: Scott.Denton@HollyFrontier.com

III. WELL DRILLER INFORMATION:

Well Driller contracted to provide plugging services: Envirotech Drilling Services LLC
New Mexico Well Driller License No.: WD-1757 Expiration Date: 1/31/2018

IV. WELL INFORMATION:

Note: A copy of the existing Well Record for the well to be plugged should be attached to this plan.

- 1) GPS Well Location: Latitude: 32 deg, 51 min, 0.1 sec
Longitude: 104 deg, 20 min, 20.1 sec, NAD 83
- 2) Reason(s) for plugging well:

This plan is for two temporary monitoring wells that will only be sampled one time, and will be plugged and abandoned once the sample collection has been completed.
- 3) Was well used for any type of monitoring program? Yes If yes, please use section VII of this form to detail what hydrogeologic parameters were monitored. If the well was used to monitor contaminated or poor quality water, authorization from the New Mexico Environment Department may be required prior to plugging.
- 4) Does the well tap brackish, saline, or otherwise poor quality water? Yes If yes, provide additional detail, including analytical results and/or laboratory report(s):

Temporary wells are located south of former Evaporation Ponds, near monitoring wells that are included in a semiannual monitoring program. Data from those wells are reported to NMED and OCD annually, and have TDS values ranging from 5,000 to 11,000 mg/L.
- 5) Static water level: 5 - 7 feet below land surface feet above land surface (circle one)
- 6) Depth of the well: 10 - 12 feet

- 7) Inside diameter of innermost casing: 2 inches.
- 8) Casing material: PVC
- 9) The well was constructed with:
☐ an open-hole production interval, state the open interval: _____
☒ a well screen or perforated pipe, state the screened interval(s): 2 to 10 (or 2 to 12)
- 10) What annular interval surrounding the artesian casing of this well is cement-grouted? N/A
- 11) Was the well built with surface casing? No No If yes, is the annulus surrounding the surface casing grouted or otherwise sealed? _____ If yes, please describe:
- 12) Has all pumping equipment and associated piping been removed from the well? N/A If not, describe remaining equipment and intentions to remove prior to plugging in Section VII of this form.

V. DESCRIPTION OF PLANNED WELL PLUGGING:

Note: If this plan proposes to plug an artesian well in a way other than with cement grout, placed bottom to top with a tremie pipe, a detailed diagram of the well showing proposed final plugged configuration shall be attached, as well as any additional technical information, such as geophysical logs, that are necessary to adequately describe the proposal.

- 1) Describe the method by which cement grout shall be placed in the well, or describe requested plugging methodology proposed for the well:

Lean cement grout will be placed in the boring from the bottom up using a tremie pipe.
- 2) Will well head be cut-off below land surface after plugging? PVC casing will be removed

VI. PLUGGING AND SEALING MATERIALS:

Note: The plugging of a well that taps poor quality water may require the use of a specialty cement or specialty sealant

- 1) For plugging intervals that employ cement grout, complete and attach Table A.
- 2) For plugging intervals that will employ approved non-cement based sealant(s), complete and attach Table B.
- 3) Theoretical volume of grout required to plug the well to land surface: 1.6 - 2 gallons
- 4) Type of Cement proposed: Portland cement
- 5) Proposed cement grout mix: 5 gallons of water per 94 pound sack of Portland cement.
- 6) Will the grout be: _____ batch-mixed and delivered to the site
X mixed on site

02:41:20 PM 4/20

APPROVED FOR PLUGGING

- 7) Grout additives requested, and percent by dry weight relative to cement:

- 8) Additional notes and calculations:

VII. ADDITIONAL INFORMATION: List additional information below, or on separate sheet(s):

VIII. SIGNATURE:

I, Scott Denton, say that I have carefully read the foregoing Well Plugging Plan of Operations and any attachments, which are a part hereof; that I am familiar with the rules and regulations of the State Engineer pertaining to the plugging of wells and will comply with them, and that each and all of the statements in the Well Plugging Plan of Operations and attachments are true to the best of my knowledge and belief.

Robert Conks for Scott M. Denton 5/2/16

Signature of Applicant

Date

IX. ACTION OF THE STATE ENGINEER:

This Well Plugging Plan of Operations is:

X Approved subject to the attached conditions.
 Not approved for the reasons provided on the attached letter.

Witness my hand and official seal this 16th day of May, 2016

Tom Blaine P.E., New Mexico State Engineer

By: Andy Morley C. Goetz

Fox Andy Morley
District II Manager

2016 MAY -2 PM 4:20
NEW MEXICO STATE ENGINEER
OFFICE OF THE STATE ENGINEER

TABLE A - For plugging intervals that employ cement grout. Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of grout placement (ft bgl)			0
Bottom of proposed interval of grout placement (ft bgl)			10-12
Theoretical volume of grout required per interval (gallons)			1.6 to 2
Proposed cement grout mix gallons of water per 94-lb. sack of Portland cement			5
Mixed on-site or batch-mixed and delivered?			mixed on-site
Grout additive 1 requested			
Additive 1 percent by dry weight relative to cement			
Grout additive 2 requested			
Additive 2 percent by dry weight relative to cement			

2016 MAY -2 PM 4:20

WELL PLUGGING PLAN
VERSION: AUGUST 11, 2015

TABLE B - For plugging intervals that will employ approved non-cement based sealant(s). Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow
			Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of sealant placement (ft bgl)			
Bottom of proposed sealant or grout placement (ft bgl)			
Theoretical volume of sealant required per interval (gallons)			
Proposed abandonment sealant (manufacturer and trade name)			

2016 MAY -2 PM 4: 20

STATE OF TEXAS
COMMISSIONER OF AGRICULTURE

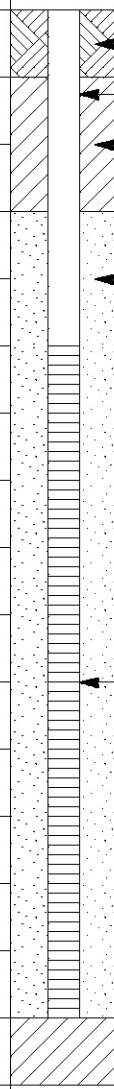


ATTACHMENT B

PROJECT: HollyFrontier Navajo Wastewater Line Release Investigation					Log of Well No. TMW-WWL-1	
BORING LOCATION:					GROUND SURFACE ELEVATION AND DATUM:	
DRILLING CONTRACTOR: Envirotech Services					DATE STARTED: 5/10/16	DATE FINISHED: 5/10/16
DRILLING METHOD: Hollow Stem Auger					TOTAL DEPTH (ft.): 16.0	SCREEN INTERVAL (ft.): 10'
DRILLING EQUIPMENT: Geoprobe 9520					DEPTH TO WATER ATD: 12'	CASING: 2'
SAMPLING METHOD: Auger					LOGGED BY: William Smith	
HAMMER WEIGHT: NA		DROP: NA			RESPONSIBLE PROFESSIONAL: William Smith	REG. NO.

DEPTH (feet)	SAMPLES		OVM Reading	DESCRIPTION	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample Blows/ Foot		NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	
0			0	SANDY CLAY (CL): reddish-brown, dry, low carbonate induration, low-medium plasticity, no odor, no staining	<p>Open</p> <p>2" Diameter Casing</p> <p>Bentonite</p> <p>20/40 Grade Silica Sand</p> <p>Sch 40 0.010 Slot PVC Screen</p>
5			0	SANDY CLAY (CL): reddish-brown, low carbonate induration, medium-high plasticity, no odor, no staining	
			0	SANDY CLAY (CL): light brown, low plasticity, no odor, no staining	
			0	SANDY CLAY (CL): brown, low plasticity, gypsum crystals, no odor, no staining	
10			0	SANDY CLAY (CL): light reddish-brown, low carbonate induration, low-medium plasticity, damp, contains some gypsum crystals, no odor, no staining	
15			0	Gypsiferous SANDY CLAY (CL): whitish-green, low plasticity, moist, no odor, no staining	
				Total Depth = 15.5'	
				Sampler Stopped at 16' Auger Stopped at 15' TMW-WWL-1 Set to 15.5'	

PROJECT: HollyFrontier Navajo Wastewater Line Release Investigation					Log of Well No. TMW-WWL-2	
BORING LOCATION:					GROUND SURFACE ELEVATION AND DATUM:	
DRILLING CONTRACTOR: Envirotech Services					DATE STARTED: 5/10/16	DATE FINISHED: 5/10/16
DRILLING METHOD: Hollow Stem Auger					TOTAL DEPTH (ft.): 16.0	SCREEN INTERVAL (ft.): 10'
DRILLING EQUIPMENT: Geoprobe 9520					DEPTH TO WATER ATD: 12'	CASING: 2'
SAMPLING METHOD: Auger					LOGGED BY: William Smith	
HAMMER WEIGHT: NA		DROP: NA			RESPONSIBLE PROFESSIONAL: William Smith	REG. NO.

DEPTH (feet)	SAMPLES		OVM Reading	DESCRIPTION	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample Blows/ Foot		NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	
0			0	SILTY SAND (SM): light brown, damp, non-plastic, no odor, no stain	 <p>Open</p> <p>2" Diameter Casing</p> <p>Bentonite</p> <p>20/40 Grade Silica Sand</p> <p>Sch 40 0.010 Slot PVC Screen</p>
5			0	SANDY CLAY (CL): brown, damp, medium plasticity, contains some gypsum crystals, no odor, no stain,	
10			0	SANDY CLAY (CL): light reddish-brown, damp, medium to high plasticity, contains some gypsum crystals, no odor, no stain,	
15			0	SANDY CLAY (CL): reddish-brown, moist, low plasticity, low-moderate carbonate induration becomes more gymsiferous with depth, no odor, organic, no stain	
20				TOTAL DEPTH = 16' Sampler Stopped at 16' Auger Stopped at 15' TMW-WWL-1 Set to 15'	



ATTACHMENT C

May 24, 2016

AMEC Foster Wheeler - Houston, TX

Sample Delivery Group: L835078
Samples Received: 05/12/2016
Project Number: 6703160012.001
Description: Wastewater Line Investigation
Site: HOLLEY FRONTIER NAVAJO
Report To: Pamela Krueger
585 N. Dairy Ashford
Houston, TX 77079

Entire Report Reviewed By:



Chris McCord
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



TMW-WWL1-01 L835078-01 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 15:00

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:06	BRJ
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 16:05	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 12:02	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873092	5	05/17/16 17:13	05/18/16 07:06	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872230	5	05/19/16 00:02	05/19/16 08:15	DWR
Wet Chemistry by Method 9056A	WG872631	20	05/16/16 17:26	05/17/16 11:40	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 01:04	CM

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

TMW-WWL1-05 L835078-02 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 15:10

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:08	CCE
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 16:29	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 10:49	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873092	5	05/17/16 17:13	05/18/16 09:12	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872230	5	05/19/16 00:02	05/19/16 08:37	DWR
Wet Chemistry by Method 9056A	WG872631	50	05/16/16 17:26	05/17/16 12:04	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 01:52	CM

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

TMW-WWL1-12 L835078-03 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 15:20

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:17	CCE
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 16:52	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 11:02	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873092	5	05/17/16 17:13	05/18/16 09:35	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872230	5	05/19/16 00:02	05/19/16 09:00	DWR
Wet Chemistry by Method 9056A	WG872631	50	05/16/16 17:26	05/17/16 12:28	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 02:16	CM

TMW-WWL2-01 L835078-04 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 16:20

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:20	BRJ
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 17:15	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 11:50	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873092	5	05/17/16 17:13	05/18/16 09:58	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872230	5	05/19/16 00:02	05/19/16 09:22	DWR
Wet Chemistry by Method 9056A	WG872631	1	05/16/16 17:26	05/17/16 06:29	CM
Wet Chemistry by Method 9056A	WG872631	10	05/16/16 17:26	05/17/16 12:52	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 02:40	CM

TMW-WWL2-05 L835078-05 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 16:30

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:23	BRJ
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 17:39	JF

ACCOUNT:

AMEC Foster Wheeler - Houston, TX

PROJECT:

6703160012.001

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L835078

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



TMW-WWL2-05 L835078-05 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 16:30

Received date/time
05/12/16 09:00

¹Cp

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 11:14	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873092	5	05/17/16 17:13	05/18/16 10:21	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG873800	5	05/19/16 11:42	05/19/16 15:29	BMB
Wet Chemistry by Method 9056A	WG872631	1	05/16/16 17:26	05/17/16 06:53	CM
Wet Chemistry by Method 9056A	WG872631	50	05/16/16 17:26	05/17/16 13:16	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 03:04	CM

²Tc

³Ss

⁴Cn

⁵Sr

TMW-WWL2-12 L835078-06 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 16:50

Received date/time
05/12/16 09:00

⁶Qc

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:26	CCE
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 18:02	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 11:26	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873220	5	05/18/16 18:29	05/18/16 20:23	JAH
Volatile Organic Compounds (GC/MS) by Method 8260B	WG873800	5	05/19/16 11:42	05/19/16 15:53	BMB
Wet Chemistry by Method 9056A	WG872631	1	05/16/16 17:26	05/17/16 07:17	CM
Wet Chemistry by Method 9056A	WG872631	50	05/16/16 17:26	05/17/16 13:40	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 04:16	CM

⁷Gl

⁸Al

⁹Sc

TMW-WWL2-12D L835078-07 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 16:55

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:29	CCE
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG873908	1	05/19/16 22:56	05/20/16 12:33	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 11:38	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873220	5	05/18/16 18:29	05/18/16 20:46	JAH
Volatile Organic Compounds (GC/MS) by Method 8260B	WG873800	5	05/19/16 11:42	05/19/16 16:17	BMB
Wet Chemistry by Method 9056A	WG872631	1	05/16/16 17:26	05/17/16 09:36	CM
Wet Chemistry by Method 9056A	WG872631	50	05/16/16 17:26	05/17/16 14:04	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 04:40	CM

TMW-WW6-EQ L835078-08 GW

Collected by
William R. Smith

Collected date/time
05/10/16 18:00

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872401	1	05/16/16 10:43	05/16/16 15:27	ST
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872427	1	05/12/16 21:03	05/15/16 18:23	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872369	1	05/12/16 20:58	05/15/16 10:41	JNS
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG872916	1	05/17/16 19:24	05/17/16 19:24	LRL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872248	1	05/13/16 18:16	05/13/16 18:16	LRL
Wet Chemistry by Method 9056A	WG873772	1	05/20/16 04:02	05/20/16 04:02	SAM

ACCOUNT:

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PROJECT:

6703160012.001

SDG:

L835078

DATE/TIME:

05/24/16 18:07

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All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Chris McCord
Technical Service Representative

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	1730		15.9	200	20	05/17/2016 11:40	WG872631
Fluoride	5.61		0.261	1.00	1	05/19/2016 01:04	WG873240
Sulfate	7580		11.4	1000	20	05/17/2016 11:40	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	12200		1.41	10.0	1	05/14/2016 14:06	WG872357
Manganese	388		0.120	1.00	1	05/14/2016 14:06	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/18/2016 07:06	WG873092
(S) a,a,a-Trifluorotoluene(FID) 99.2				59.0-128		05/18/2016 07:06	WG873092

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 08:15	WG872230
Toluene	U		0.00217	0.0250	5	05/19/2016 08:15	WG872230
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 08:15	WG872230
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 08:15	WG872230
(S) Toluene-d8	105			88.7-115		05/19/2016 08:15	WG872230
(S) Dibromofluoromethane	103			76.3-123		05/19/2016 08:15	WG872230
(S) a,a,a-Trifluorotoluene	95.8			87.2-117		05/19/2016 08:15	WG872230
(S) 4-Bromofluorobenzene	96.7			69.7-129		05/19/2016 08:15	WG872230

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	7.31		1.61	4.00	1	05/17/2016 12:02	WG872902
C28-C40 Oil Range	3.15	J	0.274	4.00	1	05/17/2016 12:02	WG872902
(S) o-Terphenyl	91.8			50.0-150		05/17/2016 12:02	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 16:05	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 16:05	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 16:05	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 16:05	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 16:05	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 16:05	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 16:05	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 16:05	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 16:05	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 16:05	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 16:05	WG872189
(S) 2-Fluorophenol	67.0			21.1-116		05/18/2016 16:05	WG872189
(S) Phenol-d5	68.0			26.3-121		05/18/2016 16:05	WG872189
(S) Nitrobenzene-d5	83.5			21.9-129		05/18/2016 16:05	WG872189
(S) 2-Fluorobiphenyl	74.9			34.9-129		05/18/2016 16:05	WG872189



Collected date/time: 05/10/16 15:00

L835078

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	62.6			21.6-142		05/18/2016 16:05	WG872189
(S) p-Terphenyl-d14	63.6			21.5-128		05/18/2016 16:05	WG872189

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	1070		39.8	500	50	05/17/2016 12:04	WG872631
Fluoride	16.1		0.261	1.00	1	05/19/2016 01:52	WG873240
Sulfate	18300		28.5	2500	50	05/17/2016 12:04	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	7850		1.41	10.0	1	05/14/2016 14:08	WG872357
Manganese	162		0.120	1.00	1	05/14/2016 14:08	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/18/2016 09:12	WG873092
(S) a,a,a-Trifluorotoluene(FID) 98.8				59.0-128		05/18/2016 09:12	WG873092

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 08:37	WG872230
Toluene	U		0.00217	0.0250	5	05/19/2016 08:37	WG872230
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 08:37	WG872230
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 08:37	WG872230
(S) Toluene-d8	105			88.7-115		05/19/2016 08:37	WG872230
(S) Dibromofluoromethane	104			76.3-123		05/19/2016 08:37	WG872230
(S) a,a,a-Trifluorotoluene	95.5			87.2-117		05/19/2016 08:37	WG872230
(S) 4-Bromofluorobenzene	99.6			69.7-129		05/19/2016 08:37	WG872230

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 10:49	WG872902
C28-C40 Oil Range	U		0.274	4.00	1	05/17/2016 10:49	WG872902
(S) o-Terphenyl	98.1			50.0-150		05/17/2016 10:49	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 16:29	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 16:29	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 16:29	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 16:29	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 16:29	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 16:29	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 16:29	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 16:29	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 16:29	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 16:29	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 16:29	WG872189
(S) 2-Fluorophenol	57.1			21.1-116		05/18/2016 16:29	WG872189
(S) Phenol-d5	46.4			26.3-121		05/18/2016 16:29	WG872189
(S) Nitrobenzene-d5	64.5			21.9-129		05/18/2016 16:29	WG872189
(S) 2-Fluorobiphenyl	66.2			34.9-129		05/18/2016 16:29	WG872189



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	39.8			21.6-142		05/18/2016 16:29	WG872189
(S) p-Terphenyl-d14	39.6			21.5-128		05/18/2016 16:29	WG872189

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	1690		39.8	500	50	05/17/2016 12:28	WG872631
Fluoride	11.8		0.261	1.00	1	05/19/2016 02:16	WG873240
Sulfate	18300		28.5	2500	50	05/17/2016 12:28	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	2710		1.41	10.0	1	05/14/2016 14:17	WG872357
Manganese	64.7		0.120	1.00	1	05/14/2016 14:17	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/18/2016 09:35	WG873092
(S) a,a,a-Trifluorotoluene(FID)	99.0			59.0-128		05/18/2016 09:35	WG873092

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 09:00	WG872230
Toluene	U		0.00217	0.0250	5	05/19/2016 09:00	WG872230
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 09:00	WG872230
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 09:00	WG872230
(S) Toluene-d8	106			88.7-115		05/19/2016 09:00	WG872230
(S) Dibromofluoromethane	104			76.3-123		05/19/2016 09:00	WG872230
(S) a,a,a-Trifluorotoluene	96.3			87.2-117		05/19/2016 09:00	WG872230
(S) 4-Bromofluorobenzene	98.8			69.7-129		05/19/2016 09:00	WG872230

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 11:02	WG872902
C28-C40 Oil Range	U		0.274	4.00	1	05/17/2016 11:02	WG872902
(S) o-Terphenyl	95.4			50.0-150		05/17/2016 11:02	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 16:52	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 16:52	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 16:52	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 16:52	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 16:52	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 16:52	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 16:52	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 16:52	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 16:52	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 16:52	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 16:52	WG872189
(S) 2-Fluorophenol	64.9			21.1-116		05/18/2016 16:52	WG872189
(S) Phenol-d5	58.7			26.3-121		05/18/2016 16:52	WG872189
(S) Nitrobenzene-d5	64.9			21.9-129		05/18/2016 16:52	WG872189
(S) 2-Fluorobiphenyl	56.2			34.9-129		05/18/2016 16:52	WG872189



Collected date/time: 05/10/16 15:20

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Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	51.6			21.6-142		05/18/2016 16:52	WG872189
(S) p-Terphenyl-d14	46.8			21.5-128		05/18/2016 16:52	WG872189

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	113		0.795	10.0	1	05/17/2016 06:29	WG872631
Fluoride	4.56		0.261	1.00	1	05/19/2016 02:40	WG873240
Sulfate	2590		5.70	500	10	05/17/2016 12:52	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	10500		1.41	10.0	1	05/14/2016 14:20	WG872357
Manganese	344		0.120	1.00	1	05/14/2016 14:20	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	0.255	J	0.108	0.500	5	05/18/2016 09:58	WG873092
(S) a,a,a-Trifluorotoluene(FID) 99.7				59.0-128		05/18/2016 09:58	WG873092

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 09:22	WG872230
Toluene	U		0.00217	0.0250	5	05/19/2016 09:22	WG872230
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 09:22	WG872230
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 09:22	WG872230
(S) Toluene-d8	106			88.7-115		05/19/2016 09:22	WG872230
(S) Dibromofluoromethane	103			76.3-123		05/19/2016 09:22	WG872230
(S) a,a,a-Trifluorotoluene	97.8			87.2-117		05/19/2016 09:22	WG872230
(S) 4-Bromofluorobenzene	100			69.7-129		05/19/2016 09:22	WG872230

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 11:50	WG872902
C28-C40 Oil Range	0.687	J	0.274	4.00	1	05/17/2016 11:50	WG872902
(S) o-Terphenyl	84.3			50.0-150		05/17/2016 11:50	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 17:15	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 17:15	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 17:15	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 17:15	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 17:15	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 17:15	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 17:15	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 17:15	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 17:15	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 17:15	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 17:15	WG872189
(S) 2-Fluorophenol	63.6			21.1-116		05/18/2016 17:15	WG872189
(S) Phenol-d5	67.5			26.3-121		05/18/2016 17:15	WG872189
(S) Nitrobenzene-d5	72.4			21.9-129		05/18/2016 17:15	WG872189
(S) 2-Fluorobiphenyl	77.4			34.9-129		05/18/2016 17:15	WG872189



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	71.5			21.6-142		05/18/2016 17:15	WG872189
(S) p-Terphenyl-d14	67.0			21.5-128		05/18/2016 17:15	WG872189

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	712		0.795	10.0	1	05/17/2016 06:53	WG872631
Fluoride	15.8		0.261	1.00	1	05/19/2016 03:04	WG873240
Sulfate	18300		28.5	2500	50	05/17/2016 13:16	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	5580		1.41	10.0	1	05/14/2016 14:23	WG872357
Manganese	70.6		0.120	1.00	1	05/14/2016 14:23	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/18/2016 10:21	WG873092
(S) a,a,a-Trifluorotoluene(FID) 99.0				59.0-128		05/18/2016 10:21	WG873092

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 15:29	WG873800
Toluene	U		0.00217	0.0250	5	05/19/2016 15:29	WG873800
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 15:29	WG873800
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 15:29	WG873800
(S) Toluene-d8	101			88.7-115		05/19/2016 15:29	WG873800
(S) Dibromofluoromethane	102			76.3-123		05/19/2016 15:29	WG873800
(S) a,a,a-Trifluorotoluene	101			87.2-117		05/19/2016 15:29	WG873800
(S) 4-Bromofluorobenzene	101			69.7-129		05/19/2016 15:29	WG873800

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 11:14	WG872902
C28-C40 Oil Range	U		0.274	4.00	1	05/17/2016 11:14	WG872902
(S) o-Terphenyl	96.4			50.0-150		05/17/2016 11:14	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 17:39	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 17:39	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 17:39	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 17:39	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 17:39	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 17:39	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 17:39	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 17:39	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 17:39	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 17:39	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 17:39	WG872189
(S) 2-Fluorophenol	59.4			21.1-116		05/18/2016 17:39	WG872189
(S) Phenol-d5	58.8			26.3-121		05/18/2016 17:39	WG872189
(S) Nitrobenzene-d5	64.1			21.9-129		05/18/2016 17:39	WG872189
(S) 2-Fluorobiphenyl	56.5			34.9-129		05/18/2016 17:39	WG872189



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	58.0			21.6-142		05/18/2016 17:39	WG872189
(S) p-Terphenyl-d14	66.9			21.5-128		05/18/2016 17:39	WG872189

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	712		0.795	10.0	1	05/17/2016 07:17	WG872631
Fluoride	8.01		0.261	1.00	1	05/19/2016 04:16	WG873240
Sulfate	17200		28.5	2500	50	05/17/2016 13:40	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	2880		1.41	10.0	1	05/14/2016 14:26	WG872357
Manganese	80.3		0.120	1.00	1	05/14/2016 14:26	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U	J3 J6	0.108	0.500	5	05/18/2016 20:23	WG873220
(S) a,a,a-Trifluorotoluene(FID) 99.8				59.0-128		05/18/2016 20:23	WG873220

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 15:53	WG873800
Toluene	U		0.00217	0.0250	5	05/19/2016 15:53	WG873800
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 15:53	WG873800
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 15:53	WG873800
(S) Toluene-d8	103			88.7-115		05/19/2016 15:53	WG873800
(S) Dibromofluoromethane	103			76.3-123		05/19/2016 15:53	WG873800
(S) a,a,a-Trifluorotoluene	100			87.2-117		05/19/2016 15:53	WG873800
(S) 4-Bromofluorobenzene	101			69.7-129		05/19/2016 15:53	WG873800

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 11:26	WG872902
C28-C40 Oil Range	U		0.274	4.00	1	05/17/2016 11:26	WG872902
(S) o-Terphenyl	102			50.0-150		05/17/2016 11:26	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 18:02	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 18:02	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 18:02	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 18:02	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 18:02	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 18:02	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 18:02	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 18:02	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 18:02	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 18:02	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 18:02	WG872189
(S) 2-Fluorophenol	45.8			21.1-116		05/18/2016 18:02	WG872189
(S) Phenol-d5	45.5			26.3-121		05/18/2016 18:02	WG872189
(S) Nitrobenzene-d5	52.8			21.9-129		05/18/2016 18:02	WG872189
(S) 2-Fluorobiphenyl	48.0			34.9-129		05/18/2016 18:02	WG872189



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	44.1			21.6-142		05/18/2016 18:02	WG872189
(S) p-Terphenyl-d14	42.5			21.5-128		05/18/2016 18:02	WG872189

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	899		0.795	10.0	1	05/17/2016 09:36	WG872631
Fluoride	11.2		0.261	1.00	1	05/19/2016 04:40	WG873240
Sulfate	18200		28.5	2500	50	05/17/2016 14:04	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	3950		1.41	10.0	1	05/14/2016 14:29	WG872357
Manganese	95.4		0.120	1.00	1	05/14/2016 14:29	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/18/2016 20:46	WG873220
(S) a,a,a-Trifluorotoluene(FID) 99.5				59.0-128		05/18/2016 20:46	WG873220

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 16:17	WG873800
Toluene	U		0.00217	0.0250	5	05/19/2016 16:17	WG873800
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 16:17	WG873800
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 16:17	WG873800
(S) Toluene-d8	106			88.7-115		05/19/2016 16:17	WG873800
(S) Dibromofluoromethane	98.9			76.3-123		05/19/2016 16:17	WG873800
(S) a,a,a-Trifluorotoluene	105			87.2-117		05/19/2016 16:17	WG873800
(S) 4-Bromofluorobenzene	99.8			69.7-129		05/19/2016 16:17	WG873800

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 11:38	WG872902
C28-C40 Oil Range	U		0.274	4.00	1	05/17/2016 11:38	WG872902
(S) o-Terphenyl	94.5			50.0-150		05/17/2016 11:38	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/20/2016 12:33	WG873908
2-Chlorophenol	U	J3	0.00831	0.333	1	05/20/2016 12:33	WG873908
2,4-Dichlorophenol	U		0.00746	0.333	1	05/20/2016 12:33	WG873908
2,4-Dimethylphenol	U		0.0471	0.333	1	05/20/2016 12:33	WG873908
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/20/2016 12:33	WG873908
2,4-Dinitrophenol	U		0.0980	0.333	1	05/20/2016 12:33	WG873908
2-Nitrophenol	U		0.0130	0.333	1	05/20/2016 12:33	WG873908
4-Nitrophenol	U		0.0525	0.333	1	05/20/2016 12:33	WG873908
Pentachlorophenol	U		0.0480	0.333	1	05/20/2016 12:33	WG873908
Phenol	U		0.00695	0.333	1	05/20/2016 12:33	WG873908
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/20/2016 12:33	WG873908
(S) 2-Fluorophenol	77.5			21.1-116		05/20/2016 12:33	WG873908
(S) Phenol-d5	72.1			26.3-121		05/20/2016 12:33	WG873908
(S) Nitrobenzene-d5	67.2			21.9-129		05/20/2016 12:33	WG873908
(S) 2-Fluorobiphenyl	75.7			34.9-129		05/20/2016 12:33	WG873908



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
(S) 2,4,6-Tribromophenol	64.1			21.6-142		05/20/2016 12:33	WG873908
(S) p-Terphenyl-d14	64.6			21.5-128		05/20/2016 12:33	WG873908

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	0.244	J	0.0519	1.00	1	05/20/2016 04:02	WG873772
Fluoride	U		0.00990	0.100	1	05/20/2016 04:02	WG873772
Sulfate	0.269	J	0.0774	5.00	1	05/20/2016 04:02	WG873772

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Iron	0.0241	B J	0.0141	0.100	1	05/16/2016 15:27	WG872401
Manganese	U		0.00120	0.0100	1	05/16/2016 15:27	WG872401

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
TPH (GC/FID) Low Fraction	U		0.0314	0.100	1	05/17/2016 19:24	WG872916
(S) a,a,a-Trifluorotoluene(FID) 94.6				62.0-128		05/17/2016 19:24	WG872916

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Benzene	0.000509	J	0.000331	0.00100	1	05/13/2016 18:16	WG872248
Toluene	U		0.000780	0.00500	1	05/13/2016 18:16	WG872248
Ethylbenzene	U		0.000384	0.00100	1	05/13/2016 18:16	WG872248
Total Xylenes	U		0.00106	0.00300	1	05/13/2016 18:16	WG872248
(S) Toluene-d8	105			90.0-115		05/13/2016 18:16	WG872248
(S) Dibromofluoromethane	106			79.0-121		05/13/2016 18:16	WG872248
(S) a,a,a-Trifluorotoluene	98.5			90.4-116		05/13/2016 18:16	WG872248
(S) 4-Bromofluorobenzene	102			80.1-120		05/13/2016 18:16	WG872248

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
C10-C28 Diesel Range	0.0358	J	0.0222	0.100	1	05/15/2016 10:41	WG872369
C28-C40 Oil Range	U		0.0118	0.100	1	05/15/2016 10:41	WG872369
(S) o-Terphenyl	109			50.0-150		05/15/2016 10:41	WG872369

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
4-Chloro-3-methylphenol	U	J4	0.000263	0.0100	1	05/15/2016 18:23	WG872427
2-Chlorophenol	U		0.000283	0.0100	1	05/15/2016 18:23	WG872427
2,4-Dichlorophenol	U		0.000284	0.0100	1	05/15/2016 18:23	WG872427
2,4-Dimethylphenol	U		0.000624	0.0100	1	05/15/2016 18:23	WG872427
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100	1	05/15/2016 18:23	WG872427
2,4-Dinitrophenol	U		0.00325	0.0100	1	05/15/2016 18:23	WG872427
2-Nitrophenol	U		0.000320	0.0100	1	05/15/2016 18:23	WG872427
4-Nitrophenol	U		0.00201	0.0100	1	05/15/2016 18:23	WG872427
Pentachlorophenol	U		0.000313	0.0100	1	05/15/2016 18:23	WG872427
Phenol	U	J4	0.000334	0.0100	1	05/15/2016 18:23	WG872427
2,4,6-Trichlorophenol	U		0.000297	0.0100	1	05/15/2016 18:23	WG872427
(S) 2-Fluorophenol	71.8			10.0-77.9		05/15/2016 18:23	WG872427
(S) Phenol-d5	58.8			5.00-70.1		05/15/2016 18:23	WG872427
(S) Nitrobenzene-d5	82.5			21.8-123		05/15/2016 18:23	WG872427
(S) 2-Fluorobiphenyl	79.0			29.5-131		05/15/2016 18:23	WG872427



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	51.3			11.2-130		05/15/2016 18:23	WG872427
(S) p-Terphenyl-d14	91.0			29.3-137		05/15/2016 18:23	WG872427

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3137464-1 05/16/16 20:07

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Chloride	U		0.795	10.0
Sulfate	U		0.57	50.0

L835458-01 Original Sample (OS) • Duplicate (DUP)

(OS) L835458-01 05/16/16 22:07 • (DUP) R3137464-4 05/16/16 22:30

	Original Result (dry)	DUP Result (dry)	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Chloride	15.8	17.1	1	8		15
Sulfate	ND	2.85	1	0		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137464-2 05/16/16 20:31 • (LCSD) R3137464-3 05/16/16 20:55

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Chloride	200	192	192	96	96	80-120			0	15
Sulfate	200	194	195	97	97	80-120			0	15

L834994-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L834994-01 05/17/16 03:18 • (MS) R3137464-5 05/17/16 03:42 • (MSD) R3137464-6 05/17/16 04:06

	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Chloride	559	13.1	595	564	104	99	1	80-120			5	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3138282-1 05/18/16 23:05

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Fluoride	U		0.261	1.00

L835078-01 Original Sample (OS) • Duplicate (DUP)

(OS) L835078-01 05/19/16 01:04 • (DUP) R3138282-4 05/19/16 01:28

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Fluoride	5.61	5.53	1	1		15

L835938-02 Original Sample (OS) • Duplicate (DUP)

(OS) L835938-02 05/19/16 09:16 • (DUP) R3138282-5 05/19/16 09:50

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Fluoride	6.25	7.86	1	23	J3	15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138282-2 05/18/16 23:28 • (LCSD) R3138282-3 05/18/16 23:52

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Fluoride	20.0	19.9	20.0	100	100	80-120			0	15

L835938-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835938-03 05/19/16 10:14 • (MS) R3138282-6 05/19/16 11:26 • (MSD) R3138282-7 05/19/16 11:50

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Fluoride	50.0	5.27	36.6	33.9	63	57	1	80-120	J6	J6	7	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3138709-1 05/19/16 20:49

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.0099	0.100
Sulfate	U		0.0774	5.00

L834614-04 Original Sample (OS) • Duplicate (DUP)

(OS) L834614-04 05/20/16 02:49 • (DUP) R3138709-5 05/20/16 03:04

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	1.51	1.52	1	0		15
Fluoride	ND	0.0592	1	0		15
Sulfate	18.1	18.1	1	0		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138709-2 05/19/16 21:03 • (LCSD) R3138709-3 05/19/16 21:18

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chloride	40.0	39.2	39.2	98	98	80-120			0	15
Fluoride	8.00	7.89	7.89	99	99	80-120			0	15
Sulfate	40.0	39.6	39.6	99	99	80-120			0	15

L834185-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L834185-02 05/20/16 00:54 • (MS) R3138709-4 05/20/16 01:09

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	40.1	92.4	104	1	80-120	
Fluoride	5.00	0.558	5.88	106	1	80-120	
Sulfate	50.0	6.65	60.4	107	1	80-120	

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc



L834409-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L834409-03 05/20/16 04:45 • (MS) R3138709-6 05/20/16 04:59 • (MSD) R3138709-7 05/20/16 05:14

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Chloride	50.0	31.0	80.0	81.0	98	100	1	80-120			1	15
Fluoride	5.00	ND	5.21	5.34	102	105	1	80-120			2	15
Sulfate	50.0	ND	53.0	53.9	101	103	1	80-120			2	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



[L835078-01,02,03,04,05,06,07](#)

Method Blank (MB)

(MB) R3136806-1 05/14/16 13:43

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Iron	1.56	U	1.41	10.0
Manganese	U		0.12	1.00

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3136806-2 05/14/16 13:46 • (LCSD) R3136806-3 05/14/16 13:48

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Iron	1000	937	924	94	92	80-120			1	20
Manganese	100	93.2	92.0	93	92	80-120			1	20

L835281-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835281-01 05/14/16 13:51 • (MS) R3136806-6 05/14/16 14:00 • (MSD) R3136806-7 05/14/16 14:03

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Iron	1090	20800	20900	23500	15	254	1	75-125	V	V	12	20
Manganese	109	608	701	714	85	97	1	75-125			2	20



Method Blank (MB)

(MB) R3137224-7 05/16/16 19:15

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Iron	0.0473	J	0.0141	0.100
Manganese	U		0.0012	0.0100

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137224-8 05/16/16 19:17 • (LCSD) R3137224-9 05/16/16 19:20

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Iron	10.0	10.2	10.3	102	103	80-120			1	20
Manganese	1.00	0.997	1.00	100	100	80-120			1	20

L835100-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835100-04 05/16/16 19:23 • (MS) R3137224-11 05/16/16 19:28 • (MSD) R3137224-12 05/16/16 19:31

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Iron	10.0	0.0740	10.3	10.3	102	102	1	75-125			0	20
Manganese	1.00	0.00612	1.02	1.02	102	101	1	75-125			1	20



Method Blank (MB)

(MB) R3137716-5 05/17/16 12:58

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
TPH (GC/FID) Low Fraction	0.0333	⬇	0.0314	0.100
(S) a,a,a-Trifluorotoluene(FID) 94.7				62.0-128

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137716-3 05/17/16 11:43 • (LCSD) R3137716-4 05/17/16 12:06

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	5.24	5.58	95.3	101	67.0-132			6.28	20
(S) a,a,a-Trifluorotoluene(FID)				104	104	62.0-128				

L835661-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835661-01 05/17/16 17:33 • (MS) R3137716-8 05/17/16 16:27 • (MSD) R3137716-9 05/17/16 16:49

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	ND	5.49	5.50	99.1	99.3	1	50.0-143			0.200	20
(S) a,a,a-Trifluorotoluene(FID)					103	104		62.0-128				



Method Blank (MB)

(MB) R3137718-3 05/18/16 01:00

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	99.8			59.0-128

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137718-1 05/17/16 23:52 • (LCSD) R3137718-2 05/18/16 00:14

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
TPH (GC/FID) Low Fraction	5.50	6.45	6.44	117	117	63.5-137			0.140	20
(S) a,a,a-Trifluorotoluene(FID)				99.0	99.6	59.0-128				

L835078-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835078-04 05/18/16 09:58 • (MS) R3137718-4 05/18/16 01:46 • (MSD) R3137718-5 05/18/16 02:09

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
TPH (GC/FID) Low Fraction	5.50	0.255	18.3	14.9	65.7	53.1	5	28.5-138			20.9	23.6
(S) a,a,a-Trifluorotoluene(FID)					96.5	97.4		59.0-128				



Method Blank (MB)

(MB) R3138234-3 05/18/16 17:50

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID) 100				59.0-128

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138234-1 05/18/16 16:42 • (LCSD) R3138234-2 05/18/16 17:04

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	5.59	6.61	102	120	63.5-137			16.8	20
(S) a,a,a-Trifluorotoluene(FID)				99.3	99.1	59.0-128				

L835078-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835078-06 05/18/16 20:23 • (MS) R3138234-4 05/18/16 19:15 • (MSD) R3138234-5 05/18/16 19:38

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	U	4.61	9.33	16.8	33.9	5	28.5-138	J6	J3	67.8	23.6
(S) a,a,a-Trifluorotoluene(FID)					98.4	98.4		59.0-128				

Method Blank (MB)

(MB) R3138213-3 05/19/16 01:28

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000270	0.00100
Ethylbenzene	U		0.000297	0.00100
Toluene	U		0.000434	0.00500
Xylenes, Total	U		0.000698	0.00300
(S) Toluene-d8	105			88.7-115
(S) Dibromofluoromethane	101			76.3-123
(S) a,a,a-Trifluorotoluene	94.8			87.2-117
(S) 4-Bromofluorobenzene	100			69.7-129

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138213-1 05/18/16 23:58 • (LCSD) R3138213-2 05/19/16 00:21

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0232	0.0234	92.7	93.6	72.6-120			1.03	20
Ethylbenzene	0.0250	0.0248	0.0244	99.2	97.6	78.6-124			1.62	20
Toluene	0.0250	0.0243	0.0247	97.2	98.7	76.7-116			1.52	20
Xylenes, Total	0.0750	0.0724	0.0729	96.5	97.1	78.1-123			0.620	20
(S) Toluene-d8				105	106	88.7-115				
(S) Dibromofluoromethane				103	103	76.3-123				
(S) a,a,a-Trifluorotoluene				95.8	96.3	87.2-117				
(S) 4-Bromofluorobenzene				102	101	69.7-129				

L835057-12 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835057-12 05/19/16 03:21 • (MS) R3138213-4 05/19/16 02:13 • (MSD) R3138213-5 05/19/16 02:36

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	ND	0.0727	0.122	58.2	97.3	5	47.8-131		J3	50.4	22.8
Ethylbenzene	0.0250	ND	0.0847	0.121	67.8	97.1	5	44.8-135		J3	35.6	26.9
Toluene	0.0250	ND	0.0832	0.122	66.5	97.9	5	47.8-127		J3	38.1	24.3
Xylenes, Total	0.0750	ND	0.253	0.362	67.6	96.6	5	42.7-135		J3	35.4	26.6
(S) Toluene-d8					104	103		88.7-115				
(S) Dibromofluoromethane					102	104		76.3-123				
(S) a,a,a-Trifluorotoluene					95.0	94.8		87.2-117				
(S) 4-Bromofluorobenzene					98.2	99.3		69.7-129				

Method Blank (MB)

(MB) R3138352-3 05/19/16 10:31

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000270	0.00100
Ethylbenzene	U		0.000297	0.00100
Toluene	U		0.000434	0.00500
Xylenes, Total	U		0.000698	0.00300
(S) Toluene-d8	105			88.7-115
(S) Dibromofluoromethane	95.5			76.3-123
(S) a,a,a-Trifluorotoluene	106			87.2-117
(S) 4-Bromofluorobenzene	103			69.7-129

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138352-1 05/19/16 08:30 • (LCSD) R3138352-2 05/19/16 08:54

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0228	0.0223	91.1	89.3	72.6-120			2.05	20
Ethylbenzene	0.0250	0.0259	0.0253	103	101	78.6-124			2.09	20
Toluene	0.0250	0.0229	0.0232	91.6	92.9	76.7-116			1.39	20
Xylenes, Total	0.0750	0.0751	0.0738	100	98.4	78.1-123			1.75	20
(S) Toluene-d8				105	106	88.7-115				
(S) Dibromofluoromethane				99.3	96.4	76.3-123				
(S) a,a,a-Trifluorotoluene				105	107	87.2-117				
(S) 4-Bromofluorobenzene				102	103	69.7-129				

L835074-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835074-10 05/19/16 14:41 • (MS) R3138352-6 05/19/16 12:16 • (MSD) R3138352-7 05/19/16 12:40

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0336	ND	1.40	1.36	90.6	87.5	45	47.8-131			3.33	22.8
Ethylbenzene	0.0336	ND	1.38	1.33	87.5	84.4	45	44.8-135			3.38	26.9
Toluene	0.0336	ND	1.40	1.37	90.6	88.7	45	47.8-127			2.13	24.3
Xylenes, Total	0.101	1.60	5.48	5.40	85.5	83.9	45	42.7-135			1.35	26.6
(S) Toluene-d8					104	104		88.7-115				
(S) Dibromofluoromethane					101	98.8		76.3-123				
(S) a,a,a-Trifluorotoluene					102	104		87.2-117				



L835074-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835074-10 05/19/16 14:41 • (MS) R3138352-6 05/19/16 12:16 • (MSD) R3138352-7 05/19/16 12:40

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
(S) 4-Bromofluorobenzene					95.1	99.8		69.7-129				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3136703-3 05/13/16 13:23

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.000331	0.00100
Ethylbenzene	U		0.000384	0.00100
Toluene	U		0.000780	0.00500
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	105			90.0-115
(S) Dibromofluoromethane	105			79.0-121
(S) a,a,a-Trifluorotoluene	98.8			90.4-116
(S) 4-Bromofluorobenzene	101			80.1-120

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3136703-1 05/13/16 12:14 • (LCSD) R3136703-2 05/13/16 12:31

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0259	0.0255	103	102	73.0-122			1.27	20
Ethylbenzene	0.0250	0.0260	0.0246	104	98.2	80.9-121			5.57	20
Toluene	0.0250	0.0264	0.0251	105	100	77.9-116			5.02	20
Xylenes, Total	0.0750	0.0786	0.0747	105	99.6	79.2-122			5.11	20
(S) Toluene-d8				105	104	90.0-115				
(S) Dibromofluoromethane				102	106	79.0-121				
(S) a,a,a-Trifluorotoluene				99.7	99.5	90.4-116				
(S) 4-Bromofluorobenzene				97.8	98.1	80.1-120				

L835078-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835078-08 05/13/16 18:16 • (MS) R3136703-4 05/13/16 18:33 • (MSD) R3136703-5 05/13/16 18:50

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.000509	0.0233	0.0247	91.1	96.9	1	58.6-133			6.06	20
Ethylbenzene	0.0250	U	0.0217	0.0232	86.9	92.7	1	62.7-136			6.45	20
Toluene	0.0250	U	0.0224	0.0240	89.4	95.8	1	67.8-124			6.96	20
Xylenes, Total	0.0750	U	0.0658	0.0704	87.8	93.9	1	65.6-133			6.70	20
(S) Toluene-d8					104	106		90.0-115				
(S) Dibromofluoromethane					106	108		79.0-121				
(S) a,a,a-Trifluorotoluene					97.8	102		90.4-116				
(S) 4-Bromofluorobenzene					98.4	98.0		80.1-120				



Method Blank (MB)

(MB) R3139237-1 05/15/16 09:51

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
C10-C28 Diesel Range	U		0.0222	0.100
C28-C40 Oil Range	U		0.0118	0.100
(S) o-Terphenyl	112			50.0-150

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3139237-2 05/15/16 10:07 • (LCSD) R3139237-3 05/15/16 10:24

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	1.50	1.53	1.54	102	102	70.0-130			0.680	20
(S) o-Terphenyl				110	117	50.0-150				

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc



Method Blank (MB)

(MB) R3137450-1 05/17/16 10:13

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	103			50.0-150

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137450-2 05/17/16 10:25 • (LCSD) R3137450-3 05/17/16 10:37

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	48.2	52.7	80.3	87.9	50.0-100			9.05	20
(S) o-Terphenyl				93.1	93.4	50.0-150				

L835078-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835078-01 05/17/16 12:02 • (MS) R3137450-4 05/17/16 12:15 • (MSD) R3137450-5 05/17/16 12:27

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	7.31	57.8	64.7	84.1	95.7	1	50.0-100			11.4	20
(S) o-Terphenyl					72.6	68.2		50.0-150				

Method Blank (MB)

(MB) R3138162-3 05/18/16 13:22

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
4-Chloro-3-methylphenol	U		0.00477	0.333
2-Chlorophenol	U		0.00831	0.333
2,4-Dichlorophenol	U		0.00746	0.333
2,4-Dimethylphenol	U		0.0471	0.333
4,6-Dinitro-2-methylphenol	U		0.124	0.333
2,4-Dinitrophenol	U		0.0980	0.333
2-Nitrophenol	U		0.0130	0.333
4-Nitrophenol	U		0.0525	0.333
Pentachlorophenol	U		0.0480	0.333
Phenol	U		0.00695	0.333
2,4,6-Trichlorophenol	U		0.00779	0.333
(S) Nitrobenzene-d5	80.9			21.9-129
(S) 2-Fluorobiphenyl	83.1			34.9-129
(S) p-Terphenyl-d14	85.7			21.5-128
(S) Phenol-d5	80.4			26.3-121
(S) 2-Fluorophenol	74.3			21.1-116
(S) 2,4,6-Tribromophenol	74.1			21.6-142

Cp

Tc

Ss

Cn

Sr

Qc

Gl

Al

Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138162-1 05/18/16 12:35 • (LCSD) R3138162-2 05/18/16 12:58

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.667	0.587	0.686	88.0	103	51.1-113			15.6	20
2-Chlorophenol	0.667	0.469	0.525	70.3	78.7	40.8-103			11.3	20
2,4-Dichlorophenol	0.667	0.551	0.617	82.6	92.5	46.2-109			11.3	20
2,4-Dimethylphenol	0.667	0.557	0.647	83.6	97.1	42.2-110			15.0	20
4,6-Dinitro-2-methylphenol	0.667	0.536	0.586	80.3	87.8	23.1-119			8.86	23.7
2,4-Dinitrophenol	0.667	0.332	0.345	49.8	51.7	10.0-105			3.82	36.5
2-Nitrophenol	0.667	0.532	0.620	79.7	93.0	44.2-113			15.3	20.9
4-Nitrophenol	0.667	0.538	0.600	80.7	90.0	34.8-109			10.9	20
Pentachlorophenol	0.667	0.550	0.574	82.5	86.1	16.2-102			4.25	22.9
Phenol	0.667	0.497	0.599	74.6	89.8	41.5-106			18.5	20
2,4,6-Trichlorophenol	0.667	0.565	0.620	84.7	93.0	44.4-108			9.39	20
(S) Nitrobenzene-d5				86.7	99.9	21.9-129				
(S) 2-Fluorobiphenyl				83.6	94.3	34.9-129				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138162-1 05/18/16 12:35 • (LCSD) R3138162-2 05/18/16 12:58

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
(S) p-Terphenyl-d14				81.3	84.5	21.5-128				
(S) Phenol-d5				74.6	82.2	26.3-121				
(S) 2-Fluorophenol				71.3	82.1	21.1-116				
(S) 2,4,6-Tribromophenol				83.7	84.4	21.6-142				

L835035-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835035-10 05/19/16 12:00 • (MS) R3138313-1 05/19/16 12:24 • (MSD) R3138313-2 05/19/16 12:47

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.142	U	0.632	0.663	89.0	93.4	5	27.0-154			4.76	26.6
2-Chlorophenol	0.142	U	0.524	0.563	73.8	79.2	5	33.2-121			7.06	29.3
2,4-Dichlorophenol	0.142	U	0.634	0.639	89.2	90.0	5	34.8-134			0.890	27.3
2,4-Dimethylphenol	0.142	U	0.638	0.651	89.9	91.7	5	12.3-149			2.00	32.3
4,6-Dinitro-2-methylphenol	0.142	U	ND	ND	0.000	0.000	5	10.0-144	J6	J6	0.000	32.7
2,4-Dinitrophenol	0.142	U	ND	ND	0.000	0.000	5	10.0-121	J6	J6	0.000	39.4
2-Nitrophenol	0.142	U	0.636	0.652	89.5	91.8	5	29.5-144			2.53	29.9
4-Nitrophenol	0.142	U	0.586	0.569	82.6	80.1	5	20.0-133			3.03	30.2
Pentachlorophenol	0.142	U	0.655	0.671	92.3	94.5	5	10.0-139			2.43	28.3
Phenol	0.142	U	0.565	0.644	79.5	90.7	5	25.1-130			13.1	29.6
2,4,6-Trichlorophenol	0.142	U	0.633	0.675	89.1	95.1	5	33.8-133			6.52	28.1
(S) Nitrobenzene-d5					86.3	94.0		21.9-129				
(S) 2-Fluorobiphenyl					83.0	81.1		34.9-129				
(S) p-Terphenyl-d14					82.2	60.4		21.5-128				
(S) Phenol-d5					80.2	86.0		26.3-121				
(S) 2-Fluorophenol					78.2	82.9		21.1-116				
(S) 2,4,6-Tribromophenol					80.1	84.2		21.6-142				



Method Blank (MB)

(MB) R3138667-3 05/20/16 10:56

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
4-Chloro-3-methylphenol	U		0.00477	0.333
2-Chlorophenol	U		0.00831	0.333
2,4-Dichlorophenol	U		0.00746	0.333
2,4-Dimethylphenol	U		0.0471	0.333
4,6-Dinitro-2-methylphenol	U		0.124	0.333
2,4-Dinitrophenol	U		0.0980	0.333
2-Nitrophenol	U		0.0130	0.333
4-Nitrophenol	U		0.0525	0.333
Pentachlorophenol	U		0.0480	0.333
Phenol	U		0.00695	0.333
2,4,6-Trichlorophenol	U		0.00779	0.333
(S) Nitrobenzene-d5	61.8			21.9-129
(S) 2-Fluorobiphenyl	61.7			34.9-129
(S) p-Terphenyl-d14	68.7			21.5-128
(S) Phenol-d5	70.1			26.3-121
(S) 2-Fluorophenol	64.2			21.1-116
(S) 2,4,6-Tribromophenol	52.9			21.6-142

Cp

Tc

Ss

Cn

Sr

Qc

Gl

Al

Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138667-1 05/20/16 10:08 • (LCSD) R3138667-2 05/20/16 10:32

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.667	0.451	0.496	67.7	74.4	51.1-113			9.51	20
2-Chlorophenol	0.667	0.345	0.432	51.7	64.8	40.8-103		J3	22.6	20
2,4-Dichlorophenol	0.667	0.452	0.451	67.8	67.5	46.2-109			0.350	20
2,4-Dimethylphenol	0.667	0.420	0.451	62.9	67.6	42.2-110			7.12	20
4,6-Dinitro-2-methylphenol	0.667	0.457	0.470	68.5	70.5	23.1-119			2.97	23.7
2,4-Dinitrophenol	0.667	0.430	0.404	64.5	60.6	10.0-105			6.29	36.5
2-Nitrophenol	0.667	0.421	0.463	63.1	69.4	44.2-113			9.50	20.9
4-Nitrophenol	0.667	0.393	0.365	58.9	54.7	34.8-109			7.41	20
Pentachlorophenol	0.667	0.517	0.487	77.5	73.0	16.2-102			5.87	22.9
Phenol	0.667	0.367	0.442	55.0	66.3	41.5-106			18.6	20
2,4,6-Trichlorophenol	0.667	0.512	0.479	76.8	71.8	44.4-108			6.68	20
(S) Nitrobenzene-d5				59.1	63.6	21.9-129				
(S) 2-Fluorobiphenyl				69.2	60.8	34.9-129				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138667-1 05/20/16 10:08 • (LCSD) R3138667-2 05/20/16 10:32

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
(S) p-Terphenyl-d14				65.8	64.2	21.5-128				
(S) Phenol-d5				56.0	67.8	26.3-121				
(S) 2-Fluorophenol				59.1	73.1	21.1-116				
(S) 2,4,6-Tribromophenol				57.7	55.4	21.6-142				

L835349-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835349-02 05/20/16 13:46 • (MS) R3138667-4 05/20/16 14:10 • (MSD) R3138667-5 05/20/16 14:34

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.767	U	0.592	0.713	77.2	93.1	1	27.0-154			18.6	26.6
2-Chlorophenol	0.767	U	0.450	0.513	58.8	67.0	1	33.2-121			13.1	29.3
2,4-Dichlorophenol	0.767	U	0.536	0.619	70.0	80.7	1	34.8-134			14.3	27.3
2,4-Dimethylphenol	0.767	U	0.502	0.634	65.4	82.8	1	12.3-149			23.4	32.3
4,6-Dinitro-2-methylphenol	0.767	U	0.558	0.641	72.8	83.6	1	10.0-144			13.8	32.7
2,4-Dinitrophenol	0.767	U	0.495	0.577	64.6	75.2	1	10.0-121			15.2	39.4
2-Nitrophenol	0.767	U	0.523	0.563	68.3	73.4	1	29.5-144			7.26	29.9
4-Nitrophenol	0.767	U	0.493	0.569	64.3	74.2	1	20.0-133			14.3	30.2
Pentachlorophenol	0.767	U	0.648	0.726	84.5	94.7	1	10.0-139			11.4	28.3
Phenol	0.767	U	0.581	0.646	75.8	84.3	1	25.1-130			10.6	29.6
2,4,6-Trichlorophenol	0.767	U	0.602	0.649	78.5	84.6	1	33.8-133			7.56	28.1
(S) Nitrobenzene-d5					67.5	80.4		21.9-129				
(S) 2-Fluorobiphenyl					59.8	65.2		34.9-129				
(S) p-Terphenyl-d14					47.5	54.0		21.5-128				
(S) Phenol-d5					63.4	68.3		26.3-121				
(S) 2-Fluorophenol					66.7	73.0		21.1-116				
(S) 2,4,6-Tribromophenol					68.4	64.6		21.6-142				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3136946-3 05/15/16 16:02

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
4-Chloro-3-methylphenol	U		0.000263	0.0100
2-Chlorophenol	U		0.000283	0.0100
2,4-Dichlorophenol	U		0.000284	0.0100
2,4-Dimethylphenol	U		0.000624	0.0100
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100
2,4-Dinitrophenol	U		0.00325	0.0100
2-Nitrophenol	U		0.000320	0.0100
4-Nitrophenol	U		0.00201	0.0100
Pentachlorophenol	U		0.000313	0.0100
Phenol	U		0.000334	0.0100
2,4,6-Trichlorophenol	U		0.000297	0.0100
(S) Nitrobenzene-d5	85.3			21.8-123
(S) 2-Fluorobiphenyl	75.7			29.5-131
(S) p-Terphenyl-d14	88.4			29.3-137
(S) Phenol-d5	53.1			5.00-70.1
(S) 2-Fluorophenol	72.7			10.0-77.9
(S) 2,4,6-Tribromophenol	44.8			11.2-130

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3136946-1 05/15/16 15:16 • (LCSD) R3136946-2 05/15/16 15:39

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.0500	0.0516	0.0536	103	107	35.7-100	J4	J4	3.90	22.9
2-Chlorophenol	0.0500	0.0350	0.0353	70.1	70.6	26.2-91.5			0.760	26.5
2,4-Dichlorophenol	0.0500	0.0414	0.0421	82.8	84.1	31.4-103			1.56	24.9
2,4-Dimethylphenol	0.0500	0.0402	0.0453	80.3	90.6	31.9-107			12.0	25.7
4,6-Dinitro-2-methylphenol	0.0500	0.0450	0.0490	89.9	98.1	18.4-148			8.69	24.4
2,4-Dinitrophenol	0.0500	0.0286	0.0321	57.1	64.3	24.2-128			11.8	20.5
2-Nitrophenol	0.0500	0.0429	0.0419	85.7	83.9	25.9-106			2.18	26.9
4-Nitrophenol	0.0500	0.0259	0.0255	51.9	50.9	10.0-52.7			1.86	40
Pentachlorophenol	0.0500	0.0325	0.0346	65.0	69.1	10.0-97.4			6.22	35.1
Phenol	0.0500	0.0280	0.0295	55.9	59.1	10.0-57.9		J4	5.49	35
2,4,6-Trichlorophenol	0.0500	0.0418	0.0443	83.7	88.6	29.8-107			5.71	24.1
(S) Nitrobenzene-d5				93.0	96.0	21.8-123				
(S) 2-Fluorobiphenyl				80.1	80.5	29.5-131				



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3136946-1 05/15/16 15:16 • (LCSD) R3136946-2 05/15/16 15:39

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
(S) p-Terphenyl-d14				88.1	101	29.3-137				
(S) Phenol-d5				55.5	52.7	5.00-70.1				
(S) 2-Fluorophenol				66.2	67.0	10.0-77.9				
(S) 2,4,6-Tribromophenol				62.1	62.8	11.2-130				

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND,U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.
SDL	Sample Detection Limit.
MQL	Method Quantitation Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
V	The sample concentration is too high to evaluate accurate spike recoveries.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina ¹	DW21704
Florida	E87487	North Carolina ²	41
Georgia	NELAP	North Dakota	R-140
Georgia ¹	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky ¹	90010	South Dakota	n/a
Kentucky ²	16	Tennessee ¹⁴	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

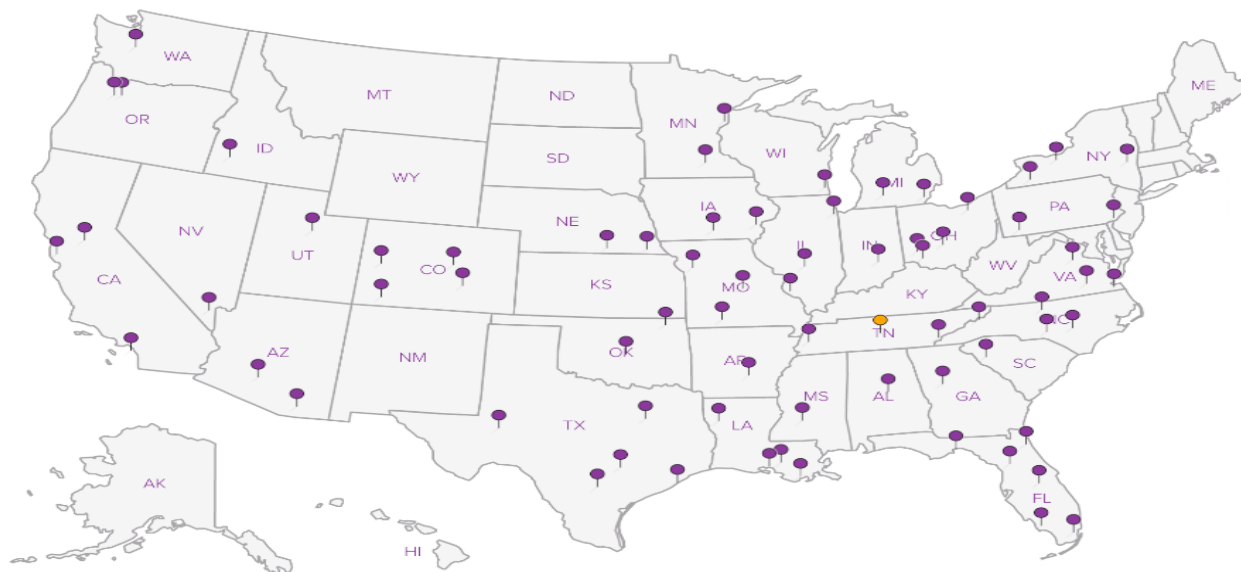
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ^{n/a} Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



AMEC Foster Wheeler - Houston, TX

585 N. Dairy Ashford
Houston, TX 77079

Billing Information:

Accounts Payable
585 N. Dairy Ashford
Houston, TX 77079

Report to:
Pamela Krueger

Email To: pamela.krueger@amecfw.com

Project
Description: Wastewater Line Investigation

City/State
Collected: ARTESIA, NM

Phone: 713-929-5674
Fax:

Client Project #
6703160012.001

Lab Project #
AMECFWHTX-WW LINE

Collected by (print):
William R Smith

Site/Facility ID #
Holley Frontline NAWGO

P.O. #

Collected by (signature):
William R Smith

Rush? (Lab MUST Be Notified)
☐ Same Day200%
☐ Next Day100%
☐ Two Day50%
☐ Three Day25%

Date Results Needed

Email? ☐ No ☒ Yes
FAX? ☐ No ☐ Yes

No.
of
Cntrs

Immediately
Packed on Ice N ☐ Y ☒

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Cntrs	8270ACID 100ml Amb NoPres	CI, FI, SO4 125mlHDPE-NoPres	CI, FI, SO4 4ozClr-NoPres	DROOROLVI 40mlAmb-HCl-BT	DRORLA,SV8270ACID 4ozClr-NoPres	FEICP,MN1CP 250mlHDPE-HNO3	FEICP,MN1CP 2ozClr-NoPres	GRO 40mlAmb HCl	GRO,V8260BTEX 2ozClr-NoPres	V8260BTEX 40mlAmb-HCl	Rem./Contaminant	Sample # (lab only)
TMW-WWL1-01		SS	1	5/10/16	15:00	4			X		X		X		X			-01
TMW-WWL1-05		SS	5	5/10/16	15:10	4			X		X		X		X			-02
TMW-WWL1-12		SS	12	5/10/16	15:20	4			X		X		X		X			-03
TMW-WWL2-01		SS	1	5/10/16	16:20	4			X		X		X		X			-04
TMW-WWL2-05		SS	5	5/10/16	16:30	4			X		X		X		X			-05
TMW-WWL2-12		SS	12	5/10/16	16:50	4			X		X		X		X			-06
TMW-WWL2-12D		SS	12	5/10/16	16:55	4			X		X		X		X			-07
		SS				4			X		X		X		X			
TMW-WWL6-EG		GW		5/10/16	18:00	11	X	X		X		X		X		X		-08
		GW				11	X	X		X		X		X		X		

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other

Remarks:

pH _____ Temp _____

Flow _____ Other _____

6711 0132 8168

Hold #

Relinquished by: (Signature)

Date:

Time:

Received by: (Signature)

Samples returned via: ☐ UPS

Condition: (lab use only)

Relinquished by: (Signature)

Date:

Time:

Received by: (Signature)

Temp: °C Bottles Received:

COC Seal Intact: ☒ Y ☐ N ☐ NA

Relinquished by: (Signature)

Date:

Time:

Received for lab by: (Signature)

Date: 5/12/16 Time: 900

pH Checked: 7.2 NCF:

AMEC Foster Wheeler - Houston, TX

Sample Delivery Group: L835353
Samples Received: 05/13/2016
Project Number: 6703160012.001
Description: Wastewater Line Investigation

Report To: Pamela Krueger
585 N. Dairy Ashford
Houston, TX 77079

Entire Report Reviewed By:



Chris McCord
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



TMW-WWL1 L835353-01 GW

			Collected by	Collected date/time	Received date/time
				05/12/16 08:30	05/13/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872666	5	05/17/16 09:52	05/17/16 17:15	ST
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872936	1	05/18/16 11:41	05/19/16 15:12	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872740	1	05/15/16 18:28	05/17/16 04:33	JNS
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG872894	1	05/17/16 00:32	05/17/16 00:32	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872872	1	05/19/16 00:20	05/19/16 00:20	DAH
Wet Chemistry by Method 9056A	WG874711	1	05/24/16 13:02	05/24/16 13:02	CM
Wet Chemistry by Method 9056A	WG875355	500	05/26/16 11:11	05/26/16 11:11	CM

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

TMW-WWL2 L835353-02 GW

			Collected by	Collected date/time	Received date/time
				05/12/16 09:00	05/13/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872666	5	05/17/16 09:52	05/17/16 17:12	ST
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872936	1	05/18/16 11:41	05/19/16 19:26	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872740	1	05/15/16 18:28	05/17/16 04:50	JNS
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG872894	1	05/17/16 00:53	05/17/16 00:53	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872872	1	05/19/16 00:43	05/19/16 00:43	DAH
Wet Chemistry by Method 9056A	WG874711	1	05/24/16 13:31	05/24/16 13:31	CM
Wet Chemistry by Method 9056A	WG874711	100	05/24/16 13:45	05/24/16 13:45	CM
Wet Chemistry by Method 9056A	WG875355	500	05/26/16 11:25	05/26/16 11:25	CM

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

TMW-WWL2D L835353-03 GW

			Collected by	Collected date/time	Received date/time
				05/12/16 09:05	05/13/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872666	5	05/17/16 09:52	05/17/16 17:18	ST
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872936	1	05/18/16 11:41	05/19/16 19:49	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872740	1	05/15/16 18:28	05/17/16 05:07	JNS
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG872894	1	05/17/16 01:15	05/17/16 01:15	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872872	1	05/19/16 01:05	05/19/16 01:05	DAH
Wet Chemistry by Method 9056A	WG874225	1	05/23/16 13:58	05/23/16 13:58	SAM
Wet Chemistry by Method 9056A	WG874225	500	05/23/16 12:55	05/23/16 12:55	SAM

TRIP BLANK L835353-04 GW

			Collected by	Collected date/time	Received date/time
				05/12/16 00:00	05/13/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872872	1	05/18/16 20:12	05/18/16 20:12	DAH

TRIP BLANK L835353-05 GW

			Collected by	Collected date/time	Received date/time
				05/12/16 00:00	05/13/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872872	1	05/18/16 20:34	05/18/16 20:34	DAH

ACCOUNT:

AMEC Foster Wheeler - Houston, TX

PROJECT:

6703160012.001

SDG:

L835353

DATE/TIME:

05/27/16 16:17

PAGE:

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



WWL-SPC L835353-06 Solid

Collected by

Collected date/time

Received date/time

05/12/16 00:00

05/13/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	1 Cp
Mercury by Method 7471A	WG873476	1	05/18/16 17:22	05/19/16 09:44	NJB	2 Tc
Metals (ICP) by Method 6010B	WG873554	1	05/20/16 11:08	05/20/16 13:52	BRJ	3 Ss
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG873908	1	05/19/16 22:56	05/20/16 14:58	SNR	4 Cn
Semi-Volatile Organic Compounds (GC) by Method 8015	WG873587	1	05/19/16 21:44	05/20/16 19:28	DMG	5 Sr
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG874253	5	05/20/16 17:57	05/20/16 22:59	JAH	6 Qc
Volatile Organic Compounds (GC/MS) by Method 8260B	WG874942	5	05/24/16 16:07	05/25/16 02:00	DWR	7 Gl
Wet Chemistry by Method 9056A	WG874228	1	05/23/16 09:00	05/23/16 17:37	CM	8 Al
Wet Chemistry by Method 9056A	WG874228	10	05/23/16 09:00	05/23/16 18:01	CM	9 Sc
Wet Chemistry by Method 9056A	WG874228	50	05/23/16 09:00	05/24/16 09:03	CM	

ACCOUNT:

AMEC Foster Wheeler - Houston, TX

PROJECT:

6703160012.001

SDG:

L835353

DATE/TIME:

05/27/16 16:17

PAGE:

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All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Chris McCord
Technical Service Representative

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	12200		26.0	500	500	05/26/2016 11:11	WG875355
Fluoride	6.21		0.00990	0.100	1	05/24/2016 13:02	WG874711
Sulfate	18800		38.7	2500	500	05/26/2016 11:11	WG875355

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Iron	0.234	J	0.0705	0.500	5	05/17/2016 17:15	WG872666
Manganese	0.954		0.00600	0.0500	5	05/17/2016 17:15	WG872666

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
TPH (GC/FID) Low Fraction	U		0.0314	0.100	1	05/17/2016 00:32	WG872894
(S) a,a,a-Trifluorotoluene(FID) 99.2				62.0-128		05/17/2016 00:32	WG872894

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	1	05/19/2016 00:20	WG872872
Toluene	U		0.000780	0.00500	1	05/19/2016 00:20	WG872872
Ethylbenzene	U		0.000384	0.00100	1	05/19/2016 00:20	WG872872
Total Xylenes	U		0.00106	0.00300	1	05/19/2016 00:20	WG872872
(S) Toluene-d8	104			90.0-115		05/19/2016 00:20	WG872872
(S) Dibromofluoromethane	109			79.0-121		05/19/2016 00:20	WG872872
(S) a,a,a-Trifluorotoluene	104			90.4-116		05/19/2016 00:20	WG872872
(S) 4-Bromofluorobenzene	101			80.1-120		05/19/2016 00:20	WG872872

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
C10-C28 Diesel Range	0.0851	J	0.0222	0.100	1	05/17/2016 04:33	WG872740
C28-C40 Oil Range	0.0419	J	0.0118	0.100	1	05/17/2016 04:33	WG872740
(S) o-Terphenyl	95.3			50.0-150		05/17/2016 04:33	WG872740

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
4-Chloro-3-methylphenol	U		0.000263	0.0100	1	05/19/2016 15:12	WG872936
2-Chlorophenol	U		0.000283	0.0100	1	05/19/2016 15:12	WG872936
2,4-Dichlorophenol	U		0.000284	0.0100	1	05/19/2016 15:12	WG872936
2,4-Dimethylphenol	U		0.000624	0.0100	1	05/19/2016 15:12	WG872936
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100	1	05/19/2016 15:12	WG872936
2,4-Dinitrophenol	U	J3	0.00325	0.0100	1	05/19/2016 15:12	WG872936
2-Nitrophenol	U		0.000320	0.0100	1	05/19/2016 15:12	WG872936
4-Nitrophenol	U		0.00201	0.0100	1	05/19/2016 15:12	WG872936
Pentachlorophenol	U		0.000313	0.0100	1	05/19/2016 15:12	WG872936
Phenol	U		0.000334	0.0100	1	05/19/2016 15:12	WG872936
2,4,6-Trichlorophenol	U		0.000297	0.0100	1	05/19/2016 15:12	WG872936
(S) 2-Fluorophenol	43.8			10.0-77.9		05/19/2016 15:12	WG872936
(S) Phenol-d5	32.9			5.00-70.1		05/19/2016 15:12	WG872936
(S) Nitrobenzene-d5	76.8			21.8-123		05/19/2016 15:12	WG872936
(S) 2-Fluorobiphenyl	87.2			29.5-131		05/19/2016 15:12	WG872936



Collected date/time: 05/12/16 08:30

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Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	71.9			11.2-130		05/19/2016 15:12	WG872936
(S) p-Terphenyl-d14	98.2			29.3-137		05/19/2016 15:12	WG872936

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	7130		5.19	100	100	05/24/2016 13:45	WG874711
Fluoride	2.59		0.00990	0.100	1	05/24/2016 13:31	WG874711
Sulfate	14600		38.7	2500	500	05/26/2016 11:25	WG875355

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Iron	0.169	J	0.0705	0.500	5	05/17/2016 17:12	WG872666
Manganese	0.836		0.00600	0.0500	5	05/17/2016 17:12	WG872666

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
TPH (GC/FID) Low Fraction	U		0.0314	0.100	1	05/17/2016 00:53	WG872894
(S) a,a,a-Trifluorotoluene(FID) 99.5				62.0-128		05/17/2016 00:53	WG872894

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	1	05/19/2016 00:43	WG872872
Toluene	U		0.000780	0.00500	1	05/19/2016 00:43	WG872872
Ethylbenzene	U		0.000384	0.00100	1	05/19/2016 00:43	WG872872
Total Xylenes	U		0.00106	0.00300	1	05/19/2016 00:43	WG872872
(S) Toluene-d8	104			90.0-115		05/19/2016 00:43	WG872872
(S) Dibromofluoromethane	110			79.0-121		05/19/2016 00:43	WG872872
(S) a,a,a-Trifluorotoluene	103			90.4-116		05/19/2016 00:43	WG872872
(S) 4-Bromofluorobenzene	114			80.1-120		05/19/2016 00:43	WG872872

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
C10-C28 Diesel Range	0.182		0.0222	0.100	1	05/17/2016 04:50	WG872740
C28-C40 Oil Range	0.175		0.0118	0.100	1	05/17/2016 04:50	WG872740
(S) o-Terphenyl	104			50.0-150		05/17/2016 04:50	WG872740

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
4-Chloro-3-methylphenol	U		0.000263	0.0100	1	05/19/2016 19:26	WG872936
2-Chlorophenol	U		0.000283	0.0100	1	05/19/2016 19:26	WG872936
2,4-Dichlorophenol	U		0.000284	0.0100	1	05/19/2016 19:26	WG872936
2,4-Dimethylphenol	U		0.000624	0.0100	1	05/19/2016 19:26	WG872936
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100	1	05/19/2016 19:26	WG872936
2,4-Dinitrophenol	U	J3	0.00325	0.0100	1	05/19/2016 19:26	WG872936
2-Nitrophenol	U		0.000320	0.0100	1	05/19/2016 19:26	WG872936
4-Nitrophenol	U		0.00201	0.0100	1	05/19/2016 19:26	WG872936
Pentachlorophenol	U		0.000313	0.0100	1	05/19/2016 19:26	WG872936
Phenol	U		0.000334	0.0100	1	05/19/2016 19:26	WG872936
2,4,6-Trichlorophenol	U		0.000297	0.0100	1	05/19/2016 19:26	WG872936
(S) 2-Fluorophenol	52.9			10.0-77.9		05/19/2016 19:26	WG872936
(S) Phenol-d5	38.1			5.00-70.1		05/19/2016 19:26	WG872936
(S) Nitrobenzene-d5	84.9			21.8-123		05/19/2016 19:26	WG872936
(S) 2-Fluorobiphenyl	88.9			29.5-131		05/19/2016 19:26	WG872936



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	78.3			11.2-130		05/19/2016 19:26	WG872936
(S) p-Terphenyl-d14	99.5			29.3-137		05/19/2016 19:26	WG872936

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	7100		26.0	500	500	05/23/2016 12:55	WG874225
Fluoride	3.10		0.00990	0.100	1	05/23/2016 13:58	WG874225
Sulfate	16800		38.7	2500	500	05/23/2016 12:55	WG874225

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Iron	0.981		0.0705	0.500	5	05/17/2016 17:18	WG872666
Manganese	0.910		0.00600	0.0500	5	05/17/2016 17:18	WG872666

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
TPH (GC/FID) Low Fraction	U		0.0314	0.100	1	05/17/2016 01:15	WG872894
(S) a,a,a-Trifluorotoluene(FID) 98.8				62.0-128		05/17/2016 01:15	WG872894

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	1	05/19/2016 01:05	WG872872
Toluene	U		0.000780	0.00500	1	05/19/2016 01:05	WG872872
Ethylbenzene	U		0.000384	0.00100	1	05/19/2016 01:05	WG872872
Total Xylenes	U		0.00106	0.00300	1	05/19/2016 01:05	WG872872
(S) Toluene-d8	103			90.0-115		05/19/2016 01:05	WG872872
(S) Dibromofluoromethane	110			79.0-121		05/19/2016 01:05	WG872872
(S) a,a,a-Trifluorotoluene	103			90.4-116		05/19/2016 01:05	WG872872
(S) 4-Bromofluorobenzene	116			80.1-120		05/19/2016 01:05	WG872872

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
C10-C28 Diesel Range	0.0892	J	0.0222	0.100	1	05/17/2016 05:07	WG872740
C28-C40 Oil Range	0.0898	J	0.0118	0.100	1	05/17/2016 05:07	WG872740
(S) o-Terphenyl	97.7			50.0-150		05/17/2016 05:07	WG872740

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
4-Chloro-3-methylphenol	U		0.000263	0.0100	1	05/19/2016 19:49	WG872936
2-Chlorophenol	U		0.000283	0.0100	1	05/19/2016 19:49	WG872936
2,4-Dichlorophenol	U		0.000284	0.0100	1	05/19/2016 19:49	WG872936
2,4-Dimethylphenol	U		0.000624	0.0100	1	05/19/2016 19:49	WG872936
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100	1	05/19/2016 19:49	WG872936
2,4-Dinitrophenol	U	J3	0.00325	0.0100	1	05/19/2016 19:49	WG872936
2-Nitrophenol	U		0.000320	0.0100	1	05/19/2016 19:49	WG872936
4-Nitrophenol	U		0.00201	0.0100	1	05/19/2016 19:49	WG872936
Pentachlorophenol	U		0.000313	0.0100	1	05/19/2016 19:49	WG872936
Phenol	U		0.000334	0.0100	1	05/19/2016 19:49	WG872936
2,4,6-Trichlorophenol	U		0.000297	0.0100	1	05/19/2016 19:49	WG872936
(S) 2-Fluorophenol	40.0			10.0-77.9		05/19/2016 19:49	WG872936
(S) Phenol-d5	32.2			5.00-70.1		05/19/2016 19:49	WG872936
(S) Nitrobenzene-d5	70.2			21.8-123		05/19/2016 19:49	WG872936
(S) 2-Fluorobiphenyl	81.9			29.5-131		05/19/2016 19:49	WG872936



Collected date/time: 05/12/16 09:05

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Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	63.3			11.2-130		05/19/2016 19:49	WG872936
(S) p-Terphenyl-d14	94.9			29.3-137		05/19/2016 19:49	WG872936

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	U		0.000331	0.00100	1	05/18/2016 20:12	WG872872
Toluene	U		0.000780	0.00500	1	05/18/2016 20:12	WG872872
Ethylbenzene	U		0.000384	0.00100	1	05/18/2016 20:12	WG872872
Total Xylenes	U		0.00106	0.00300	1	05/18/2016 20:12	WG872872
(S) Toluene-d8	104			90.0-115		05/18/2016 20:12	WG872872
(S) Dibromofluoromethane	109			79.0-121		05/18/2016 20:12	WG872872
(S) a,a,a-Trifluorotoluene	104			90.4-116		05/18/2016 20:12	WG872872
(S) 4-Bromofluorobenzene	99.5			80.1-120		05/18/2016 20:12	WG872872

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	U		0.000331	0.00100	1	05/18/2016 20:34	WG872872
Toluene	U		0.000780	0.00500	1	05/18/2016 20:34	WG872872
Ethylbenzene	U		0.000384	0.00100	1	05/18/2016 20:34	WG872872
Total Xylenes	U		0.00106	0.00300	1	05/18/2016 20:34	WG872872
(S) Toluene-d8	108			90.0-115		05/18/2016 20:34	WG872872
(S) Dibromofluoromethane	99.3			79.0-121		05/18/2016 20:34	WG872872
(S) a,a,a-Trifluorotoluene	108			90.4-116		05/18/2016 20:34	WG872872
(S) 4-Bromofluorobenzene	105			80.1-120		05/18/2016 20:34	WG872872

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	1660		7.95	100	10	05/23/2016 18:01	WG874228
Fluoride	18.3		0.261	1.00	1	05/23/2016 17:37	WG874228
Sulfate	20000		28.5	2500	50	05/24/2016 09:03	WG874228

Mercury by Method 7471A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	U		0.00280	0.0200	1	05/19/2016 09:44	WG873476

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Arsenic	2.87		0.650	2.00	1	05/20/2016 13:52	WG873554
Barium	95.9		0.170	0.500	1	05/20/2016 13:52	WG873554
Cadmium	0.222	J	0.0700	0.500	1	05/20/2016 13:52	WG873554
Chromium	5.89		0.140	1.00	1	05/20/2016 13:52	WG873554
Iron	5120		1.41	10.0	1	05/20/2016 13:52	WG873554
Lead	7.90		0.190	0.500	1	05/20/2016 13:52	WG873554
Manganese	390		0.120	1.00	1	05/20/2016 13:52	WG873554
Selenium	U		0.740	2.00	1	05/20/2016 13:52	WG873554
Silver	U		0.280	1.00	1	05/20/2016 13:52	WG873554

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/20/2016 22:59	WG874253
(S) a,a,a-Trifluorotoluene(FID) 87.3				59.0-128		05/20/2016 22:59	WG874253

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/25/2016 02:00	WG874942
Toluene	U		0.00217	0.0250	5	05/25/2016 02:00	WG874942
Ethylbenzene	U		0.00148	0.00500	5	05/25/2016 02:00	WG874942
Total Xylenes	U		0.00349	0.0150	5	05/25/2016 02:00	WG874942
(S) Toluene-d8	106			88.7-115		05/25/2016 02:00	WG874942
(S) Dibromofluoromethane	102			76.3-123		05/25/2016 02:00	WG874942
(S) a,a,a-Trifluorotoluene	103			87.2-117		05/25/2016 02:00	WG874942
(S) 4-Bromofluorobenzene	103			69.7-129		05/25/2016 02:00	WG874942

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/20/2016 19:28	WG873587
C28-C40 Oil Range	4.12		0.274	4.00	1	05/20/2016 19:28	WG873587
(S) o-Terphenyl	87.5			50.0-150		05/20/2016 19:28	WG873587

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc



Collected date/time: 05/12/16 00:00

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Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/20/2016 14:58	WG873908
2-Chlorophenol	U	<u>J3</u>	0.00831	0.333	1	05/20/2016 14:58	WG873908
2,4-Dichlorophenol	U		0.00746	0.333	1	05/20/2016 14:58	WG873908
2,4-Dimethylphenol	U		0.0471	0.333	1	05/20/2016 14:58	WG873908
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/20/2016 14:58	WG873908
2,4-Dinitrophenol	U		0.0980	0.333	1	05/20/2016 14:58	WG873908
2-Nitrophenol	U		0.0130	0.333	1	05/20/2016 14:58	WG873908
4-Nitrophenol	U		0.0525	0.333	1	05/20/2016 14:58	WG873908
Pentachlorophenol	U		0.0480	0.333	1	05/20/2016 14:58	WG873908
Phenol	U		0.00695	0.333	1	05/20/2016 14:58	WG873908
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/20/2016 14:58	WG873908
(S) 2-Fluorophenol	61.1			21.1-116		05/20/2016 14:58	WG873908
(S) Phenol-d5	55.3			26.3-121		05/20/2016 14:58	WG873908
(S) Nitrobenzene-d5	67.6			21.9-129		05/20/2016 14:58	WG873908
(S) 2-Fluorobiphenyl	62.2			34.9-129		05/20/2016 14:58	WG873908
(S) 2,4,6-Tribromophenol	46.7			21.6-142		05/20/2016 14:58	WG873908
(S) p-Terphenyl-d14	52.9			21.5-128		05/20/2016 14:58	WG873908

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3139265-1 05/23/16 09:07

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.0099	0.100
Sulfate	U		0.0774	5.00

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3139265-2 05/23/16 09:23 • (LCSD) R3139265-3 05/23/16 09:38

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chloride	40.0	38.9	38.9	97	97	80-120			0	15
Fluoride	8.00	7.73	7.76	97	97	80-120			0	15
Sulfate	40.0	38.5	38.6	96	97	80-120			0	15

L835977-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835977-10 05/23/16 17:41 • (MS) R3139265-4 05/23/16 17:57 • (MSD) R3139265-5 05/23/16 18:13

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Fluoride	5.00	0.361	5.34	5.28	100	98	1	80-120			1	15
Sulfate	50.0	ND	50.8	51.0	99	99	1	80-120			0	15

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc



Method Blank (MB)

(MB) R3139346-1 05/24/16 08:33

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.0099	0.100

L836606-01 Original Sample (OS) • Duplicate (DUP)

(OS) L836606-01 05/24/16 16:53 • (DUP) R3139346-5 05/24/16 17:07

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Chloride	ND	0.611	1	0		15
Fluoride	ND	0.0818	1	0		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3139346-2 05/24/16 08:47 • (LCSD) R3139346-3 05/24/16 10:27

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Chloride	40.0	39.0	39.2	97	98	90-110			0	20
Fluoride	8.00	7.82	7.84	98	98	90-110			0	20

L836505-07 Original Sample (OS) • Matrix Spike (MS)

(OS) L836505-07 05/24/16 14:28 • (MS) R3139346-4 05/24/16 14:43

	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Analyte	mg/l	mg/l	mg/l	%		%	
Chloride	50.0	17.2	67.6	101	1	80-120	
Fluoride	5.00	0.122	5.04	98	1	80-120	

L836606-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836606-06 05/24/16 18:36 • (MS) R3139346-6 05/24/16 18:50 • (MSD) R3139346-7 05/24/16 19:04

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Chloride	50.0	ND	50.1	51.6	100	103	1	80-120			3	15
Fluoride	5.00	ND	4.98	5.18	98	102	1	80-120			4	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3140117-1 05/26/16 09:06

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Chloride	U		0.0519	1.00
Sulfate	U		0.0774	5.00

L837803-06 Original Sample (OS) • Duplicate (DUP)

(OS) L837803-06 05/26/16 15:51 • (DUP) R3140117-4 05/26/16 16:06

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Sulfate	35.7	35.6	1	0		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3140117-2 05/26/16 09:21 • (LCSD) R3140117-3 05/26/16 09:36

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Chloride	40.0	39.4	39.3	99	98	80-120			0	15
Sulfate	40.0	39.8	39.8	100	100	80-120			0	15

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



Method Blank (MB)

(MB) R3139258-1 05/23/16 10:37

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Chloride	U		0.795	10.0
Fluoride	U		0.261	1.00
Sulfate	U		0.57	50.0

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L836501-15 Original Sample (OS) • Duplicate (DUP)

(OS) L836501-15 05/23/16 20:25 • (DUP) R3139258-4 05/23/16 20:49

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	86.9	80.8	1	7		15
Fluoride	7.38	6.69	1	10		15
Sulfate	215	177	1	19	P1	15

L836501-21 Original Sample (OS) • Duplicate (DUP)

(OS) L836501-21 05/24/16 00:48 • (DUP) R3139258-7 05/24/16 01:12

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	75.8	83.5	1	10		15
Fluoride	16.2	13.3	1	20	J3	15
Sulfate	257	235	1	9		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3139258-2 05/23/16 11:01 • (LCSD) R3139258-3 05/23/16 11:25

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chloride	200	199	199	99	99	80-120			0	15
Fluoride	20.0	20.4	20.5	102	103	80-120			0	15
Sulfate	200	200	200	100	100	80-120			0	15



L836501-16 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836501-16 05/23/16 22:00 • (MS) R3139258-5 05/23/16 22:24 • (MSD) R3139258-6 05/23/16 22:48

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	538	78.6	643	629	105	102	1	80-120			2	15
Fluoride	53.8	5.67	49.6	49.1	82	81	1	80-120			1	15
Sulfate	538	269	822	816	103	102	1	80-120			1	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3138224-1 05/19/16 09:36

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Mercury	U		0.0028	0.0200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138224-2 05/19/16 09:39 • (LCSD) R3138224-3 05/19/16 09:41

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Mercury	0.300	0.260	0.274	87	91	80-120			5	20

L835353-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835353-06 05/19/16 09:44 • (MS) R3138224-4 05/19/16 09:47 • (MSD) R3138224-5 05/19/16 09:54

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Mercury	0.300	U	0.282	0.276	94	92	1	75-125			2	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3137501-1 05/17/16 12:02

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Iron	U		0.0141	0.100
Manganese	U		0.0012	0.0100

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137501-2 05/17/16 12:04 • (LCSD) R3137501-3 05/17/16 12:07

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Iron	10.0	9.70	9.78	97	98	80-120			1	20
Manganese	1.00	0.973	0.980	97	98	80-120			1	20

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R3138672-1 05/20/16 13:30

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Arsenic	U		0.65	2.00
Barium	0.278	J	0.17	0.500
Cadmium	U		0.07	0.500
Chromium	U		0.14	1.00
Iron	U		1.41	10.0
Lead	U		0.19	0.500
Manganese	U		0.12	1.00
Selenium	U		0.74	2.00
Silver	U		0.28	1.00

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138672-2 05/20/16 13:33 • (LCSD) R3138672-3 05/20/16 13:35

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	100	99.2	97.4	99	97	80-120			2	20
Barium	100	104	102	104	102	80-120			1	20
Cadmium	100	103	101	103	101	80-120			2	20
Chromium	100	99.2	97.9	99	98	80-120			1	20
Iron	1000	974	963	97	96	80-120			1	20
Lead	100	104	102	104	102	80-120			2	20
Manganese	100	99.7	98.4	100	98	80-120			1	20
Selenium	100	103	102	103	102	80-120			1	20
Silver	100	98.4	97.0	98	97	80-120			1	20

L836003-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836003-08 05/20/16 13:38 • (MS) R3138672-6 05/20/16 13:46 • (MSD) R3138672-7 05/20/16 13:48

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	105	4.07	102	106	94	97	1	75-125			3	20
Barium	105	47.6	155	166	102	113	1	75-125			7	20
Cadmium	105	U	106	108	101	103	1	75-125			2	20
Chromium	105	7.15	105	111	93	99	1	75-125			6	20
Iron	1050	11300	10800	12600	0	118	1	75-125	V		16	20



[L835353-06](#)

L836003-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836003-08 05/20/16 13:38 • (MS) R3138672-6 05/20/16 13:46 • (MSD) R3138672-7 05/20/16 13:48

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Lead	105	6.62	114	116	102	105	1	75-125			2	20
Manganese	105	293	362	353	65	57	1	75-125	<u>J6</u>	<u>J6</u>	2	20
Selenium	105	U	92.7	98.3	88	94	1	75-125			6	20
Silver	105	U	100	104	95	99	1	75-125			4	20

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3137306-3 05/16/16 22:25

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
TPH (GC/FID) Low Fraction	U		0.0314	0.100
(S) a,a,a-Trifluorotoluene(FID) 100				62.0-128

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137306-1 05/16/16 21:22 • (LCSD) R3137306-2 05/16/16 21:43

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	6.14	6.04	112	110	67.0-132			1.66	20
(S) a,a,a-Trifluorotoluene(FID)				102	101	62.0-128				

L834446-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L834446-01 05/16/16 23:50 • (MS) R3137306-4 05/16/16 22:46 • (MSD) R3137306-5 05/16/16 23:07

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	ND	2.91	3.00	52.9	54.6	1	50.0-143			3.25	20
(S) a,a,a-Trifluorotoluene(FID)					100	100		62.0-128				



Method Blank (MB)

(MB) R3138993-3 05/20/16 19:11

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID) 88.2				59.0-128

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138993-1 05/20/16 18:01 • (LCSD) R3138993-2 05/20/16 18:24

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	5.12	4.92	93.0	89.4	63.5-137			3.96	20
(S) a,a,a-Trifluorotoluene(FID)				89.1	89.0	59.0-128				

L835353-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835353-06 05/20/16 22:59 • (MS) R3138993-4 05/20/16 21:50 • (MSD) R3138993-5 05/20/16 22:13

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	U	17.6	19.8	63.9	71.9	5	28.5-138			11.7	23.6
(S) a,a,a-Trifluorotoluene(FID)					86.7	87.5		59.0-128				

Method Blank (MB)

(MB) R3138238-3 05/18/16 18:41

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.000331	0.00100
Ethylbenzene	U		0.000384	0.00100
Toluene	U		0.000780	0.00500
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	102			90.0-115
(S) Dibromofluoromethane	109			79.0-121
(S) a,a,a-Trifluorotoluene	103			90.4-116
(S) 4-Bromofluorobenzene	101			80.1-120

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138238-1 05/18/16 16:49 • (LCSD) R3138238-2 05/18/16 17:11

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0256	0.0267	102	107	73.0-122			4.33	20
Ethylbenzene	0.0250	0.0251	0.0260	100	104	80.9-121			3.74	20
Toluene	0.0250	0.0235	0.0244	93.9	97.4	77.9-116			3.63	20
Xylenes, Total	0.0750	0.0736	0.0765	98.2	102	79.2-122			3.82	20
(S) Toluene-d8				105	106	90.0-115				
(S) Dibromofluoromethane				110	103	79.0-121				
(S) a,a,a-Trifluorotoluene				103	106	90.4-116				
(S) 4-Bromofluorobenzene				101	106	80.1-120				

L835321-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835321-02 05/18/16 21:19 • (MS) R3138238-4 05/18/16 19:04 • (MSD) R3138238-5 05/18/16 19:27

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	ND	0.0233	0.0247	93.2	98.8	1	58.6-133			5.89	20
Ethylbenzene	0.0250	ND	0.0234	0.0253	93.5	101	1	62.7-136			7.89	20
Toluene	0.0250	ND	0.0215	0.0228	85.9	91.4	1	67.8-124			6.16	20
Xylenes, Total	0.0750	ND	0.0695	0.0740	92.6	98.7	1	65.6-133			6.31	20
(S) Toluene-d8					106	105		90.0-115				
(S) Dibromofluoromethane					108	109		79.0-121				
(S) a,a,a-Trifluorotoluene					104	104		90.4-116				
(S) 4-Bromofluorobenzene					104	104		80.1-120				



Method Blank (MB)

(MB) R3139540-3 05/24/16 21:59

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000270	0.00100
Ethylbenzene	U		0.000297	0.00100
Toluene	U		0.000434	0.00500
Xylenes, Total	U		0.000698	0.00300
(S) Toluene-d8	106			88.7-115
(S) Dibromofluoromethane	99.4			76.3-123
(S) a,a,a-Trifluorotoluene	105			87.2-117
(S) 4-Bromofluorobenzene	103			69.7-129

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3139540-1 05/24/16 20:22 • (LCSD) R3139540-2 05/24/16 20:42

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0216	0.0216	86.5	86.4	72.6-120			0.0900	20
Ethylbenzene	0.0250	0.0236	0.0232	94.6	92.8	78.6-124			1.85	20
Toluene	0.0250	0.0224	0.0225	89.5	90.1	76.7-116			0.740	20
Xylenes, Total	0.0750	0.0711	0.0715	94.8	95.3	78.1-123			0.510	20
(S) Toluene-d8				108	108	88.7-115				
(S) Dibromofluoromethane				101	101	76.3-123				
(S) a,a,a-Trifluorotoluene				107	106	87.2-117				
(S) 4-Bromofluorobenzene				103	102	69.7-129				

L836637-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836637-05 05/26/16 11:45 • (MS) R3139988-1 05/26/16 12:04 • (MSD) R3139988-2 05/26/16 12:24

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0285	29.5	137	134	81.9	79.6	4600	47.8-131			2.25	22.8
Ethylbenzene	0.0285	108	229	232	91.7	94.6	4600	44.8-135			1.67	26.9
Toluene	0.0285	222	339	347	89.5	95.7	4600	47.8-127			2.37	24.3
Xylenes, Total	0.0855	527	895	913	93.6	98.1	4600	42.7-135			1.94	26.6
(S) Toluene-d8					108	107		88.7-115				
(S) Dibromofluoromethane					102	99.1		76.3-123				
(S) a,a,a-Trifluorotoluene					106	107		87.2-117				



L836637-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836637-05 05/26/16 11:45 • (MS) R3139988-1 05/26/16 12:04 • (MSD) R3139988-2 05/26/16 12:24

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
(S) 4-Bromofluorobenzene					104	105		69.7-129				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3137334-1 05/17/16 03:42

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
C10-C28 Diesel Range	U		0.0222	0.100
C28-C40 Oil Range	U		0.0118	0.100
(S) o-Terphenyl	105			50.0-150

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137334-2 05/17/16 03:59 • (LCSD) R3137334-3 05/17/16 04:16

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	1.50	1.48	1.44	98.5	96.1	70.0-130			2.44	20
(S) o-Terphenyl				104	97.9	50.0-150				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3138554-1 05/20/16 10:03

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	88.1			50.0-150

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138554-2 05/20/16 10:17 • (LCSD) R3138554-3 05/20/16 10:31

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	47.4	48.5	78.9	80.9	50.0-100			2.44	20
(S) o-Terphenyl				88.9	91.0	50.0-150				

L835353-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835353-06 05/20/16 19:28 • (MS) R3138554-4 05/20/16 19:42 • (MSD) R3138554-5 05/20/16 19:57

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	U	43.1	44.1	71.8	73.6	1	50.0-100			2.39	20
(S) o-Terphenyl					67.2	65.3		50.0-150				

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc



Method Blank (MB)

(MB) R3138702-3 05/19/16 14:49

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
4-Chloro-3-methylphenol	U		0.000263	0.0100
2-Chlorophenol	U		0.000283	0.0100
2,4-Dichlorophenol	U		0.000284	0.0100
2,4-Dimethylphenol	U		0.000624	0.0100
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100
2,4-Dinitrophenol	U		0.00325	0.0100
2-Nitrophenol	U		0.000320	0.0100
4-Nitrophenol	U		0.00201	0.0100
Pentachlorophenol	U		0.000313	0.0100
Phenol	U		0.000334	0.0100
2,4,6-Trichlorophenol	U		0.000297	0.0100
(S) Nitrobenzene-d5	77.9			21.8-123
(S) 2-Fluorobiphenyl	84.2			29.5-131
(S) p-Terphenyl-d14	93.8			29.3-137
(S) Phenol-d5	38.1			5.00-70.1
(S) 2-Fluorophenol	55.7			10.0-77.9
(S) 2,4,6-Tribromophenol	70.6			11.2-130

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138702-1 05/19/16 14:02 • (LCSD) R3138702-2 05/19/16 14:25

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.0500	0.0439	0.0424	87.8	84.8	35.7-100			3.47	22.9
2-Chlorophenol	0.0500	0.0377	0.0354	75.3	70.8	26.2-91.5			6.19	26.5
2,4-Dichlorophenol	0.0500	0.0441	0.0428	88.1	85.7	31.4-103			2.83	24.9
2,4-Dimethylphenol	0.0500	0.0430	0.0431	86.1	86.2	31.9-107			0.150	25.7
4,6-Dinitro-2-methylphenol	0.0500	0.0375	0.0383	75.0	76.7	18.4-148			2.20	24.4
2,4-Dinitrophenol	0.0500	0.0258	0.0157	51.5	31.3	24.2-128		J3	48.8	20.5
2-Nitrophenol	0.0500	0.0447	0.0434	89.3	86.7	25.9-106			2.97	26.9
4-Nitrophenol	0.0500	0.0190	0.0153	38.0	30.6	10.0-52.7			21.7	40
Pentachlorophenol	0.0500	0.0392	0.0347	78.3	69.4	10.0-97.4			12.0	35.1
Phenol	0.0500	0.0200	0.0177	40.0	35.5	10.0-57.9			12.1	35
2,4,6-Trichlorophenol	0.0500	0.0452	0.0456	90.5	91.2	29.8-107			0.790	24.1
(S) Nitrobenzene-d5				84.3	87.2	21.8-123				
(S) 2-Fluorobiphenyl				86.0	90.9	29.5-131				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138702-1 05/19/16 14:02 • (LCSD) R3138702-2 05/19/16 14:25

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
(S) p-Terphenyl-d14				96.1	98.8	29.3-137				
(S) Phenol-d5				37.7	32.4	5.00-70.1				
(S) 2-Fluorophenol				52.3	43.9	10.0-77.9				
(S) 2,4,6-Tribromophenol				88.7	88.5	11.2-130				

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



Method Blank (MB)

(MB) R3138667-3 05/20/16 10:56

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
4-Chloro-3-methylphenol	U		0.00477	0.333
2-Chlorophenol	U		0.00831	0.333
2,4-Dichlorophenol	U		0.00746	0.333
2,4-Dimethylphenol	U		0.0471	0.333
4,6-Dinitro-2-methylphenol	U		0.124	0.333
2,4-Dinitrophenol	U		0.0980	0.333
2-Nitrophenol	U		0.0130	0.333
4-Nitrophenol	U		0.0525	0.333
Pentachlorophenol	U		0.0480	0.333
Phenol	U		0.00695	0.333
2,4,6-Trichlorophenol	U		0.00779	0.333
(S) Nitrobenzene-d5	61.8			21.9-129
(S) 2-Fluorobiphenyl	61.7			34.9-129
(S) p-Terphenyl-d14	68.7			21.5-128
(S) Phenol-d5	70.1			26.3-121
(S) 2-Fluorophenol	64.2			21.1-116
(S) 2,4,6-Tribromophenol	52.9			21.6-142

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138667-1 05/20/16 10:08 • (LCSD) R3138667-2 05/20/16 10:32

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.667	0.451	0.496	67.7	74.4	51.1-113			9.51	20
2-Chlorophenol	0.667	0.345	0.432	51.7	64.8	40.8-103		J3	22.6	20
2,4-Dichlorophenol	0.667	0.452	0.451	67.8	67.5	46.2-109			0.350	20
2,4-Dimethylphenol	0.667	0.420	0.451	62.9	67.6	42.2-110			7.12	20
4,6-Dinitro-2-methylphenol	0.667	0.457	0.470	68.5	70.5	23.1-119			2.97	23.7
2,4-Dinitrophenol	0.667	0.430	0.404	64.5	60.6	10.0-105			6.29	36.5
2-Nitrophenol	0.667	0.421	0.463	63.1	69.4	44.2-113			9.50	20.9
4-Nitrophenol	0.667	0.393	0.365	58.9	54.7	34.8-109			7.41	20
Pentachlorophenol	0.667	0.517	0.487	77.5	73.0	16.2-102			5.87	22.9
Phenol	0.667	0.367	0.442	55.0	66.3	41.5-106			18.6	20
2,4,6-Trichlorophenol	0.667	0.512	0.479	76.8	71.8	44.4-108			6.68	20
(S) Nitrobenzene-d5				59.1	63.6	21.9-129				
(S) 2-Fluorobiphenyl				69.2	60.8	34.9-129				



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138667-1 05/20/16 10:08 • (LCSD) R3138667-2 05/20/16 10:32

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
(S) p-Terphenyl-d14				65.8	64.2	21.5-128				
(S) Phenol-d5				56.0	67.8	26.3-121				
(S) 2-Fluorophenol				59.1	73.1	21.1-116				
(S) 2,4,6-Tribromophenol				57.7	55.4	21.6-142				

L835349-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835349-02 05/20/16 13:46 • (MS) R3138667-4 05/20/16 14:10 • (MSD) R3138667-5 05/20/16 14:34

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.767	U	0.592	0.713	77.2	93.1	1	27.0-154			18.6	26.6
2-Chlorophenol	0.767	U	0.450	0.513	58.8	67.0	1	33.2-121			13.1	29.3
2,4-Dichlorophenol	0.767	U	0.536	0.619	70.0	80.7	1	34.8-134			14.3	27.3
2,4-Dimethylphenol	0.767	U	0.502	0.634	65.4	82.8	1	12.3-149			23.4	32.3
4,6-Dinitro-2-methylphenol	0.767	U	0.558	0.641	72.8	83.6	1	10.0-144			13.8	32.7
2,4-Dinitrophenol	0.767	U	0.495	0.577	64.6	75.2	1	10.0-121			15.2	39.4
2-Nitrophenol	0.767	U	0.523	0.563	68.3	73.4	1	29.5-144			7.26	29.9
4-Nitrophenol	0.767	U	0.493	0.569	64.3	74.2	1	20.0-133			14.3	30.2
Pentachlorophenol	0.767	U	0.648	0.726	84.5	94.7	1	10.0-139			11.4	28.3
Phenol	0.767	U	0.581	0.646	75.8	84.3	1	25.1-130			10.6	29.6
2,4,6-Trichlorophenol	0.767	U	0.602	0.649	78.5	84.6	1	33.8-133			7.56	28.1
(S) Nitrobenzene-d5					67.5	80.4		21.9-129				
(S) 2-Fluorobiphenyl					59.8	65.2		34.9-129				
(S) p-Terphenyl-d14					47.5	54.0		21.5-128				
(S) Phenol-d5					63.4	68.3		26.3-121				
(S) 2-Fluorophenol					66.7	73.0		21.1-116				
(S) 2,4,6-Tribromophenol					68.4	64.6		21.6-142				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.

Qualifier	Description
-----------	-------------

J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
V	The sample concentration is too high to evaluate accurate spike recoveries.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina ¹	DW21704
Florida	E87487	North Carolina ²	41
Georgia	NELAP	North Dakota	R-140
Georgia ¹	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky ¹	90010	South Dakota	n/a
Kentucky ²	16	Tennessee ¹⁴	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

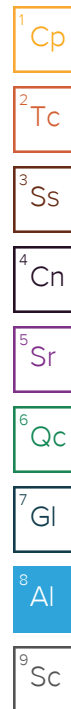
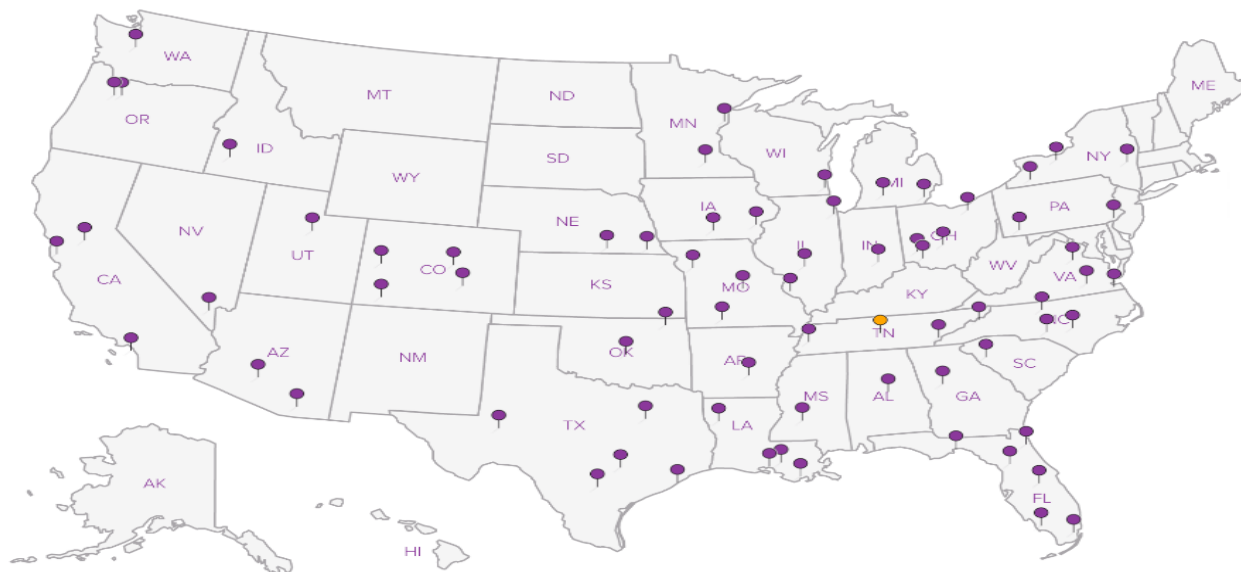
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ^{n/a} Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



AMEC Foster Wheeler - Houston, TX

585 N. Dairy Ashford
Houston, TX 77079

Billing Information:

Accounts Payable
585 N. Dairy Ashford
Houston, TX 77079

Email To: pamela.krueger@amecfw.com

Report to:
Pamela Krueger

Project: **WASTE WATER LINE**
Description: **Slurry Slinger Sump Investigation**

Phone: 713-929-5674
Fax:

Client Project #
6703160012.00

City/State
Collected:

Lab Project #
AMECFWHTX-SLURRY

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Rush? (Lab MUST Be Notified)
 Same Day200%
 Next Day100%
 Two Day50%
 Three Day25%

Date Results Needed

Email? ☐ No ☒ Yes
 FAX? ☐ No ☐ Yes

Immediately
Packed on Ice N ☐ Y ☐

No.
of
Cntrs

8270 100ml Amb NoPres

DROOROLVI 40mlAmb-HCl-BT

DRORLA,SV8270 40zClr-NoPres

GRO 40mlAmb HCl

GRO,V8260 20zClr-NoPres

Skinner's List Mtls. 250mlHDPE-HNO3

Skinner's List Mtls. 20zClr-NoPres

V8260 40mlAmb-HCl

V8260- Trip Blank 40mlAmb-HCl-Bik

Chain of Custody Page 1 of 1



ESC
L.A.B. S.C.I.E.N.C.E.S.

YOUR LAB OF CHOICE

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859



L# **1835353**

1198

Acctnum: AMECFWHTX

Template: T112081

Prelogin: P552543

TSR: 526 - Chris McCord

PB: **5-4-10 KM**

Shipped Via: **FedEX Ground**

Rem./Contaminant Sample # (lab only)

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8270 100ml Amb NoPres	DROOROLVI 40mlAmb-HCl-BT	DRORLA,SV8270 40zClr-NoPres	GRO 40mlAmb HCl	GRO,V8260 20zClr-NoPres	Skinner's List Mtls. 250mlHDPE-HNO3	Skinner's List Mtls. 20zClr-NoPres	V8260 40mlAmb-HCl	V8260- Trip Blank 40mlAmb-HCl-Bik	Rem./Contaminant	Sample # (lab only)
		SS				3			X		X		X				
		SS				3			X		X		X				
		SS				3			X		X		X				
TMW-WWL1		GW	5/12/16	8:30	10		X	X		X		X		X			-01
TMW-WWL2		GW	5/12/16	9:00	10		X	X		X		X		X			02
TMW-WWL2D		GW	5/12/16	9:05	10		X	X		X		X		X			03
TRIP Blank		GW			1										X		04
TRIP Blank		GW			1										X		05
TRIP Blank		GW			1										X		

Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other

Remarks: *** Pamela Krueger will call in analysis for WWL1 Soil Pit Composite Sample**

Relinquished by: (Signature) *[Signature]*

Date: 5/12/16

Time: 11:00

Received by: (Signature)

Samples returned via: ☐ UPS

☐ FedEx ☐ Courier ☐

Temp: °C Bottles Received:

2.6 35

Date: 5-12-16 Time: 9:00

Relinquished by: (Signature)

Date:

Time:

Received by: (Signature)

Temp: °C Bottles Received:

2.6 35

Date: 5-12-16 Time: 9:00

Relinquished by: (Signature)

Date:

Time:

Received for lab by: (Signature)

Date: 5-12-16 Time: 9:00

6711 0132 9017

5-054

Condition: (lab use only)

COC Seal Intact: ☒ Y ☐ N ☐ NA

pH Checked: ☒ NCF:

[Signature]

Jeremy W. Watkins

ESC Lab Sciences
Non-Conformance Form

Login #: L835353	Client: AMECFWHTX	Date: 5/13/16	Evaluated by: Jeremy
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Non-Conformance (check applicable items)

Sample Integrity	Chain of Custody Clarification	
Parameter(s) past holding time	Login Clarification Needed	If Broken Container:
Improper temperature	Chain of custody is incomplete	Insufficient packing material around container
Improper container type	Please specify Metals requested.	Insufficient packing material inside cooler
Improper preservation	Please specify TCLP requested.	Improper handling by carrier (FedEx / UPS / Courier)
Insufficient sample volume.	Received additional samples not listed on coc.	Sample was frozen
Sample is biphasic.	Sample ids on containers do not match ids on coc	Container lid not intact
Vials received with headspace.	Trip Blank not received.	If no Chain of Custody:
Broken container	Client did not "X" analysis.	Received by:
Broken container:	Chain of Custody is missing	Date/Time:
Sufficient sample remains		Temp./Cont. Rec./pH:
		Carrier:
		Tracking#

Login Comments: Received a 125ml-NP for Anions for all TMW ID's not listed on COC.

Client informed by:	Call	Email	Voice Mail	Date:	Time:
TSR Initials: CM	Client Contact:				

Login Instructions:

Log 125mL-NP for CHLORIDE, FLUORIDE and SULFATE.

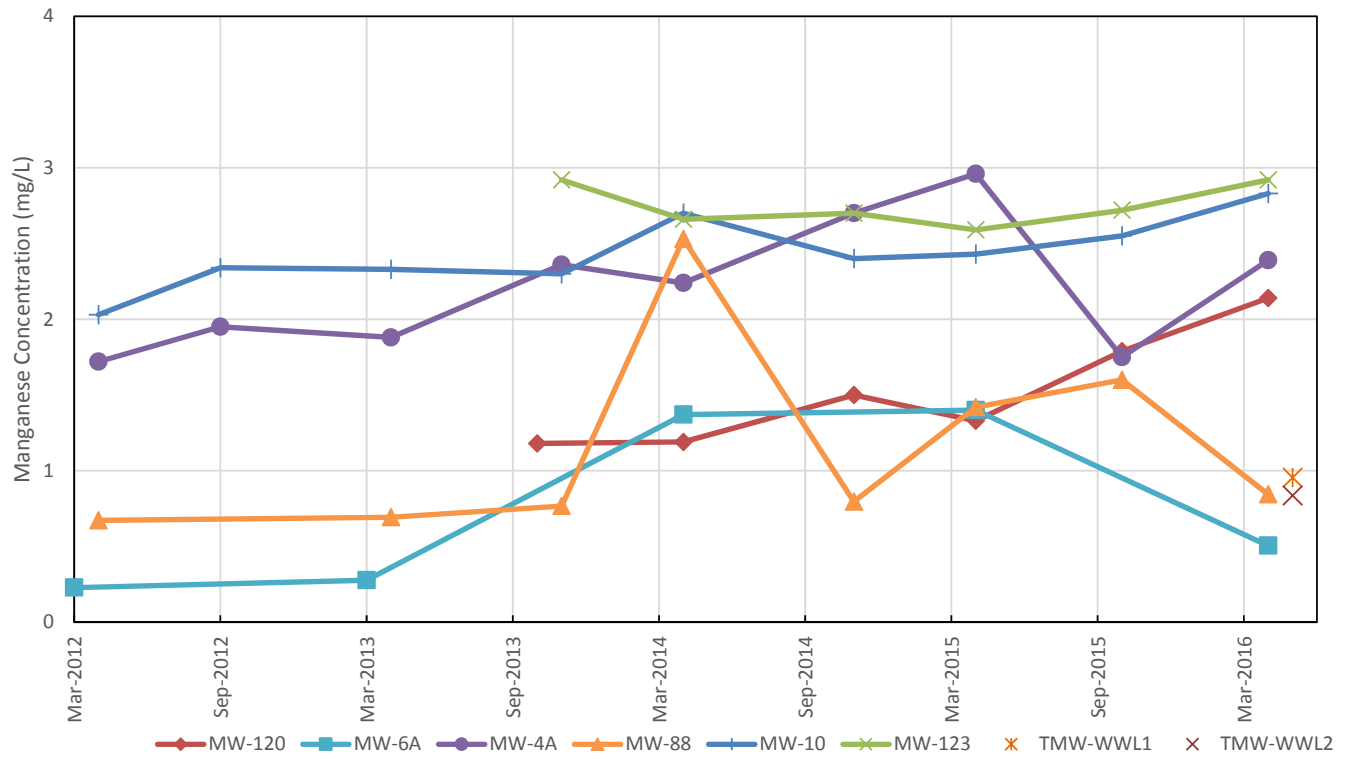
Also, change on all IDs: 8270 to 8270ACID; V8260 to V8260BTEX and only log metals FEICP and MNICP.

This E-mail and any attached files are confidential, and may be copyright protected. If you are not the addressee, any dissemination of this communication is strictly prohibited. If you have received this message in error, please contact the sender immediately and delete/destroy all information received.

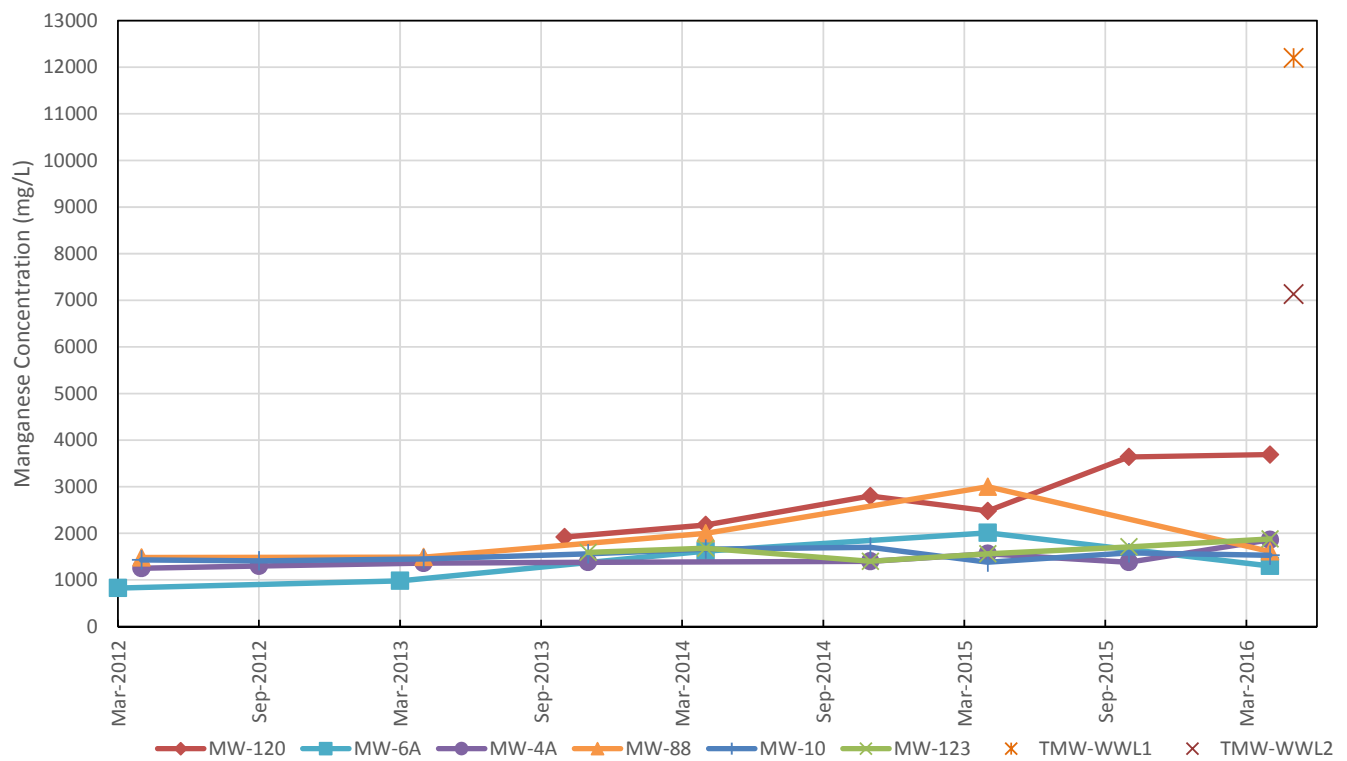


ATTACHMENT D

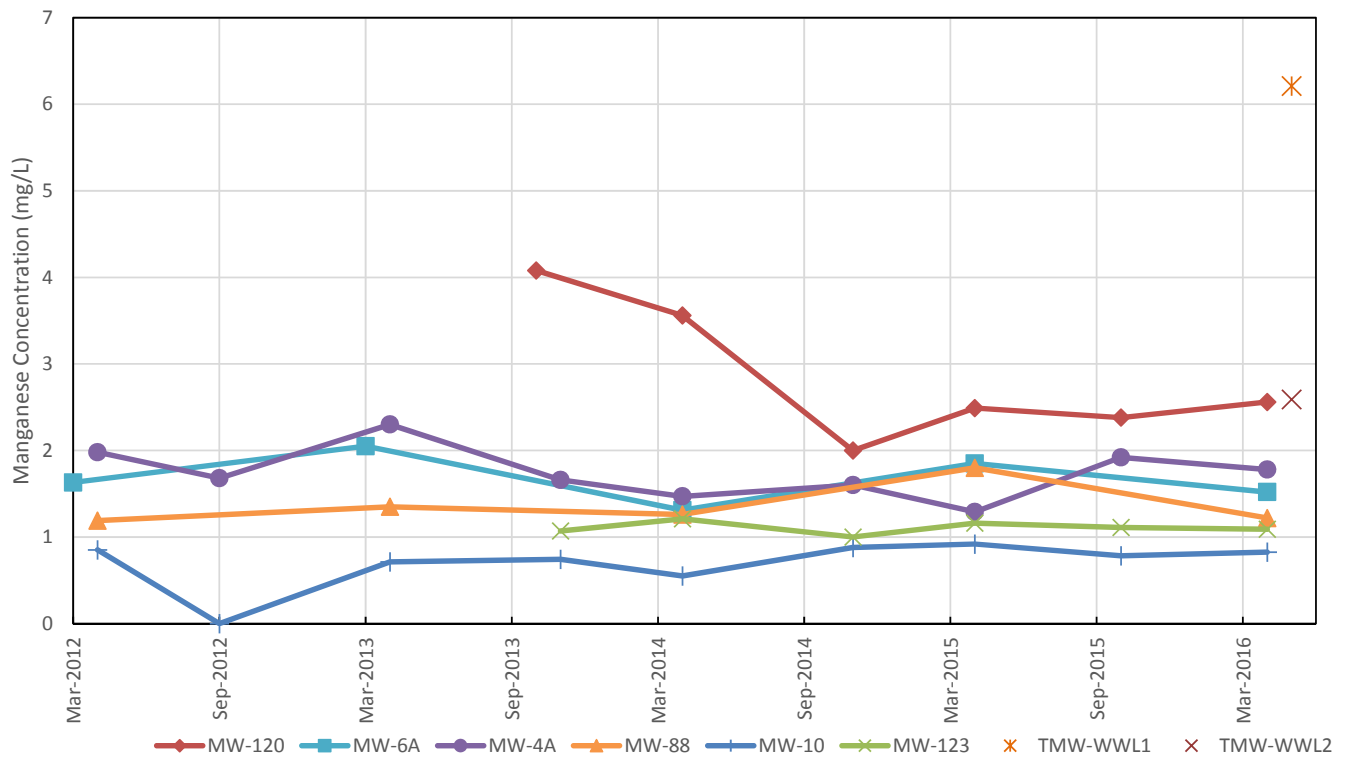
Manganese



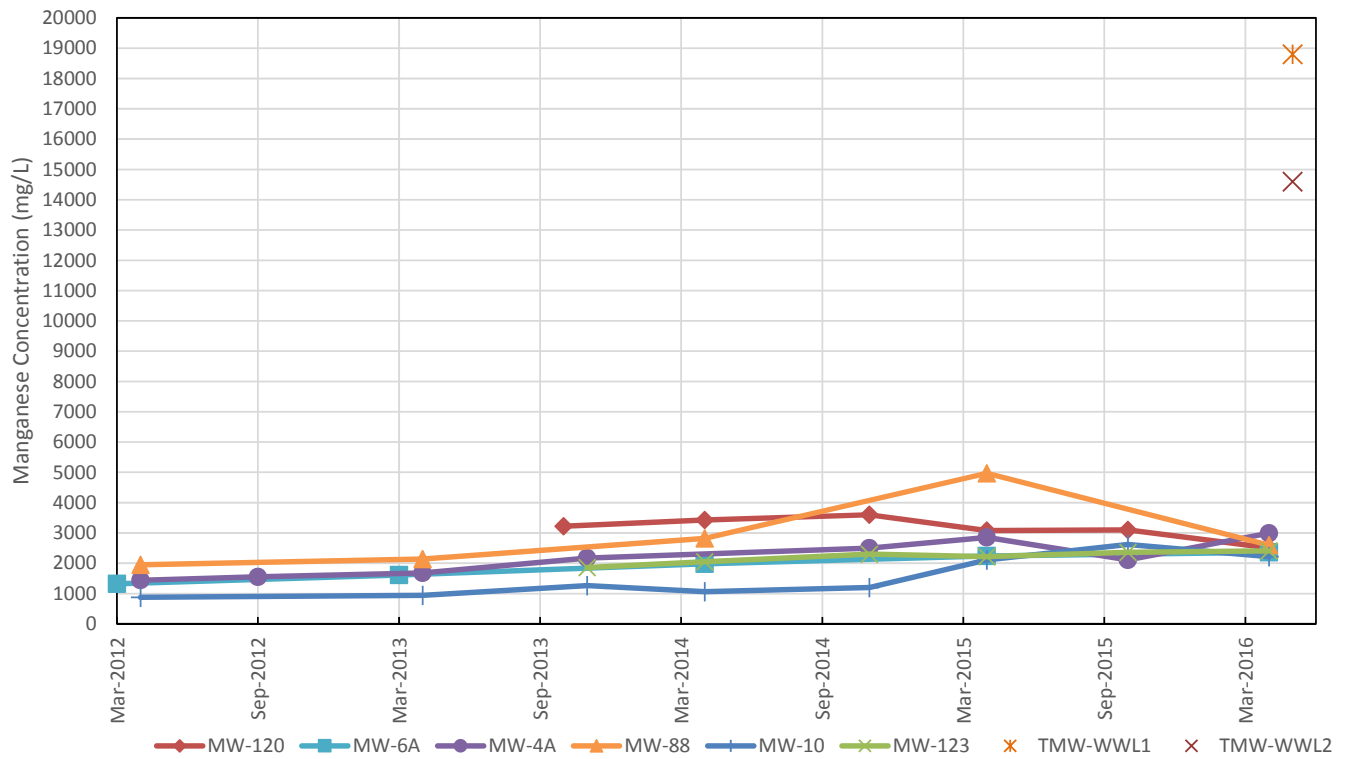
Chloride



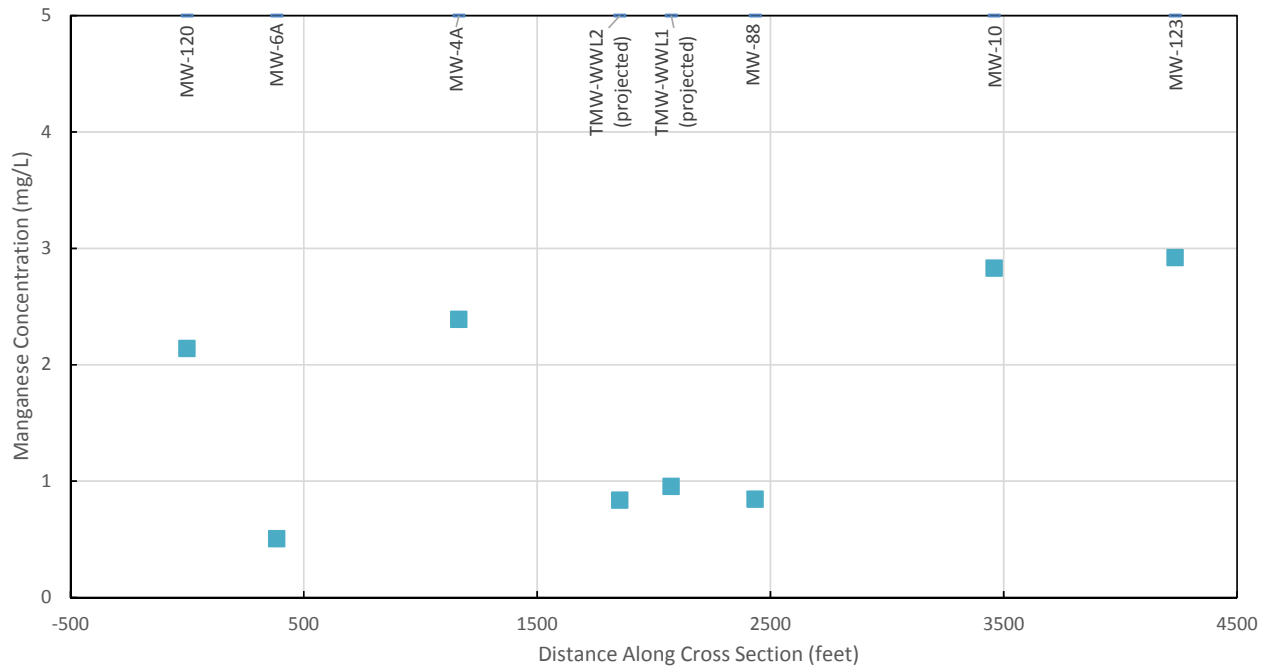
Fluoride



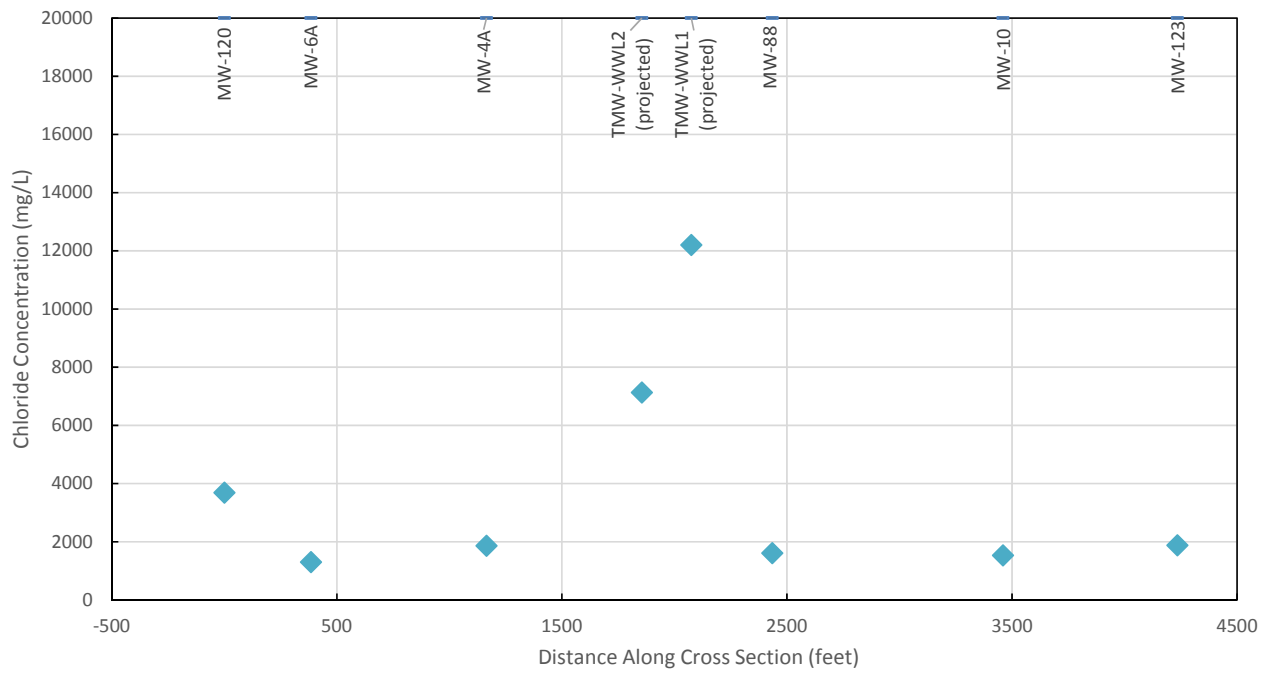
Sulfate



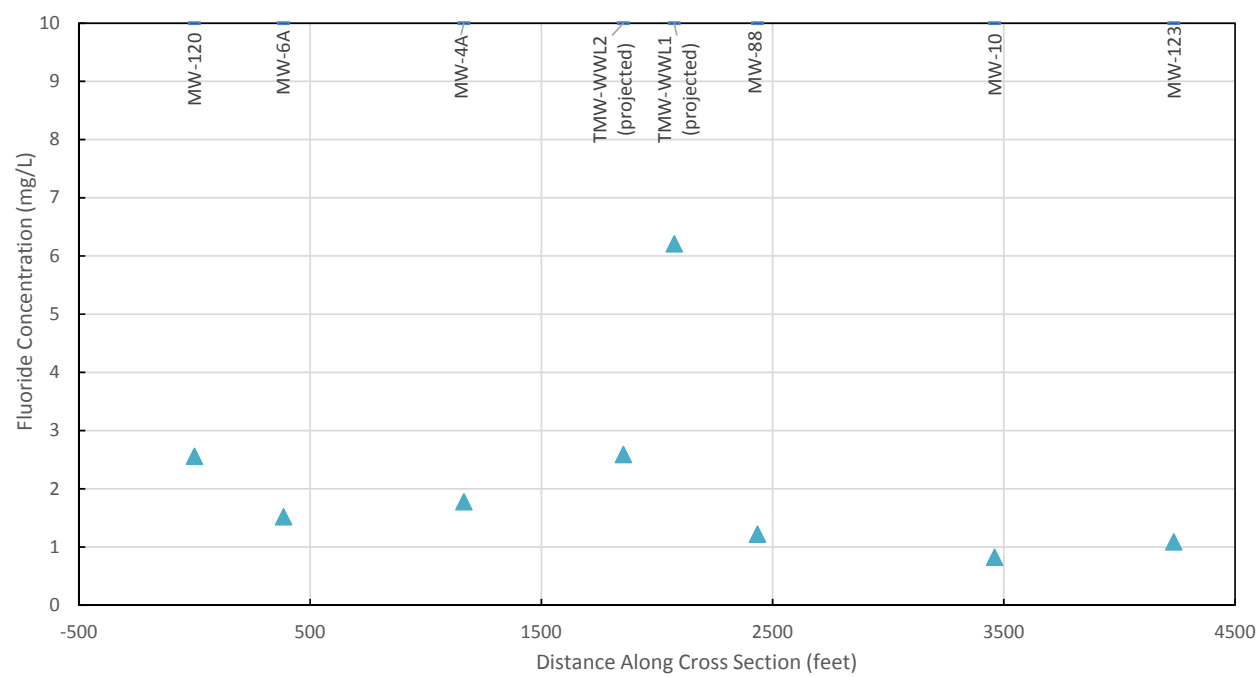
Manganese



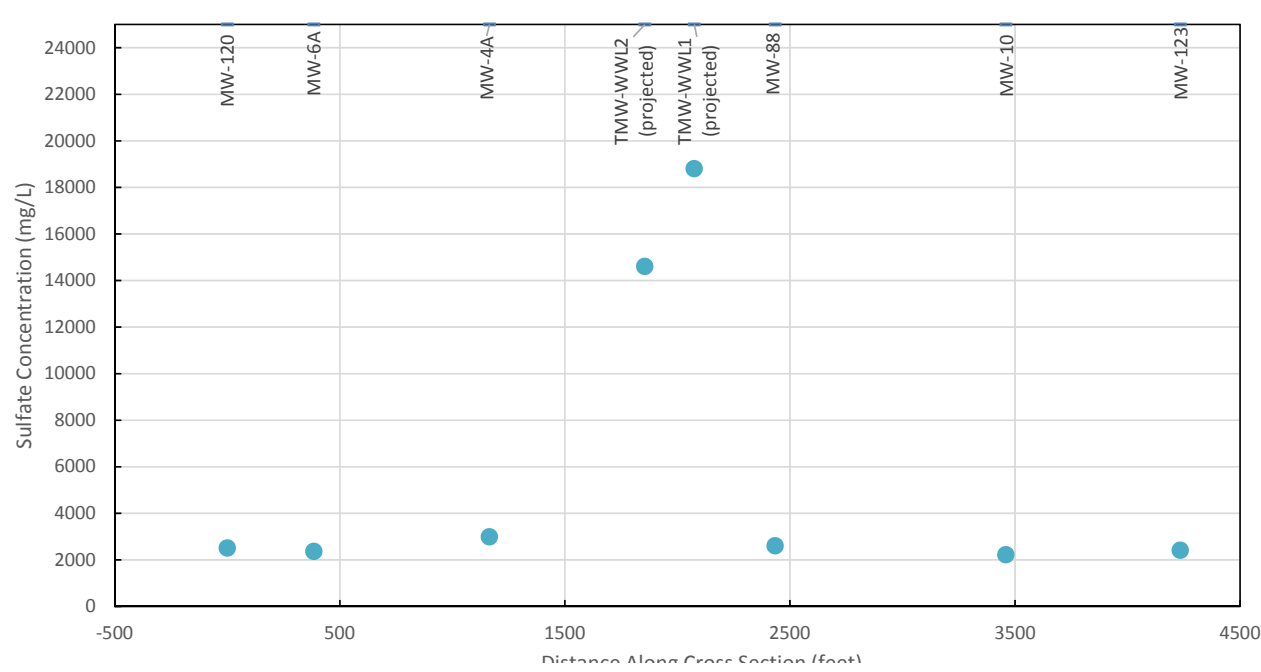
Chloride



Fluoride



Sulfate



Tom Blaine, P.E.
State Engineer



Roswell Office
1900 WEST SECOND STREET
ROSWELL, NM 88201

**STATE OF NEW MEXICO
OFFICE OF THE STATE ENGINEER**

Trn Nbr: 586987
File Nbr: RA 12403

May. 10, 2016

SCOTT DENTON
HOLLYFRONTIER NAVAJO REFINING
501 EAST MAIN STREET
ARTESIA, NM 88210


Greetings:

Enclosed is your copy of the above numbered permit that has been approved subject to the conditions set forth on the approval page. In accordance with the conditions of approval, the well can only be tested for 10 cumulative days, and the well is to be plugged on or before 05/31/2017, unless a permit to use the water is acquired from this office.

A Well Record & Log (OSE Form wr-20) shall be filed in this office within twenty (20) days after completion of drilling, but no later than 05/31/2017.

Appropriate forms can be downloaded from the OSE website www.ose.state.nm.us or will be mailed upon request.

Sincerely,


Juan Hernandez
(575) 622-6521

Enclosure

explore

File No.

RA-12403



NEW MEXICO OFFICE OF THE STATE ENGINEER

APPLICATION FOR PERMIT TO DRILL A WELL
WITH NO CONSUMPTIVE USE OF WATER

(check applicable box):

For fees, see State Engineer website: <http://www.ose.state.nm.us/>

- Purpose:
- ☐ Pollution Control And / Or Recovery ☐ Geo-Thermal
- ☐ Exploratory ☐ Construction Site De-Watering ☐ Other (Describe):
- ☒ Monitoring ☐ Mineral De-Watering

A separate permit will be required to apply water to beneficial use.

☒ Temporary Request - Requested Start Date: 5/1/2016

Requested End Date: 6/1/2016

Plugging Plan of Operations Submitted? ☒ Yes ☐ No

1. APPLICANT(S)

Name: HollyFrontier Navajo Refining LLC	Name:
Contact or Agent: check here if Agent <input type="checkbox"/> Scott Denton	Contact or Agent: check here if Agent <input type="checkbox"/>
Mailing Address: 501 East Main Street	Mailing Address:
City: Artesia	City:
State: NM Zip Code: 88210	State: Zip Code:
Phone: <input checked="" type="checkbox"/> Home <input type="checkbox"/> Cell Phone (Work): 575-746-5487	Phone: <input type="checkbox"/> Home <input type="checkbox"/> Cell Phone (Work): 575-746-5487
E-mail (optional): Scott.Denton@HollyFrontier.com	E-mail (optional):

FOR OSE INTERNAL USE

Application for Permit, Form wr-07, Rev 6/14/12

File No.: RA-12403	Trn. No.: 586987	Receipt No.:
Trans Description (optional): POD 1,2		
Sub-Basin:	PCW/LOG Due Date: 5-31-17	

2. WELL(S) Describe the well(s) applicable to this application.

Location Required: Coordinate location must be reported in NM State Plane (NAD 83), UTM (NAD 83), or Latitude/Longitude (Lat/Long - WGS84).
District II (Roswell) and District VII (Cimarron) customers, provide a PLSS location in addition to above.

☐ NM State Plane (NAD83) (Feet)
 ☐ UTM (NAD83) (Meters)
 ☒ Lat/Long (WGS84) (to the nearest 1/10th of second)

☐ NM West Zone
 ☐ Zone 12N

☐ NM East Zone
 ☐ Zone 13N

☐ NM Central Zone

Well Number (if known):	X or Easting or Longitude:	Y or Northing or Latitude:	Provide if known: -Public Land Survey System (PLSS) (Quarters or Halves, Section, Township, Range) OR - Hydrographic Survey Map & Tract; OR - Lot, Block & Subdivision; OR - Land Grant Name
TMW-WWLine1	104 20' 20.1" W	32 51' 0.1" N	T17S, R26E, S12, Q4 1, Q16 3
TMW-WWLine2	104 20' 20.3" W	32 51' 0.7" N	T17S, R26E, S12, Q4 1, Q16 3

NOTE: If more well locations need to be described, complete form WR-08 (Attachment 1 – POD Descriptions)

Additional well descriptions are attached: ☐ Yes ☒ No If yes, how many _____

Other description relating well to common landmarks, streets, or other:
 Temporary wells to be installed on either side of underground wastewater line south of former evaporation ponds, north of US Highway 82.

Well is on land owned by: HollyFrontier Navajo Refining, LLC

Well Information: **NOTE: If more than one (1) well needs to be described, provide attachment.** Attached? ☐ Yes ☒ No
 If yes, how many _____

Approximate depth of well (feet): 10 to 12 feet Outside diameter of well casing (inches): 2

Driller Name: Envirotech Drilling Services LLC Driller License Number: WD-1757

3. ADDITIONAL STATEMENTS OR EXPLANATIONS

Temporary monitoring wells will be installed and developed, allowed to rest for 24 hours, sampled (once only), then plugged and abandoned. The purpose of the temporary monitoring wells is to determine whether wastewater released from an identified line break may have impacted the shallow groundwater beneath the pipeline.

2016 MAY -2 PM 4:20

FOR OSE INTERNAL USE

Application for Permit, Form wr-07

File No.: RA-12403

Trn No.: 586987

4. SPECIFIC REQUIREMENTS: The applicant must include the following, as applicable to each well type. Please check the appropriate boxes, to indicate the information has been included and/or attached to this application:

Exploratory: <input type="checkbox"/> Include a description of any proposed pump test, if applicable.	Pollution Control and/or Recovery: <input type="checkbox"/> Include a plan for pollution control/recovery, that includes the following: <input type="checkbox"/> A description of the need for the pollution control or recovery operation. <input type="checkbox"/> The estimated maximum period of time for completion of the operation. <input type="checkbox"/> The annual diversion amount. <input type="checkbox"/> The annual consumptive use amount. <input type="checkbox"/> The maximum amount of water to be diverted and injected for the duration of the operation. <input type="checkbox"/> The method and place of discharge.	Construction De-Watering: <input type="checkbox"/> Include a description of the proposed dewatering operation, <input type="checkbox"/> The estimated duration of the operation, <input type="checkbox"/> The maximum amount of water to be diverted, <input type="checkbox"/> A description of the need for the dewatering operation, and, <input type="checkbox"/> A description of how the diverted water will be disposed of.	Mine De-Watering: <input type="checkbox"/> Include a plan for pollution control/recovery, that includes the following: <input type="checkbox"/> A description of the need for mine dewatering. <input type="checkbox"/> The estimated maximum period of time for completion of the operation. <input type="checkbox"/> The source(s) of the water to be diverted. <input type="checkbox"/> The geohydrologic characteristics of the aquifer(s). <input type="checkbox"/> The maximum amount of water to be diverted per annum. <input type="checkbox"/> The maximum amount of water to be diverted for the duration of the operation. <input type="checkbox"/> The quality of the water.
Monitoring: <input checked="" type="checkbox"/> Include the reason for the monitoring well, and, <input checked="" type="checkbox"/> The duration of the planned monitoring.	<input type="checkbox"/> The method of measurement of water produced and discharged. <input type="checkbox"/> The source of water to be injected. <input type="checkbox"/> The method of measurement of water injected. <input type="checkbox"/> The characteristics of the aquifer. <input type="checkbox"/> The method of determining the resulting annual consumptive use of water and depletion from any related stream system. <input type="checkbox"/> Proof of any permit required from the New Mexico Environment Department. <input type="checkbox"/> An access agreement if the applicant is not the owner of the land on which the pollution plume control or recovery well is to be located.	Geo-Thermal: <input type="checkbox"/> Include a description of the geothermal heat exchange project, <input type="checkbox"/> The amount of water to be diverted and re-injected for the project, <input type="checkbox"/> The time frame for constructing the geothermal heat exchange project, and, <input type="checkbox"/> The duration of the project. <input type="checkbox"/> Preliminary surveys, design data, and additional information shall be included to provide all essential facts relating to the request.	<input type="checkbox"/> The method of measurement of water diverted. <input type="checkbox"/> The recharge of water to the aquifer. <input type="checkbox"/> Description of the estimated area of hydrologic effect of the project. <input type="checkbox"/> The method and place of discharge. <input type="checkbox"/> An estimation of the effects on surface water rights and underground water rights from the mine dewatering project. <input type="checkbox"/> A description of the methods employed to estimate effects on surface water rights and underground water rights. <input type="checkbox"/> Information on existing wells, rivers, springs, and wetlands within the area of hydrologic effect.

ACKNOWLEDGEMENT

I, We (name of applicant(s)), Scott Denton on behalf of HollyFrontier Navajo Refining LLC

Print Name(s)

affirm that the foregoing statements are true to the best of (my, our) knowledge and belief.

Robert Combs for Scott M. Denton

Applicant Signature

Applicant Signature

ACTION OF THE STATE ENGINEER

This application is:

☒ approved

☐ partially approved

☐ denied

provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare and further subject to the attached conditions of approval.

Witness my hand and seal this 10th day of May 20 16, for the State Engineer,

Tom Blaine, P.E.

State Engineer

By:

Signature

Print

Title: Juan Hernandez, Engr Specialist Supervisor

Print

FOR USE INTERNAL USE

Application for Permit, Form wr-07

File No.:

RA-12403

Trn No.:

586987

**NEW MEXICO STATE ENGINEER OFFICE
PERMIT TO EXPLORE**

SPECIFIC CONDITIONS OF APPROVAL

- 1A Depth of the well shall not exceed the thickness of the valley fill.
- 4 No water shall be appropriated and beneficially used under this permit.
- 6 The well shall be plugged upon completion of the permitted use, and a plugging report shall be filed with the State Engineer within 10 days.
- 7 The Permittee shall utilize the highest and best technology available to ensure conservation of water to the maximum extent practical.
- B The well shall be drilled by a driller licensed in the State of New Mexico in accordance with Section 72-12-12 New Mexico Statutes Annotated.
- C Driller's well record must be filed with the State Engineer within 20 days after the well is drilled or driven. Well record forms will be provided by the State Engineer upon request.
- C2 No water shall be diverted from this well except for testing purposes which shall not exceed ten (10) cumulative days, and well shall be plugged or capped on or before , unless a permit to use water from this well is acquired from the Office of the State Engineer.
- P The well shall be constructed, maintained, and operated to prevent inter-aquifer exchange of water and to prevent loss of hydraulic head between geologic zones.

**NEW MEXICO STATE ENGINEER OFFICE
PERMIT TO EXPLORE**

SPECIFIC CONDITIONS OF APPROVAL (Continued)

Q The State Engineer retains jurisdiction over this permit.

LOG The Point of Diversion RA 12403 POD1 must be completed and the Well Log filed on or before 05/31/2017.

LOG The Point of Diversion RA 12403 POD2 must be completed and the Well Log filed on or before 05/31/2017.

IT IS THE PERMITTEES RESPONSIBILITY TO OBTAIN ALL AUTHORIZATIONS AND PERMISSIONS TO DRILL ON PROPERTY OF OTHER OWNERSHIP BEFORE COMMENCING ACTIVITIES UNDER THIS PERMIT.

SHOULD THE PERMITTEE CHANGE THE PURPOSE OF USE TO OTHER THAN MONITORING PURPOSES, AN APPLICATION SHALL BE ACQUIRED FROM THE OFFICE OF THE STATE ENGINEER.

ACTION OF STATE ENGINEER

Notice of Intention Rcvd:	Date Rcvd. Corrected:
Formal Application Rcvd: 05/02/2016	Pub. of Notice Ordered:
Date Returned - Correction:	Affidavit of Pub. Filed:

This application is approved provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare of the state; and further subject to the specific conditions listed previously.

Witness my hand and seal this 10 day of May A.D., 2016

Tom Blaine, P.E., State Engineer

By: 

Juan Hernandez

Trn Desc: RA 12403 POD1,2

File Number: RA 12403

Trn Number: 586987

Locator Tool Report

General Information:

Application ID: 29 Date: 05-10-2016 Time: 08:42:10

WR File Number: RA
Purpose: POINT OF DIVERSION

Applicant First Name: HOLLY FRONTIER NAVAJO REFINING LC
Applicant Last Name: TMW-WWLINE2

GW Basin: ROSWELL ARTESIAN
County: EDDY

Critical Management Area Name(s): NONE
Special Condition Area Name(s): NONE
Land Grant Name: NON GRANT

PLSS Description (New Mexico Principal Meridian):

SW 1/4 of SW 1/4 of SE 1/4 of NW 1/4 of Section 12, Township 17S, Range 26E.

Coordinate System Details:

Geographic Coordinates:

Latitude: 32 Degrees 51 Minutes 0.7 Seconds N
Longitude: 104 Degrees 20 Minutes 20.3 Seconds W

Universal Transverse Mercator Zone: 13N

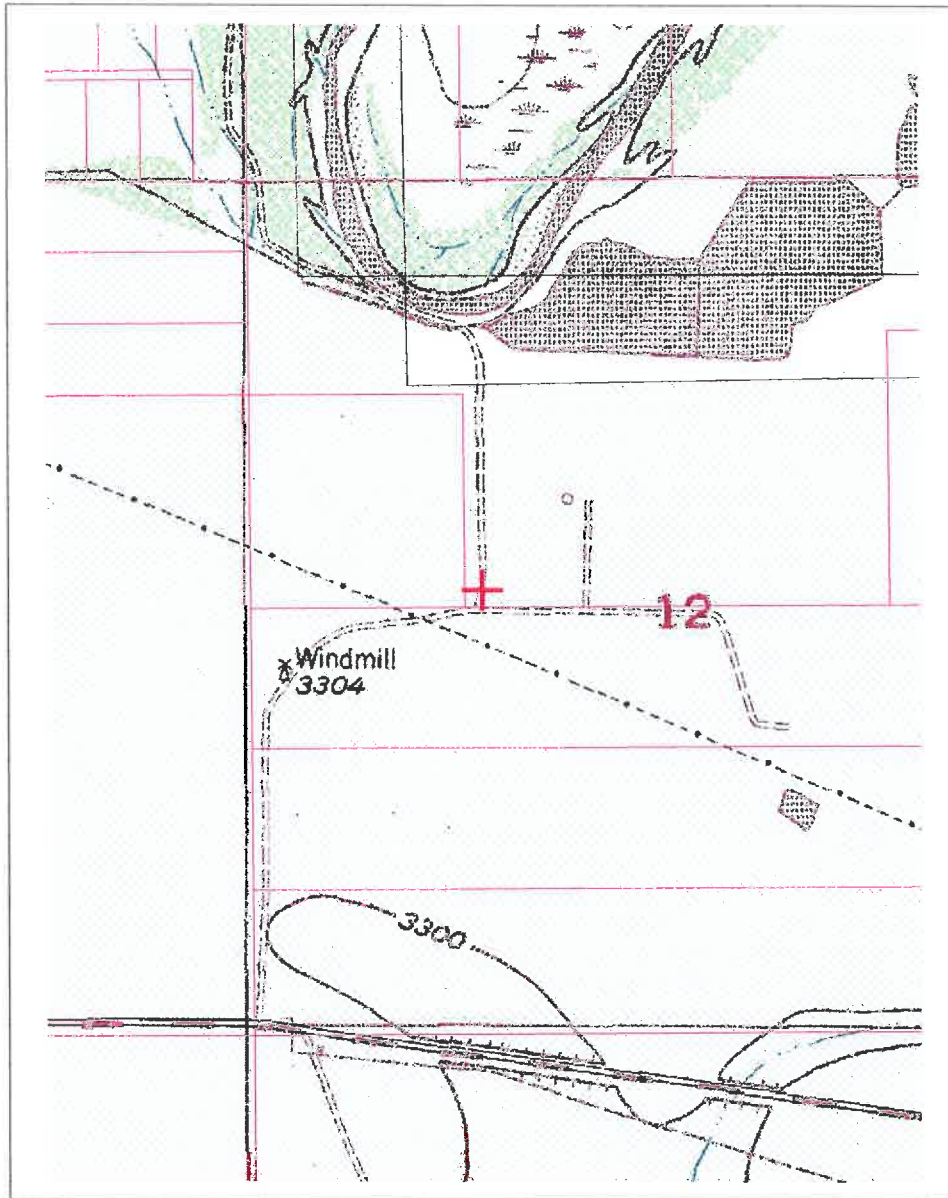
NAD 1983(92) (Meters)	N: 3,634,873	E: 561,855
NAD 1983(92) (Survey Feet)	N: 11,925,413	E: 1,843,353
NAD 1927 (Meters)	N: 3,634,670	E: 561,905
NAD 1927 (Survey Feet)	N: 11,924,748	E: 1,843,516

State Plane Coordinate System Zone: New Mexico East

NAD 1983(92) (Meters)	N: 205,141	E: 164,472
NAD 1983(92) (Survey Feet)	N: 673,034	E: 539,606
NAD 1927 (Meters)	N: 205,122	E: 151,921
NAD 1927 (Survey Feet)	N: 672,971	E: 498,427

NEW MEXICO OFFICE OF STATE ENGINEER

Locator Tool Report



WR File Number: RA

Scale: 1:14,368

Northing/Easting: UTM83(92) (Meter): N: 3,634,873

E: 561,855

Northing/Easting: SPCS83(92) (Feet): N: 673,034

E: 539,606

GW Basin: Roswell Artesian

Locator Tool Report

General Information:

Application ID:29 Date: 05-10-2016 Time: 08:40:32

WR File Number: RA
Purpose: POINT OF DIVERSION

Applicant First Name: HOLLY FRONTIER NAVAJO REFINING LC
Applicant Last Name: TMW-WWLINE1

GW Basin: ROSWELL ARTESIAN
County: EDDY

Critical Management Area Name(s): NONE
Special Condition Area Name(s): NONE
Land Grant Name: NON GRANT

PLSS Description (New Mexico Principal Meridian):

SW 1/4 of SW 1/4 of SE 1/4 of NW 1/4 of Section 12, Township 17S, Range 26E.

Coordinate System Details:

Geographic Coordinates:

Latitude: 32 Degrees 51 Minutes 0.1 Seconds N
Longitude: 104 Degrees 20 Minutes 20.1 Seconds W

Universal Transverse Mercator Zone: 13N

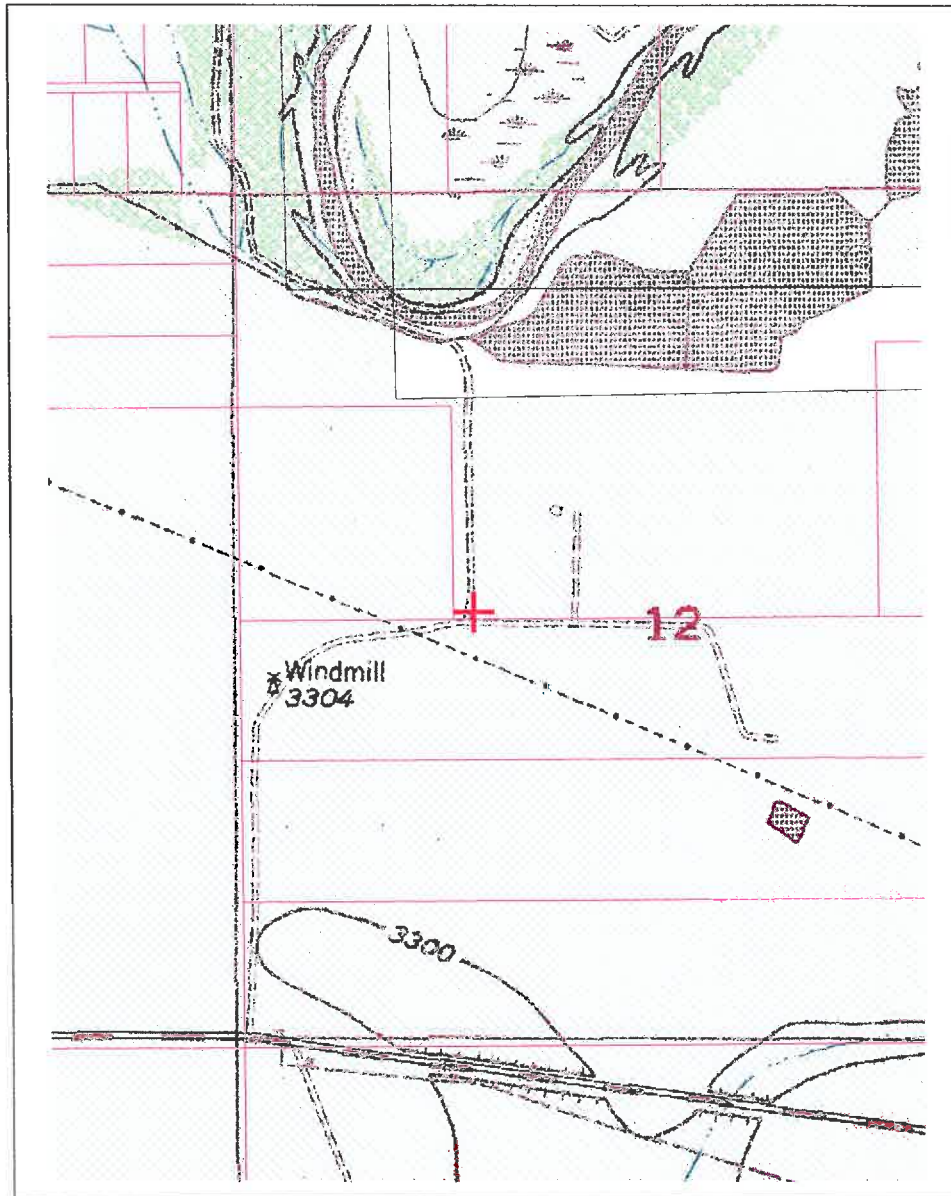
NAD 1983(92) (Meters)	N: 3,634,855	E: 561,860
NAD 1983(92) (Survey Feet)	N: 11,925,353	E: 1,843,371
NAD 1927 (Meters)	N: 3,634,652	E: 561,910
NAD 1927 (Survey Feet)	N: 11,924,687	E: 1,843,534

State Plane Coordinate System Zone: New Mexico East

NAD 1983(92) (Meters)	N: 205,123	E: 164,477
NAD 1983(92) (Survey Feet)	N: 672,973	E: 539,623
NAD 1927 (Meters)	N: 205,103	E: 151,926
NAD 1927 (Survey Feet)	N: 672,910	E: 498,444

NEW MEXICO OFFICE OF STATE ENGINEER

Locator Tool Report



WR File Number: RA

Scale: 1:14,368

Northing/Easting: UTM83(92) (Meter): N: 3,634,855

E: 561,860

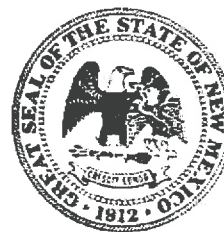
Northing/Easting: SPCS83(92) (Feet): N: 672,973

E: 539,623

GW Basin: Roswell Artesian



WELL PLUGGING PLAN OF OPERATIONS



NOTE: A Well Plugging Plan of Operations shall be filed with and accepted by the Office of the State Engineer prior to plugging.

I. FILING FEE: There is no filing fee for this form.

II. GENERAL / WELL OWNERSHIP:

Existing Office of the State Engineer POD Number (Well Number) for well to be plugged: RA-12403
Name of well owner: HollyFrontier Navajo Refining, LLC
Mailing address: 501 East Main Street
City: Artesia State: NM Zip code: 88210
Phone number: 575-746-5487 E-mail: Scott.Denton@HollyFrontier.com

III. WELL DRILLER INFORMATION:

Well Driller contracted to provide plugging services: Envirotech Drilling Services LLC
New Mexico Well Driller License No.: WD-1757 Expiration Date: 1/31/2018

IV. WELL INFORMATION:

Note: A copy of the existing Well Record for the well to be plugged should be attached to this plan.

- 1) GPS Well Location: Latitude: 32 deg, 51 min, 0.1 sec
Longitude: 104 deg, 20 min, 20.1 sec, NAD 83
- 2) Reason(s) for plugging well:

This plan is for two temporary monitoring wells that will only be sampled one time, and will be plugged and abandoned once the sample collection has been completed.
- 3) Was well used for any type of monitoring program? Yes If yes, please use section VII of this form to detail what hydrogeologic parameters were monitored. If the well was used to monitor contaminated or poor quality water, authorization from the New Mexico Environment Department may be required prior to plugging.
- 4) Does the well tap brackish, saline, or otherwise poor quality water? Yes If yes, provide additional detail, including analytical results and/or laboratory report(s):

Temporary wells are located south of former Evaporation Ponds, near monitoring wells that are included in a semiannual monitoring program. Data from those wells are reported to NMED and OCD annually, and have TDS values ranging from 5,000 to 11,000 mg/L.
- 5) Static water level: 5 - 7 feet below land surface feet above land surface (circle one)
- 6) Depth of the well: 10 - 12 feet

- 7) Inside diameter of innermost casing: 2 inches.
- 8) Casing material: PVC
- 9) The well was constructed with:
☐ an open-hole production interval, state the open interval: _____
☒ a well screen or perforated pipe, state the screened interval(s): 2 to 10 (or 2 to 12)
- 10) What annular interval surrounding the artesian casing of this well is cement-grouted? N/A
- 11) Was the well built with surface casing? No No If yes, is the annulus surrounding the surface casing grouted or otherwise sealed? _____ If yes, please describe:
- 12) Has all pumping equipment and associated piping been removed from the well? N/A If not, describe remaining equipment and intentions to remove prior to plugging in Section VII of this form.

V. DESCRIPTION OF PLANNED WELL PLUGGING:

Note: If this plan proposes to plug an artesian well in a way other than with cement grout, placed bottom to top with a tremie pipe, a detailed diagram of the well showing proposed final plugged configuration shall be attached, as well as any additional technical information, such as geophysical logs, that are necessary to adequately describe the proposal.

- 1) Describe the method by which cement grout shall be placed in the well, or describe requested plugging methodology proposed for the well:

Lean cement grout will be placed in the boring from the bottom up using a tremie pipe.
- 2) Will well head be cut-off below land surface after plugging? PVC casing will be removed

VI. PLUGGING AND SEALING MATERIALS:

Note: The plugging of a well that taps poor quality water may require the use of a specialty cement or specialty sealant

- 1) For plugging intervals that employ cement grout, complete and attach Table A.
- 2) For plugging intervals that will employ approved non-cement based sealant(s), complete and attach Table B.
- 3) Theoretical volume of grout required to plug the well to land surface: 1.6 - 2 gallons
- 4) Type of Cement proposed: Portland cement
- 5) Proposed cement grout mix: 5 gallons of water per 94 pound sack of Portland cement.
- 6) Will the grout be: _____ batch-mixed and delivered to the site
X mixed on site

02:41:20 PM 4/20

WELL PLUGGING PLAN
 VERSION: AUGUST 11, 2015

- 7) Grout additives requested, and percent by dry weight relative to cement:

- 8) Additional notes and calculations:

VII. ADDITIONAL INFORMATION: List additional information below, or on separate sheet(s):

VIII. SIGNATURE:

I, Scott Denton, say that I have carefully read the foregoing Well Plugging Plan of Operations and any attachments, which are a part hereof; that I am familiar with the rules and regulations of the State Engineer pertaining to the plugging of wells and will comply with them, and that each and all of the statements in the Well Plugging Plan of Operations and attachments are true to the best of my knowledge and belief.

Robert Conks for Scott M. Denton 5/2/16

Signature of Applicant

Date

IX. ACTION OF THE STATE ENGINEER:

This Well Plugging Plan of Operations is:

X Approved subject to the attached conditions.
 Not approved for the reasons provided on the attached letter.

Witness my hand and official seal this 16th day of May, 2016

Tom Blaine P.E., New Mexico State Engineer

By: Andy Morley C. Goetz

Fox Andy Morley
District II Manager

2016 MAY -2 PM 4:20
NEW MEXICO STATE ENGINEER
OFFICE OF THE STATE ENGINEER

TABLE A - For plugging intervals that employ cement grout. Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of grout placement (ft bgl)			0
Bottom of proposed interval of grout placement (ft bgl)			10-12
Theoretical volume of grout required per interval (gallons)			1.6 to 2
Proposed cement grout mix gallons of water per 94-lb. sack of Portland cement			5
Mixed on-site or batch-mixed and delivered?			mixed on-site
Grout additive 1 requested			
Additive 1 percent by dry weight relative to cement			
Grout additive 2 requested			
Additive 2 percent by dry weight relative to cement			

2016 MAY -2 PM 4:20

WELL PLUGGING PLAN
VERSION: AUGUST 11, 2015
PAGE 4 OF 5

TABLE B - For plugging intervals that will employ approved non-cement based sealant(s). Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow
			Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of sealant placement (ft bgl)			
Bottom of proposed sealant or grout placement (ft bgl)			
Theoretical volume of sealant required per interval (gallons)			
Proposed abandonment sealant (manufacturer and trade name)			

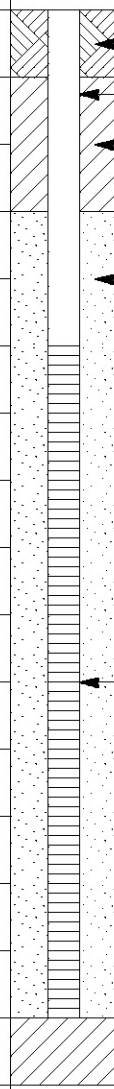
2016 MAY -2 PM 4: 20

STATE OF TEXAS
COMMISSIONER OF AGRICULTURE

PROJECT: HollyFrontier Navajo Wastewater Line Release Investigation					Log of Well No. TMW-WWL-1	
BORING LOCATION:					GROUND SURFACE ELEVATION AND DATUM:	
DRILLING CONTRACTOR: Envirotech Services					DATE STARTED: 5/10/16	DATE FINISHED: 5/10/16
DRILLING METHOD: Hollow Stem Auger					TOTAL DEPTH (ft.): 16.0	SCREEN INTERVAL (ft.): 10'
DRILLING EQUIPMENT: Geoprobe 9520					DEPTH TO WATER ATD: 12'	CASING: 2'
SAMPLING METHOD: Auger					LOGGED BY: William Smith	
HAMMER WEIGHT: NA		DROP: NA			RESPONSIBLE PROFESSIONAL: William Smith	REG. NO.

DEPTH (feet)	SAMPLES		OVM Reading	DESCRIPTION	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample Blows/ Foot		NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	
0			0	SANDY CLAY (CL): reddish-brown, dry, low carbonate induration, low-medium plasticity, no odor, no staining	<p>Open</p> <p>2" Diameter Casing</p> <p>Bentonite</p> <p>20/40 Grade Silica Sand</p> <p>Sch 40 0.010 Slot PVC Screen</p>
5			0	SANDY CLAY (CL): reddish-brown, low carbonate induration, medium-high plasticity, no odor, no staining	
			0	SANDY CLAY (CL): light brown, low plasticity, no odor, no staining	
			0	SANDY CLAY (CL): brown, low plasticity, gypsum crystals, no odor, no staining	
10			0	SANDY CLAY (CL): light reddish-brown, low carbonate induration, low-medium plasticity, damp, contains some gypsum crystals, no odor, no staining	
15			0	Gypsiferous SANDY CLAY (CL): whitish-green, low plasticity, moist, no odor, no staining	
				Total Depth = 15.5'	
				Sampler Stopped at 16' Auger Stopped at 15' TMW-WWL-1 Set to 15.5'	

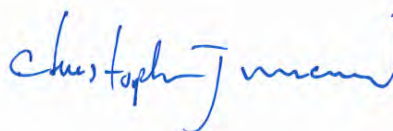
PROJECT: HollyFrontier Navajo Wastewater Line Release Investigation					Log of Well No. TMW-WWL-2	
BORING LOCATION:					GROUND SURFACE ELEVATION AND DATUM:	
DRILLING CONTRACTOR: Envirotech Services					DATE STARTED: 5/10/16	DATE FINISHED: 5/10/16
DRILLING METHOD: Hollow Stem Auger					TOTAL DEPTH (ft.): 16.0	SCREEN INTERVAL (ft.): 10'
DRILLING EQUIPMENT: Geoprobe 9520					DEPTH TO WATER ATD: 12'	CASING: 2'
SAMPLING METHOD: Auger					LOGGED BY: William Smith	
HAMMER WEIGHT: NA		DROP: NA			RESPONSIBLE PROFESSIONAL: William Smith	REG. NO.

DEPTH (feet)	SAMPLES		OVM Reading	DESCRIPTION	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample Blows/ Foot		NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	
0			0	SILTY SAND (SM): light brown, damp, non-plastic, no odor, no stain	 <p>Open</p> <p>2" Diameter Casing</p> <p>Bentonite</p> <p>20/40 Grade Silica Sand</p> <p>Sch 40 0.010 Slot PVC Screen</p>
5			0	SANDY CLAY (CL): brown, damp, medium plasticity, contains some gypsum crystals, no odor, no stain, SANDY CLAY (CL): light reddish-brown, damp, medium to high plasticity, contains some gypsum crystals, no odor, no stain,	
10			0		
15			0	SANDY CLAY (CL): reddish-brown, moist, low plasticity, low-moderate carbonate induration becomes more gymsiferous with depth, no odor, organic, no stain	
20				TOTAL DEPTH = 16' Sampler Stopped at 16' Auger Stopped at 15' TMW-WWL-1 Set to 15'	

AMEC Foster Wheeler - Houston, TX

Sample Delivery Group: L835078
Samples Received: 05/12/2016
Project Number: 6703160012.001
Description: Wastewater Line Investigation
Site: HOLLEY FRONTIER NAVAJO
Report To: Pamela Krueger
585 N. Dairy Ashford
Houston, TX 77079

Entire Report Reviewed By:



Chris McCord
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



TMW-WWL1-01 L835078-01 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 15:00

Received date/time
05/12/16 09:00

¹ Cp

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:06	BRJ
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 16:05	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 12:02	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873092	5	05/17/16 17:13	05/18/16 07:06	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872230	5	05/19/16 00:02	05/19/16 08:15	DWR
Wet Chemistry by Method 9056A	WG872631	20	05/16/16 17:26	05/17/16 11:40	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 01:04	CM

² Tc

³ Ss

⁴ Cn

⁵ Sr

TMW-WWL1-05 L835078-02 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 15:10

Received date/time
05/12/16 09:00

⁶ Qc

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:08	CCE
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 16:29	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 10:49	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873092	5	05/17/16 17:13	05/18/16 09:12	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872230	5	05/19/16 00:02	05/19/16 08:37	DWR
Wet Chemistry by Method 9056A	WG872631	50	05/16/16 17:26	05/17/16 12:04	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 01:52	CM

⁷ Gl

⁸ Al

⁹ Sc

TMW-WWL1-12 L835078-03 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 15:20

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:17	CCE
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 16:52	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 11:02	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873092	5	05/17/16 17:13	05/18/16 09:35	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872230	5	05/19/16 00:02	05/19/16 09:00	DWR
Wet Chemistry by Method 9056A	WG872631	50	05/16/16 17:26	05/17/16 12:28	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 02:16	CM

TMW-WWL2-01 L835078-04 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 16:20

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:20	BRJ
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 17:15	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 11:50	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873092	5	05/17/16 17:13	05/18/16 09:58	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872230	5	05/19/16 00:02	05/19/16 09:22	DWR
Wet Chemistry by Method 9056A	WG872631	1	05/16/16 17:26	05/17/16 06:29	CM
Wet Chemistry by Method 9056A	WG872631	10	05/16/16 17:26	05/17/16 12:52	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 02:40	CM

TMW-WWL2-05 L835078-05 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 16:30

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:23	BRJ
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 17:39	JF

ACCOUNT:

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



TMW-WWL2-05 L835078-05 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 16:30

Received date/time
05/12/16 09:00

¹Cp

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 11:14	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873092	5	05/17/16 17:13	05/18/16 10:21	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG873800	5	05/19/16 11:42	05/19/16 15:29	BMB
Wet Chemistry by Method 9056A	WG872631	1	05/16/16 17:26	05/17/16 06:53	CM
Wet Chemistry by Method 9056A	WG872631	50	05/16/16 17:26	05/17/16 13:16	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 03:04	CM

²Tc

³Ss

⁴Cn

⁵Sr

TMW-WWL2-12 L835078-06 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 16:50

Received date/time
05/12/16 09:00

⁶Qc

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:26	CCE
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 18:02	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 11:26	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873220	5	05/18/16 18:29	05/18/16 20:23	JAH
Volatile Organic Compounds (GC/MS) by Method 8260B	WG873800	5	05/19/16 11:42	05/19/16 15:53	BMB
Wet Chemistry by Method 9056A	WG872631	1	05/16/16 17:26	05/17/16 07:17	CM
Wet Chemistry by Method 9056A	WG872631	50	05/16/16 17:26	05/17/16 13:40	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 04:16	CM

⁷Gl

⁸Al

⁹Sc

TMW-WWL2-12D L835078-07 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 16:55

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:29	CCE
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG873908	1	05/19/16 22:56	05/20/16 12:33	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 11:38	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873220	5	05/18/16 18:29	05/18/16 20:46	JAH
Volatile Organic Compounds (GC/MS) by Method 8260B	WG873800	5	05/19/16 11:42	05/19/16 16:17	BMB
Wet Chemistry by Method 9056A	WG872631	1	05/16/16 17:26	05/17/16 09:36	CM
Wet Chemistry by Method 9056A	WG872631	50	05/16/16 17:26	05/17/16 14:04	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 04:40	CM

TMW-WW6-EQ L835078-08 GW

Collected by
William R. Smith

Collected date/time
05/10/16 18:00

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872401	1	05/16/16 10:43	05/16/16 15:27	ST
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872427	1	05/12/16 21:03	05/15/16 18:23	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872369	1	05/12/16 20:58	05/15/16 10:41	JNS
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG872916	1	05/17/16 19:24	05/17/16 19:24	LRL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872248	1	05/13/16 18:16	05/13/16 18:16	LRL
Wet Chemistry by Method 9056A	WG873772	1	05/20/16 04:02	05/20/16 04:02	SAM

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All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Chris McCord
Technical Service Representative

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	1730		15.9	200	20	05/17/2016 11:40	WG872631
Fluoride	5.61		0.261	1.00	1	05/19/2016 01:04	WG873240
Sulfate	7580		11.4	1000	20	05/17/2016 11:40	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	12200		1.41	10.0	1	05/14/2016 14:06	WG872357
Manganese	388		0.120	1.00	1	05/14/2016 14:06	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/18/2016 07:06	WG873092
(S) a,a,a-Trifluorotoluene(FID) 99.2				59.0-128		05/18/2016 07:06	WG873092

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 08:15	WG872230
Toluene	U		0.00217	0.0250	5	05/19/2016 08:15	WG872230
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 08:15	WG872230
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 08:15	WG872230
(S) Toluene-d8	105			88.7-115		05/19/2016 08:15	WG872230
(S) Dibromofluoromethane	103			76.3-123		05/19/2016 08:15	WG872230
(S) a,a,a-Trifluorotoluene	95.8			87.2-117		05/19/2016 08:15	WG872230
(S) 4-Bromofluorobenzene	96.7			69.7-129		05/19/2016 08:15	WG872230

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	7.31		1.61	4.00	1	05/17/2016 12:02	WG872902
C28-C40 Oil Range	3.15	J	0.274	4.00	1	05/17/2016 12:02	WG872902
(S) o-Terphenyl	91.8			50.0-150		05/17/2016 12:02	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 16:05	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 16:05	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 16:05	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 16:05	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 16:05	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 16:05	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 16:05	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 16:05	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 16:05	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 16:05	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 16:05	WG872189
(S) 2-Fluorophenol	67.0			21.1-116		05/18/2016 16:05	WG872189
(S) Phenol-d5	68.0			26.3-121		05/18/2016 16:05	WG872189
(S) Nitrobenzene-d5	83.5			21.9-129		05/18/2016 16:05	WG872189
(S) 2-Fluorobiphenyl	74.9			34.9-129		05/18/2016 16:05	WG872189



Collected date/time: 05/10/16 15:00

L835078

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	62.6			21.6-142		05/18/2016 16:05	WG872189
(S) p-Terphenyl-d14	63.6			21.5-128		05/18/2016 16:05	WG872189

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	1070		39.8	500	50	05/17/2016 12:04	WG872631
Fluoride	16.1		0.261	1.00	1	05/19/2016 01:52	WG873240
Sulfate	18300		28.5	2500	50	05/17/2016 12:04	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	7850		1.41	10.0	1	05/14/2016 14:08	WG872357
Manganese	162		0.120	1.00	1	05/14/2016 14:08	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/18/2016 09:12	WG873092
(S) a,a,a-Trifluorotoluene(FID) 98.8				59.0-128		05/18/2016 09:12	WG873092

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 08:37	WG872230
Toluene	U		0.00217	0.0250	5	05/19/2016 08:37	WG872230
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 08:37	WG872230
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 08:37	WG872230
(S) Toluene-d8	105			88.7-115		05/19/2016 08:37	WG872230
(S) Dibromofluoromethane	104			76.3-123		05/19/2016 08:37	WG872230
(S) a,a,a-Trifluorotoluene	95.5			87.2-117		05/19/2016 08:37	WG872230
(S) 4-Bromofluorobenzene	99.6			69.7-129		05/19/2016 08:37	WG872230

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 10:49	WG872902
C28-C40 Oil Range	U		0.274	4.00	1	05/17/2016 10:49	WG872902
(S) o-Terphenyl	98.1			50.0-150		05/17/2016 10:49	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 16:29	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 16:29	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 16:29	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 16:29	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 16:29	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 16:29	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 16:29	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 16:29	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 16:29	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 16:29	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 16:29	WG872189
(S) 2-Fluorophenol	57.1			21.1-116		05/18/2016 16:29	WG872189
(S) Phenol-d5	46.4			26.3-121		05/18/2016 16:29	WG872189
(S) Nitrobenzene-d5	64.5			21.9-129		05/18/2016 16:29	WG872189
(S) 2-Fluorobiphenyl	66.2			34.9-129		05/18/2016 16:29	WG872189



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	39.8			21.6-142		05/18/2016 16:29	WG872189
(S) p-Terphenyl-d14	39.6			21.5-128		05/18/2016 16:29	WG872189

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	1690		39.8	500	50	05/17/2016 12:28	WG872631
Fluoride	11.8		0.261	1.00	1	05/19/2016 02:16	WG873240
Sulfate	18300		28.5	2500	50	05/17/2016 12:28	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	2710		1.41	10.0	1	05/14/2016 14:17	WG872357
Manganese	64.7		0.120	1.00	1	05/14/2016 14:17	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/18/2016 09:35	WG873092
(S) a,a,a-Trifluorotoluene(FID)	99.0			59.0-128		05/18/2016 09:35	WG873092

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 09:00	WG872230
Toluene	U		0.00217	0.0250	5	05/19/2016 09:00	WG872230
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 09:00	WG872230
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 09:00	WG872230
(S) Toluene-d8	106			88.7-115		05/19/2016 09:00	WG872230
(S) Dibromofluoromethane	104			76.3-123		05/19/2016 09:00	WG872230
(S) a,a,a-Trifluorotoluene	96.3			87.2-117		05/19/2016 09:00	WG872230
(S) 4-Bromofluorobenzene	98.8			69.7-129		05/19/2016 09:00	WG872230

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 11:02	WG872902
C28-C40 Oil Range	U		0.274	4.00	1	05/17/2016 11:02	WG872902
(S) o-Terphenyl	95.4			50.0-150		05/17/2016 11:02	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 16:52	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 16:52	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 16:52	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 16:52	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 16:52	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 16:52	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 16:52	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 16:52	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 16:52	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 16:52	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 16:52	WG872189
(S) 2-Fluorophenol	64.9			21.1-116		05/18/2016 16:52	WG872189
(S) Phenol-d5	58.7			26.3-121		05/18/2016 16:52	WG872189
(S) Nitrobenzene-d5	64.9			21.9-129		05/18/2016 16:52	WG872189
(S) 2-Fluorobiphenyl	56.2			34.9-129		05/18/2016 16:52	WG872189



Collected date/time: 05/10/16 15:20

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Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	51.6			21.6-142		05/18/2016 16:52	WG872189
(S) p-Terphenyl-d14	46.8			21.5-128		05/18/2016 16:52	WG872189

- 1Cp
- 2Tc
- 3Ss
- 4Cn
- 5Sr
- 6Qc
- 7Gl
- 8Al
- 9Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	113		0.795	10.0	1	05/17/2016 06:29	WG872631
Fluoride	4.56		0.261	1.00	1	05/19/2016 02:40	WG873240
Sulfate	2590		5.70	500	10	05/17/2016 12:52	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	10500		1.41	10.0	1	05/14/2016 14:20	WG872357
Manganese	344		0.120	1.00	1	05/14/2016 14:20	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	0.255	J	0.108	0.500	5	05/18/2016 09:58	WG873092
(S) a,a,a-Trifluorotoluene(FID) 99.7				59.0-128		05/18/2016 09:58	WG873092

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 09:22	WG872230
Toluene	U		0.00217	0.0250	5	05/19/2016 09:22	WG872230
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 09:22	WG872230
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 09:22	WG872230
(S) Toluene-d8	106			88.7-115		05/19/2016 09:22	WG872230
(S) Dibromofluoromethane	103			76.3-123		05/19/2016 09:22	WG872230
(S) a,a,a-Trifluorotoluene	97.8			87.2-117		05/19/2016 09:22	WG872230
(S) 4-Bromofluorobenzene	100			69.7-129		05/19/2016 09:22	WG872230

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 11:50	WG872902
C28-C40 Oil Range	0.687	J	0.274	4.00	1	05/17/2016 11:50	WG872902
(S) o-Terphenyl	84.3			50.0-150		05/17/2016 11:50	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 17:15	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 17:15	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 17:15	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 17:15	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 17:15	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 17:15	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 17:15	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 17:15	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 17:15	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 17:15	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 17:15	WG872189
(S) 2-Fluorophenol	63.6			21.1-116		05/18/2016 17:15	WG872189
(S) Phenol-d5	67.5			26.3-121		05/18/2016 17:15	WG872189
(S) Nitrobenzene-d5	72.4			21.9-129		05/18/2016 17:15	WG872189
(S) 2-Fluorobiphenyl	77.4			34.9-129		05/18/2016 17:15	WG872189



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	71.5			21.6-142		05/18/2016 17:15	WG872189
(S) p-Terphenyl-d14	67.0			21.5-128		05/18/2016 17:15	WG872189

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	712		0.795	10.0	1	05/17/2016 06:53	WG872631
Fluoride	15.8		0.261	1.00	1	05/19/2016 03:04	WG873240
Sulfate	18300		28.5	2500	50	05/17/2016 13:16	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	5580		1.41	10.0	1	05/14/2016 14:23	WG872357
Manganese	70.6		0.120	1.00	1	05/14/2016 14:23	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/18/2016 10:21	WG873092
(S) a,a,a-Trifluorotoluene(FID) 99.0				59.0-128		05/18/2016 10:21	WG873092

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 15:29	WG873800
Toluene	U		0.00217	0.0250	5	05/19/2016 15:29	WG873800
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 15:29	WG873800
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 15:29	WG873800
(S) Toluene-d8	101			88.7-115		05/19/2016 15:29	WG873800
(S) Dibromofluoromethane	102			76.3-123		05/19/2016 15:29	WG873800
(S) a,a,a-Trifluorotoluene	101			87.2-117		05/19/2016 15:29	WG873800
(S) 4-Bromofluorobenzene	101			69.7-129		05/19/2016 15:29	WG873800

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 11:14	WG872902
C28-C40 Oil Range	U		0.274	4.00	1	05/17/2016 11:14	WG872902
(S) o-Terphenyl	96.4			50.0-150		05/17/2016 11:14	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 17:39	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 17:39	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 17:39	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 17:39	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 17:39	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 17:39	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 17:39	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 17:39	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 17:39	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 17:39	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 17:39	WG872189
(S) 2-Fluorophenol	59.4			21.1-116		05/18/2016 17:39	WG872189
(S) Phenol-d5	58.8			26.3-121		05/18/2016 17:39	WG872189
(S) Nitrobenzene-d5	64.1			21.9-129		05/18/2016 17:39	WG872189
(S) 2-Fluorobiphenyl	56.5			34.9-129		05/18/2016 17:39	WG872189



Collected date/time: 05/10/16 16:30

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Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
(S) 2,4,6-Tribromophenol	58.0			21.6-142		05/18/2016 17:39	WG872189
(S) p-Terphenyl-d14	66.9			21.5-128		05/18/2016 17:39	WG872189

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	712		0.795	10.0	1	05/17/2016 07:17	WG872631
Fluoride	8.01		0.261	1.00	1	05/19/2016 04:16	WG873240
Sulfate	17200		28.5	2500	50	05/17/2016 13:40	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	2880		1.41	10.0	1	05/14/2016 14:26	WG872357
Manganese	80.3		0.120	1.00	1	05/14/2016 14:26	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U	J3 J6	0.108	0.500	5	05/18/2016 20:23	WG873220
(S) a,a,a-Trifluorotoluene(FID) 99.8				59.0-128		05/18/2016 20:23	WG873220

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 15:53	WG873800
Toluene	U		0.00217	0.0250	5	05/19/2016 15:53	WG873800
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 15:53	WG873800
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 15:53	WG873800
(S) Toluene-d8	103			88.7-115		05/19/2016 15:53	WG873800
(S) Dibromofluoromethane	103			76.3-123		05/19/2016 15:53	WG873800
(S) a,a,a-Trifluorotoluene	100			87.2-117		05/19/2016 15:53	WG873800
(S) 4-Bromofluorobenzene	101			69.7-129		05/19/2016 15:53	WG873800

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 11:26	WG872902
C28-C40 Oil Range	U		0.274	4.00	1	05/17/2016 11:26	WG872902
(S) o-Terphenyl	102			50.0-150		05/17/2016 11:26	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 18:02	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 18:02	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 18:02	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 18:02	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 18:02	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 18:02	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 18:02	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 18:02	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 18:02	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 18:02	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 18:02	WG872189
(S) 2-Fluorophenol	45.8			21.1-116		05/18/2016 18:02	WG872189
(S) Phenol-d5	45.5			26.3-121		05/18/2016 18:02	WG872189
(S) Nitrobenzene-d5	52.8			21.9-129		05/18/2016 18:02	WG872189
(S) 2-Fluorobiphenyl	48.0			34.9-129		05/18/2016 18:02	WG872189



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	44.1			21.6-142		05/18/2016 18:02	WG872189
(S) p-Terphenyl-d14	42.5			21.5-128		05/18/2016 18:02	WG872189

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	899		0.795	10.0	1	05/17/2016 09:36	WG872631
Fluoride	11.2		0.261	1.00	1	05/19/2016 04:40	WG873240
Sulfate	18200		28.5	2500	50	05/17/2016 14:04	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	3950		1.41	10.0	1	05/14/2016 14:29	WG872357
Manganese	95.4		0.120	1.00	1	05/14/2016 14:29	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/18/2016 20:46	WG873220
(S) a,a,a-Trifluorotoluene(FID) 99.5				59.0-128		05/18/2016 20:46	WG873220

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 16:17	WG873800
Toluene	U		0.00217	0.0250	5	05/19/2016 16:17	WG873800
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 16:17	WG873800
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 16:17	WG873800
(S) Toluene-d8	106			88.7-115		05/19/2016 16:17	WG873800
(S) Dibromofluoromethane	98.9			76.3-123		05/19/2016 16:17	WG873800
(S) a,a,a-Trifluorotoluene	105			87.2-117		05/19/2016 16:17	WG873800
(S) 4-Bromofluorobenzene	99.8			69.7-129		05/19/2016 16:17	WG873800

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 11:38	WG872902
C28-C40 Oil Range	U		0.274	4.00	1	05/17/2016 11:38	WG872902
(S) o-Terphenyl	94.5			50.0-150		05/17/2016 11:38	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/20/2016 12:33	WG873908
2-Chlorophenol	U	J3	0.00831	0.333	1	05/20/2016 12:33	WG873908
2,4-Dichlorophenol	U		0.00746	0.333	1	05/20/2016 12:33	WG873908
2,4-Dimethylphenol	U		0.0471	0.333	1	05/20/2016 12:33	WG873908
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/20/2016 12:33	WG873908
2,4-Dinitrophenol	U		0.0980	0.333	1	05/20/2016 12:33	WG873908
2-Nitrophenol	U		0.0130	0.333	1	05/20/2016 12:33	WG873908
4-Nitrophenol	U		0.0525	0.333	1	05/20/2016 12:33	WG873908
Pentachlorophenol	U		0.0480	0.333	1	05/20/2016 12:33	WG873908
Phenol	U		0.00695	0.333	1	05/20/2016 12:33	WG873908
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/20/2016 12:33	WG873908
(S) 2-Fluorophenol	77.5			21.1-116		05/20/2016 12:33	WG873908
(S) Phenol-d5	72.1			26.3-121		05/20/2016 12:33	WG873908
(S) Nitrobenzene-d5	67.2			21.9-129		05/20/2016 12:33	WG873908
(S) 2-Fluorobiphenyl	75.7			34.9-129		05/20/2016 12:33	WG873908



Collected date/time: 05/10/16 16:55

L835078

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
(S) 2,4,6-Tribromophenol	64.1			21.6-142		05/20/2016 12:33	WG873908
(S) p-Terphenyl-d14	64.6			21.5-128		05/20/2016 12:33	WG873908

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	0.244	J	0.0519	1.00	1	05/20/2016 04:02	WG873772
Fluoride	U		0.00990	0.100	1	05/20/2016 04:02	WG873772
Sulfate	0.269	J	0.0774	5.00	1	05/20/2016 04:02	WG873772

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Iron	0.0241	B J	0.0141	0.100	1	05/16/2016 15:27	WG872401
Manganese	U		0.00120	0.0100	1	05/16/2016 15:27	WG872401

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
TPH (GC/FID) Low Fraction	U		0.0314	0.100	1	05/17/2016 19:24	WG872916
(S) a,a,a-Trifluorotoluene(FID) 94.6				62.0-128		05/17/2016 19:24	WG872916

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Benzene	0.000509	J	0.000331	0.00100	1	05/13/2016 18:16	WG872248
Toluene	U		0.000780	0.00500	1	05/13/2016 18:16	WG872248
Ethylbenzene	U		0.000384	0.00100	1	05/13/2016 18:16	WG872248
Total Xylenes	U		0.00106	0.00300	1	05/13/2016 18:16	WG872248
(S) Toluene-d8	105			90.0-115		05/13/2016 18:16	WG872248
(S) Dibromofluoromethane	106			79.0-121		05/13/2016 18:16	WG872248
(S) a,a,a-Trifluorotoluene	98.5			90.4-116		05/13/2016 18:16	WG872248
(S) 4-Bromofluorobenzene	102			80.1-120		05/13/2016 18:16	WG872248

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
C10-C28 Diesel Range	0.0358	J	0.0222	0.100	1	05/15/2016 10:41	WG872369
C28-C40 Oil Range	U		0.0118	0.100	1	05/15/2016 10:41	WG872369
(S) o-Terphenyl	109			50.0-150		05/15/2016 10:41	WG872369

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
4-Chloro-3-methylphenol	U	J4	0.000263	0.0100	1	05/15/2016 18:23	WG872427
2-Chlorophenol	U		0.000283	0.0100	1	05/15/2016 18:23	WG872427
2,4-Dichlorophenol	U		0.000284	0.0100	1	05/15/2016 18:23	WG872427
2,4-Dimethylphenol	U		0.000624	0.0100	1	05/15/2016 18:23	WG872427
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100	1	05/15/2016 18:23	WG872427
2,4-Dinitrophenol	U		0.00325	0.0100	1	05/15/2016 18:23	WG872427
2-Nitrophenol	U		0.000320	0.0100	1	05/15/2016 18:23	WG872427
4-Nitrophenol	U		0.00201	0.0100	1	05/15/2016 18:23	WG872427
Pentachlorophenol	U		0.000313	0.0100	1	05/15/2016 18:23	WG872427
Phenol	U	J4	0.000334	0.0100	1	05/15/2016 18:23	WG872427
2,4,6-Trichlorophenol	U		0.000297	0.0100	1	05/15/2016 18:23	WG872427
(S) 2-Fluorophenol	71.8			10.0-77.9		05/15/2016 18:23	WG872427
(S) Phenol-d5	58.8			5.00-70.1		05/15/2016 18:23	WG872427
(S) Nitrobenzene-d5	82.5			21.8-123		05/15/2016 18:23	WG872427
(S) 2-Fluorobiphenyl	79.0			29.5-131		05/15/2016 18:23	WG872427



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	51.3			11.2-130		05/15/2016 18:23	WG872427
(S) p-Terphenyl-d14	91.0			29.3-137		05/15/2016 18:23	WG872427

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc



Method Blank (MB)

(MB) R3137464-1 05/16/16 20:07

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Chloride	U		0.795	10.0
Sulfate	U		0.57	50.0

L835458-01 Original Sample (OS) • Duplicate (DUP)

(OS) L835458-01 05/16/16 22:07 • (DUP) R3137464-4 05/16/16 22:30

	Original Result (dry)	DUP Result (dry)	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Chloride	15.8	17.1	1	8		15
Sulfate	ND	2.85	1	0		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137464-2 05/16/16 20:31 • (LCSD) R3137464-3 05/16/16 20:55

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Chloride	200	192	192	96	96	80-120			0	15
Sulfate	200	194	195	97	97	80-120			0	15

L834994-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L834994-01 05/17/16 03:18 • (MS) R3137464-5 05/17/16 03:42 • (MSD) R3137464-6 05/17/16 04:06

	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Chloride	559	13.1	595	564	104	99	1	80-120			5	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3138282-1 05/18/16 23:05

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Fluoride	U		0.261	1.00

L835078-01 Original Sample (OS) • Duplicate (DUP)

(OS) L835078-01 05/19/16 01:04 • (DUP) R3138282-4 05/19/16 01:28

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Fluoride	5.61	5.53	1	1		15

L835938-02 Original Sample (OS) • Duplicate (DUP)

(OS) L835938-02 05/19/16 09:16 • (DUP) R3138282-5 05/19/16 09:50

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Fluoride	6.25	7.86	1	23	J3	15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138282-2 05/18/16 23:28 • (LCSD) R3138282-3 05/18/16 23:52

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Fluoride	20.0	19.9	20.0	100	100	80-120			0	15

L835938-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835938-03 05/19/16 10:14 • (MS) R3138282-6 05/19/16 11:26 • (MSD) R3138282-7 05/19/16 11:50

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Fluoride	50.0	5.27	36.6	33.9	63	57	1	80-120	J6	J6	7	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3138709-1 05/19/16 20:49

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.0099	0.100
Sulfate	U		0.0774	5.00

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L834614-04 Original Sample (OS) • Duplicate (DUP)

(OS) L834614-04 05/20/16 02:49 • (DUP) R3138709-5 05/20/16 03:04

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	1.51	1.52	1	0		15
Fluoride	ND	0.0592	1	0		15
Sulfate	18.1	18.1	1	0		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138709-2 05/19/16 21:03 • (LCSD) R3138709-3 05/19/16 21:18

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chloride	40.0	39.2	39.2	98	98	80-120			0	15
Fluoride	8.00	7.89	7.89	99	99	80-120			0	15
Sulfate	40.0	39.6	39.6	99	99	80-120			0	15

L834185-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L834185-02 05/20/16 00:54 • (MS) R3138709-4 05/20/16 01:09

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	40.1	92.4	104	1	80-120	
Fluoride	5.00	0.558	5.88	106	1	80-120	
Sulfate	50.0	6.65	60.4	107	1	80-120	



L834409-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L834409-03 05/20/16 04:45 • (MS) R3138709-6 05/20/16 04:59 • (MSD) R3138709-7 05/20/16 05:14

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Chloride	50.0	31.0	80.0	81.0	98	100	1	80-120			1	15
Fluoride	5.00	ND	5.21	5.34	102	105	1	80-120			2	15
Sulfate	50.0	ND	53.0	53.9	101	103	1	80-120			2	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3136806-1 05/14/16 13:43

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Iron	1.56	U	1.41	10.0
Manganese	U		0.12	1.00

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3136806-2 05/14/16 13:46 • (LCSD) R3136806-3 05/14/16 13:48

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Iron	1000	937	924	94	92	80-120			1	20
Manganese	100	93.2	92.0	93	92	80-120			1	20

L835281-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835281-01 05/14/16 13:51 • (MS) R3136806-6 05/14/16 14:00 • (MSD) R3136806-7 05/14/16 14:03

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Iron	1090	20800	20900	23500	15	254	1	75-125	V	V	12	20
Manganese	109	608	701	714	85	97	1	75-125			2	20



Method Blank (MB)

(MB) R3137224-7 05/16/16 19:15

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Iron	0.0473	J	0.0141	0.100
Manganese	U		0.0012	0.0100

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137224-8 05/16/16 19:17 • (LCSD) R3137224-9 05/16/16 19:20

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Iron	10.0	10.2	10.3	102	103	80-120			1	20
Manganese	1.00	0.997	1.00	100	100	80-120			1	20

L835100-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835100-04 05/16/16 19:23 • (MS) R3137224-11 05/16/16 19:28 • (MSD) R3137224-12 05/16/16 19:31

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Iron	10.0	0.0740	10.3	10.3	102	102	1	75-125			0	20
Manganese	1.00	0.00612	1.02	1.02	102	101	1	75-125			1	20



Method Blank (MB)

(MB) R3137716-5 05/17/16 12:58

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
TPH (GC/FID) Low Fraction	0.0333	⬇	0.0314	0.100
(S) a,a,a-Trifluorotoluene(FID) 94.7				62.0-128

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137716-3 05/17/16 11:43 • (LCSD) R3137716-4 05/17/16 12:06

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	5.24	5.58	95.3	101	67.0-132			6.28	20
(S) a,a,a-Trifluorotoluene(FID)				104	104	62.0-128				

L835661-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835661-01 05/17/16 17:33 • (MS) R3137716-8 05/17/16 16:27 • (MSD) R3137716-9 05/17/16 16:49

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	ND	5.49	5.50	99.1	99.3	1	50.0-143			0.200	20
(S) a,a,a-Trifluorotoluene(FID)					103	104		62.0-128				



Method Blank (MB)

(MB) R3137718-3 05/18/16 01:00

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	99.8			59.0-128

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137718-1 05/17/16 23:52 • (LCSD) R3137718-2 05/18/16 00:14

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
TPH (GC/FID) Low Fraction	5.50	6.45	6.44	117	117	63.5-137			0.140	20
(S) a,a,a-Trifluorotoluene(FID)				99.0	99.6	59.0-128				

L835078-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835078-04 05/18/16 09:58 • (MS) R3137718-4 05/18/16 01:46 • (MSD) R3137718-5 05/18/16 02:09

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
TPH (GC/FID) Low Fraction	5.50	0.255	18.3	14.9	65.7	53.1	5	28.5-138			20.9	23.6
(S) a,a,a-Trifluorotoluene(FID)					96.5	97.4		59.0-128				



Method Blank (MB)

(MB) R3138234-3 05/18/16 17:50

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID) 100				59.0-128

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138234-1 05/18/16 16:42 • (LCSD) R3138234-2 05/18/16 17:04

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	5.59	6.61	102	120	63.5-137			16.8	20
(S) a,a,a-Trifluorotoluene(FID)				99.3	99.1	59.0-128				

L835078-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835078-06 05/18/16 20:23 • (MS) R3138234-4 05/18/16 19:15 • (MSD) R3138234-5 05/18/16 19:38

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	U	4.61	9.33	16.8	33.9	5	28.5-138	J6	J3	67.8	23.6
(S) a,a,a-Trifluorotoluene(FID)					98.4	98.4		59.0-128				



Method Blank (MB)

(MB) R3138213-3 05/19/16 01:28

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000270	0.00100
Ethylbenzene	U		0.000297	0.00100
Toluene	U		0.000434	0.00500
Xylenes, Total	U		0.000698	0.00300
(S) Toluene-d8	105			88.7-115
(S) Dibromofluoromethane	101			76.3-123
(S) a,a,a-Trifluorotoluene	94.8			87.2-117
(S) 4-Bromofluorobenzene	100			69.7-129

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138213-1 05/18/16 23:58 • (LCSD) R3138213-2 05/19/16 00:21

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0232	0.0234	92.7	93.6	72.6-120			1.03	20
Ethylbenzene	0.0250	0.0248	0.0244	99.2	97.6	78.6-124			1.62	20
Toluene	0.0250	0.0243	0.0247	97.2	98.7	76.7-116			1.52	20
Xylenes, Total	0.0750	0.0724	0.0729	96.5	97.1	78.1-123			0.620	20
(S) Toluene-d8				105	106	88.7-115				
(S) Dibromofluoromethane				103	103	76.3-123				
(S) a,a,a-Trifluorotoluene				95.8	96.3	87.2-117				
(S) 4-Bromofluorobenzene				102	101	69.7-129				

L835057-12 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835057-12 05/19/16 03:21 • (MS) R3138213-4 05/19/16 02:13 • (MSD) R3138213-5 05/19/16 02:36

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	ND	0.0727	0.122	58.2	97.3	5	47.8-131		J3	50.4	22.8
Ethylbenzene	0.0250	ND	0.0847	0.121	67.8	97.1	5	44.8-135		J3	35.6	26.9
Toluene	0.0250	ND	0.0832	0.122	66.5	97.9	5	47.8-127		J3	38.1	24.3
Xylenes, Total	0.0750	ND	0.253	0.362	67.6	96.6	5	42.7-135		J3	35.4	26.6
(S) Toluene-d8					104	103		88.7-115				
(S) Dibromofluoromethane					102	104		76.3-123				
(S) a,a,a-Trifluorotoluene					95.0	94.8		87.2-117				
(S) 4-Bromofluorobenzene					98.2	99.3		69.7-129				

Method Blank (MB)

(MB) R3138352-3 05/19/16 10:31

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000270	0.00100
Ethylbenzene	U		0.000297	0.00100
Toluene	U		0.000434	0.00500
Xylenes, Total	U		0.000698	0.00300
(S) Toluene-d8	105			88.7-115
(S) Dibromofluoromethane	95.5			76.3-123
(S) a,a,a-Trifluorotoluene	106			87.2-117
(S) 4-Bromofluorobenzene	103			69.7-129

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138352-1 05/19/16 08:30 • (LCSD) R3138352-2 05/19/16 08:54

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0228	0.0223	91.1	89.3	72.6-120			2.05	20
Ethylbenzene	0.0250	0.0259	0.0253	103	101	78.6-124			2.09	20
Toluene	0.0250	0.0229	0.0232	91.6	92.9	76.7-116			1.39	20
Xylenes, Total	0.0750	0.0751	0.0738	100	98.4	78.1-123			1.75	20
(S) Toluene-d8				105	106	88.7-115				
(S) Dibromofluoromethane				99.3	96.4	76.3-123				
(S) a,a,a-Trifluorotoluene				105	107	87.2-117				
(S) 4-Bromofluorobenzene				102	103	69.7-129				

L835074-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835074-10 05/19/16 14:41 • (MS) R3138352-6 05/19/16 12:16 • (MSD) R3138352-7 05/19/16 12:40

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0336	ND	1.40	1.36	90.6	87.5	45	47.8-131			3.33	22.8
Ethylbenzene	0.0336	ND	1.38	1.33	87.5	84.4	45	44.8-135			3.38	26.9
Toluene	0.0336	ND	1.40	1.37	90.6	88.7	45	47.8-127			2.13	24.3
Xylenes, Total	0.101	1.60	5.48	5.40	85.5	83.9	45	42.7-135			1.35	26.6
(S) Toluene-d8					104	104		88.7-115				
(S) Dibromofluoromethane					101	98.8		76.3-123				
(S) a,a,a-Trifluorotoluene					102	104		87.2-117				



L835074-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835074-10 05/19/16 14:41 • (MS) R3138352-6 05/19/16 12:16 • (MSD) R3138352-7 05/19/16 12:40

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
(S) 4-Bromofluorobenzene					95.1	99.8		69.7-129				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3136703-3 05/13/16 13:23

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.000331	0.00100
Ethylbenzene	U		0.000384	0.00100
Toluene	U		0.000780	0.00500
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	105			90.0-115
(S) Dibromofluoromethane	105			79.0-121
(S) a,a,a-Trifluorotoluene	98.8			90.4-116
(S) 4-Bromofluorobenzene	101			80.1-120

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3136703-1 05/13/16 12:14 • (LCSD) R3136703-2 05/13/16 12:31

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0259	0.0255	103	102	73.0-122			1.27	20
Ethylbenzene	0.0250	0.0260	0.0246	104	98.2	80.9-121			5.57	20
Toluene	0.0250	0.0264	0.0251	105	100	77.9-116			5.02	20
Xylenes, Total	0.0750	0.0786	0.0747	105	99.6	79.2-122			5.11	20
(S) Toluene-d8				105	104	90.0-115				
(S) Dibromofluoromethane				102	106	79.0-121				
(S) a,a,a-Trifluorotoluene				99.7	99.5	90.4-116				
(S) 4-Bromofluorobenzene				97.8	98.1	80.1-120				

L835078-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835078-08 05/13/16 18:16 • (MS) R3136703-4 05/13/16 18:33 • (MSD) R3136703-5 05/13/16 18:50

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.000509	0.0233	0.0247	91.1	96.9	1	58.6-133			6.06	20
Ethylbenzene	0.0250	U	0.0217	0.0232	86.9	92.7	1	62.7-136			6.45	20
Toluene	0.0250	U	0.0224	0.0240	89.4	95.8	1	67.8-124			6.96	20
Xylenes, Total	0.0750	U	0.0658	0.0704	87.8	93.9	1	65.6-133			6.70	20
(S) Toluene-d8					104	106		90.0-115				
(S) Dibromofluoromethane					106	108		79.0-121				
(S) a,a,a-Trifluorotoluene					97.8	102		90.4-116				
(S) 4-Bromofluorobenzene					98.4	98.0		80.1-120				



Method Blank (MB)

(MB) R3139237-1 05/15/16 09:51

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
C10-C28 Diesel Range	U		0.0222	0.100
C28-C40 Oil Range	U		0.0118	0.100
(S) o-Terphenyl	112			50.0-150

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3139237-2 05/15/16 10:07 • (LCSD) R3139237-3 05/15/16 10:24

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	1.50	1.53	1.54	102	102	70.0-130			0.680	20
(S) o-Terphenyl				110	117	50.0-150				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3137450-1 05/17/16 10:13

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	103			50.0-150

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137450-2 05/17/16 10:25 • (LCSD) R3137450-3 05/17/16 10:37

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	48.2	52.7	80.3	87.9	50.0-100			9.05	20
(S) o-Terphenyl				93.1	93.4	50.0-150				

L835078-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835078-01 05/17/16 12:02 • (MS) R3137450-4 05/17/16 12:15 • (MSD) R3137450-5 05/17/16 12:27

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	7.31	57.8	64.7	84.1	95.7	1	50.0-100			11.4	20
(S) o-Terphenyl					72.6	68.2		50.0-150				

Method Blank (MB)

(MB) R3138162-3 05/18/16 13:22

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
4-Chloro-3-methylphenol	U		0.00477	0.333
2-Chlorophenol	U		0.00831	0.333
2,4-Dichlorophenol	U		0.00746	0.333
2,4-Dimethylphenol	U		0.0471	0.333
4,6-Dinitro-2-methylphenol	U		0.124	0.333
2,4-Dinitrophenol	U		0.0980	0.333
2-Nitrophenol	U		0.0130	0.333
4-Nitrophenol	U		0.0525	0.333
Pentachlorophenol	U		0.0480	0.333
Phenol	U		0.00695	0.333
2,4,6-Trichlorophenol	U		0.00779	0.333
(S) Nitrobenzene-d5	80.9			21.9-129
(S) 2-Fluorobiphenyl	83.1			34.9-129
(S) p-Terphenyl-d14	85.7			21.5-128
(S) Phenol-d5	80.4			26.3-121
(S) 2-Fluorophenol	74.3			21.1-116
(S) 2,4,6-Tribromophenol	74.1			21.6-142

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138162-1 05/18/16 12:35 • (LCSD) R3138162-2 05/18/16 12:58

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.667	0.587	0.686	88.0	103	51.1-113			15.6	20
2-Chlorophenol	0.667	0.469	0.525	70.3	78.7	40.8-103			11.3	20
2,4-Dichlorophenol	0.667	0.551	0.617	82.6	92.5	46.2-109			11.3	20
2,4-Dimethylphenol	0.667	0.557	0.647	83.6	97.1	42.2-110			15.0	20
4,6-Dinitro-2-methylphenol	0.667	0.536	0.586	80.3	87.8	23.1-119			8.86	23.7
2,4-Dinitrophenol	0.667	0.332	0.345	49.8	51.7	10.0-105			3.82	36.5
2-Nitrophenol	0.667	0.532	0.620	79.7	93.0	44.2-113			15.3	20.9
4-Nitrophenol	0.667	0.538	0.600	80.7	90.0	34.8-109			10.9	20
Pentachlorophenol	0.667	0.550	0.574	82.5	86.1	16.2-102			4.25	22.9
Phenol	0.667	0.497	0.599	74.6	89.8	41.5-106			18.5	20
2,4,6-Trichlorophenol	0.667	0.565	0.620	84.7	93.0	44.4-108			9.39	20
(S) Nitrobenzene-d5				86.7	99.9	21.9-129				
(S) 2-Fluorobiphenyl				83.6	94.3	34.9-129				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138162-1 05/18/16 12:35 • (LCSD) R3138162-2 05/18/16 12:58

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
(S) p-Terphenyl-d14				81.3	84.5	21.5-128				
(S) Phenol-d5				74.6	82.2	26.3-121				
(S) 2-Fluorophenol				71.3	82.1	21.1-116				
(S) 2,4,6-Tribromophenol				83.7	84.4	21.6-142				

L835035-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835035-10 05/19/16 12:00 • (MS) R3138313-1 05/19/16 12:24 • (MSD) R3138313-2 05/19/16 12:47

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.142	U	0.632	0.663	89.0	93.4	5	27.0-154			4.76	26.6
2-Chlorophenol	0.142	U	0.524	0.563	73.8	79.2	5	33.2-121			7.06	29.3
2,4-Dichlorophenol	0.142	U	0.634	0.639	89.2	90.0	5	34.8-134			0.890	27.3
2,4-Dimethylphenol	0.142	U	0.638	0.651	89.9	91.7	5	12.3-149			2.00	32.3
4,6-Dinitro-2-methylphenol	0.142	U	ND	ND	0.000	0.000	5	10.0-144	J6	J6	0.000	32.7
2,4-Dinitrophenol	0.142	U	ND	ND	0.000	0.000	5	10.0-121	J6	J6	0.000	39.4
2-Nitrophenol	0.142	U	0.636	0.652	89.5	91.8	5	29.5-144			2.53	29.9
4-Nitrophenol	0.142	U	0.586	0.569	82.6	80.1	5	20.0-133			3.03	30.2
Pentachlorophenol	0.142	U	0.655	0.671	92.3	94.5	5	10.0-139			2.43	28.3
Phenol	0.142	U	0.565	0.644	79.5	90.7	5	25.1-130			13.1	29.6
2,4,6-Trichlorophenol	0.142	U	0.633	0.675	89.1	95.1	5	33.8-133			6.52	28.1
(S) Nitrobenzene-d5					86.3	94.0		21.9-129				
(S) 2-Fluorobiphenyl					83.0	81.1		34.9-129				
(S) p-Terphenyl-d14					82.2	60.4		21.5-128				
(S) Phenol-d5					80.2	86.0		26.3-121				
(S) 2-Fluorophenol					78.2	82.9		21.1-116				
(S) 2,4,6-Tribromophenol					80.1	84.2		21.6-142				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3138667-3 05/20/16 10:56

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
4-Chloro-3-methylphenol	U		0.00477	0.333
2-Chlorophenol	U		0.00831	0.333
2,4-Dichlorophenol	U		0.00746	0.333
2,4-Dimethylphenol	U		0.0471	0.333
4,6-Dinitro-2-methylphenol	U		0.124	0.333
2,4-Dinitrophenol	U		0.0980	0.333
2-Nitrophenol	U		0.0130	0.333
4-Nitrophenol	U		0.0525	0.333
Pentachlorophenol	U		0.0480	0.333
Phenol	U		0.00695	0.333
2,4,6-Trichlorophenol	U		0.00779	0.333
(S) Nitrobenzene-d5	61.8			21.9-129
(S) 2-Fluorobiphenyl	61.7			34.9-129
(S) p-Terphenyl-d14	68.7			21.5-128
(S) Phenol-d5	70.1			26.3-121
(S) 2-Fluorophenol	64.2			21.1-116
(S) 2,4,6-Tribromophenol	52.9			21.6-142

Cp

Tc

Ss

Cn

Sr

Qc

Gl

Al

Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138667-1 05/20/16 10:08 • (LCSD) R3138667-2 05/20/16 10:32

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.667	0.451	0.496	67.7	74.4	51.1-113			9.51	20
2-Chlorophenol	0.667	0.345	0.432	51.7	64.8	40.8-103		J3	22.6	20
2,4-Dichlorophenol	0.667	0.452	0.451	67.8	67.5	46.2-109			0.350	20
2,4-Dimethylphenol	0.667	0.420	0.451	62.9	67.6	42.2-110			7.12	20
4,6-Dinitro-2-methylphenol	0.667	0.457	0.470	68.5	70.5	23.1-119			2.97	23.7
2,4-Dinitrophenol	0.667	0.430	0.404	64.5	60.6	10.0-105			6.29	36.5
2-Nitrophenol	0.667	0.421	0.463	63.1	69.4	44.2-113			9.50	20.9
4-Nitrophenol	0.667	0.393	0.365	58.9	54.7	34.8-109			7.41	20
Pentachlorophenol	0.667	0.517	0.487	77.5	73.0	16.2-102			5.87	22.9
Phenol	0.667	0.367	0.442	55.0	66.3	41.5-106			18.6	20
2,4,6-Trichlorophenol	0.667	0.512	0.479	76.8	71.8	44.4-108			6.68	20
(S) Nitrobenzene-d5				59.1	63.6	21.9-129				
(S) 2-Fluorobiphenyl				69.2	60.8	34.9-129				



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138667-1 05/20/16 10:08 • (LCSD) R3138667-2 05/20/16 10:32

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
(S) p-Terphenyl-d14				65.8	64.2	21.5-128				
(S) Phenol-d5				56.0	67.8	26.3-121				
(S) 2-Fluorophenol				59.1	73.1	21.1-116				
(S) 2,4,6-Tribromophenol				57.7	55.4	21.6-142				

L835349-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835349-02 05/20/16 13:46 • (MS) R3138667-4 05/20/16 14:10 • (MSD) R3138667-5 05/20/16 14:34

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.767	U	0.592	0.713	77.2	93.1	1	27.0-154			18.6	26.6
2-Chlorophenol	0.767	U	0.450	0.513	58.8	67.0	1	33.2-121			13.1	29.3
2,4-Dichlorophenol	0.767	U	0.536	0.619	70.0	80.7	1	34.8-134			14.3	27.3
2,4-Dimethylphenol	0.767	U	0.502	0.634	65.4	82.8	1	12.3-149			23.4	32.3
4,6-Dinitro-2-methylphenol	0.767	U	0.558	0.641	72.8	83.6	1	10.0-144			13.8	32.7
2,4-Dinitrophenol	0.767	U	0.495	0.577	64.6	75.2	1	10.0-121			15.2	39.4
2-Nitrophenol	0.767	U	0.523	0.563	68.3	73.4	1	29.5-144			7.26	29.9
4-Nitrophenol	0.767	U	0.493	0.569	64.3	74.2	1	20.0-133			14.3	30.2
Pentachlorophenol	0.767	U	0.648	0.726	84.5	94.7	1	10.0-139			11.4	28.3
Phenol	0.767	U	0.581	0.646	75.8	84.3	1	25.1-130			10.6	29.6
2,4,6-Trichlorophenol	0.767	U	0.602	0.649	78.5	84.6	1	33.8-133			7.56	28.1
(S) Nitrobenzene-d5					67.5	80.4		21.9-129				
(S) 2-Fluorobiphenyl					59.8	65.2		34.9-129				
(S) p-Terphenyl-d14					47.5	54.0		21.5-128				
(S) Phenol-d5					63.4	68.3		26.3-121				
(S) 2-Fluorophenol					66.7	73.0		21.1-116				
(S) 2,4,6-Tribromophenol					68.4	64.6		21.6-142				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3136946-3 05/15/16 16:02

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
4-Chloro-3-methylphenol	U		0.000263	0.0100
2-Chlorophenol	U		0.000283	0.0100
2,4-Dichlorophenol	U		0.000284	0.0100
2,4-Dimethylphenol	U		0.000624	0.0100
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100
2,4-Dinitrophenol	U		0.00325	0.0100
2-Nitrophenol	U		0.000320	0.0100
4-Nitrophenol	U		0.00201	0.0100
Pentachlorophenol	U		0.000313	0.0100
Phenol	U		0.000334	0.0100
2,4,6-Trichlorophenol	U		0.000297	0.0100
(S) Nitrobenzene-d5	85.3			21.8-123
(S) 2-Fluorobiphenyl	75.7			29.5-131
(S) p-Terphenyl-d14	88.4			29.3-137
(S) Phenol-d5	53.1			5.00-70.1
(S) 2-Fluorophenol	72.7			10.0-77.9
(S) 2,4,6-Tribromophenol	44.8			11.2-130

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3136946-1 05/15/16 15:16 • (LCSD) R3136946-2 05/15/16 15:39

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.0500	0.0516	0.0536	103	107	35.7-100	J4	J4	3.90	22.9
2-Chlorophenol	0.0500	0.0350	0.0353	70.1	70.6	26.2-91.5			0.760	26.5
2,4-Dichlorophenol	0.0500	0.0414	0.0421	82.8	84.1	31.4-103			1.56	24.9
2,4-Dimethylphenol	0.0500	0.0402	0.0453	80.3	90.6	31.9-107			12.0	25.7
4,6-Dinitro-2-methylphenol	0.0500	0.0450	0.0490	89.9	98.1	18.4-148			8.69	24.4
2,4-Dinitrophenol	0.0500	0.0286	0.0321	57.1	64.3	24.2-128			11.8	20.5
2-Nitrophenol	0.0500	0.0429	0.0419	85.7	83.9	25.9-106			2.18	26.9
4-Nitrophenol	0.0500	0.0259	0.0255	51.9	50.9	10.0-52.7			1.86	40
Pentachlorophenol	0.0500	0.0325	0.0346	65.0	69.1	10.0-97.4			6.22	35.1
Phenol	0.0500	0.0280	0.0295	55.9	59.1	10.0-57.9		J4	5.49	35
2,4,6-Trichlorophenol	0.0500	0.0418	0.0443	83.7	88.6	29.8-107			5.71	24.1
(S) Nitrobenzene-d5				93.0	96.0	21.8-123				
(S) 2-Fluorobiphenyl				80.1	80.5	29.5-131				



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3136946-1 05/15/16 15:16 • (LCSD) R3136946-2 05/15/16 15:39

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
(S) p-Terphenyl-d14				88.1	101	29.3-137				
(S) Phenol-d5				55.5	52.7	5.00-70.1				
(S) 2-Fluorophenol				66.2	67.0	10.0-77.9				
(S) 2,4,6-Tribromophenol				62.1	62.8	11.2-130				

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND,U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.
SDL	Sample Detection Limit.
MQL	Method Quantitation Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
V	The sample concentration is too high to evaluate accurate spike recoveries.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina ¹	DW21704
Florida	E87487	North Carolina ²	41
Georgia	NELAP	North Dakota	R-140
Georgia ¹	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky ¹	90010	South Dakota	n/a
Kentucky ²	16	Tennessee ¹⁴	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

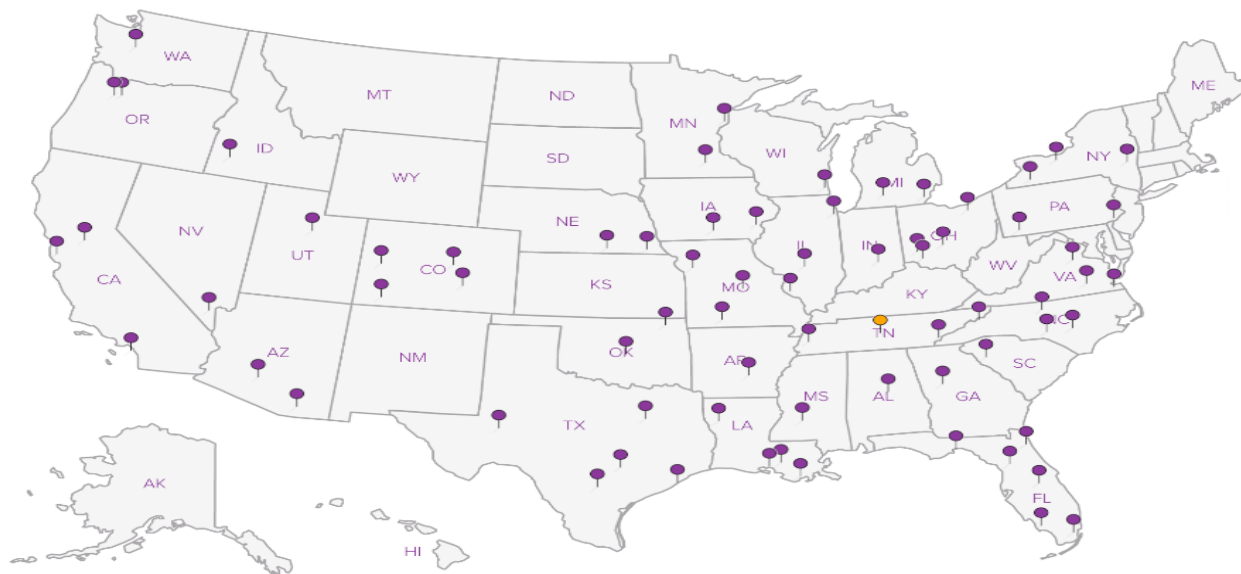
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ^{n/a} Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



AMEC Foster Wheeler - Houston, TX

585 N. Dairy Ashford
Houston, TX 77079

Billing Information:

Accounts Payable
585 N. Dairy Ashford
Houston, TX 77079

Report to:
Pamela Krueger

Email To: pamela.krueger@amecfw.com

Project
Description: Wastewater Line Investigation

City/State
Collected: ARTESIA, NM

Phone: 713-929-5674
Fax:

Client Project #
6703160012.001

Lab Project #
AMECFWHTX-WW LINE

Collected by (print):
William R Smith

Site/Facility ID #
Holley Frontline NAWGO

P.O. #

Collected by (signature):
William R Smith

Rush? (Lab MUST Be Notified)
☐ Same Day200%
☐ Next Day100%
☐ Two Day50%
☐ Three Day25%

Date Results Needed

Email? ☐ No ☒ Yes
FAX? ☐ No ☐ Yes

No.
of
Cntrs

Immediately
Packed on Ice N ☐ Y ☒

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Cntrs	8270ACID 100ml Amb NoPres	CI, FI, SO4 125mlHDPE-NoPres	CI, FI, SO4 4ozClr-NoPres	DROROLVI 40mlAmb-HCl-BT	DRORLA,SV8270ACID 4ozClr-NoPres	FEICP,MN1CP 250mlHDPE-HNO3	FEICP,MN1CP 2ozClr-NoPres	GRO 40mlAmb HCl	GRO,V8260BTEX 2ozClr-NoPres	V8260BTEX 40mlAmb-HCl	Rem./Contaminant	Sample # (lab only)
TMW-WWL1-01		SS	1	5/10/16	15:00	4			X		X		X		X			-01
TMW-WWL1-05		SS	5	5/10/16	15:10	4			X		X		X		X			-02
TMW-WWL1-12		SS	12	5/10/16	15:20	4			X		X		X		X			-03
TMW-WWL2-01		SS	1	5/10/16	16:20	4			X		X		X		X			-04
TMW-WWL2-05		SS	5	5/10/16	16:30	4			X		X		X		X			-05
TMW-WWL2-12		SS	12	5/10/16	16:50	4			X		X		X		X			-06
TMW-WWL2-12D		SS	12	5/10/16	16:55	4			X		X		X		X			-07
		SS				4			X		X		X		X			
TMW-WWL6-EG		GW		5/10/16	18:00	11	X	X		X		X		X		X		-08
		GW				11	X	X		X		X		X		X		

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other

Remarks:

pH _____ Temp _____

Flow _____ Other _____

6711 0132 8168

Hold #

Relinquished by: (Signature)

Date:

Time:

Received by: (Signature)

Samples returned via: ☐ UPS

Condition: (lab use only)

Relinquished by: (Signature)

Date:

Time:

Received by: (Signature)

Temp: °C Bottles Received:

COC Seal Intact: ☒ Y ☐ N ☐ NA

Relinquished by: (Signature)

Date:

Time:

Received for lab by: (Signature)

Date: 5/12/16 Time: 900

pH Checked: 7.2 NCF:

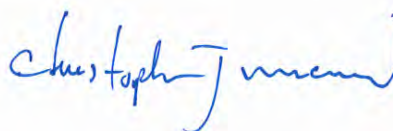
May 27, 2016

AMEC Foster Wheeler - Houston, TX

Sample Delivery Group: L835353
Samples Received: 05/13/2016
Project Number: 6703160012.001
Description: Wastewater Line Investigation

Report To: Pamela Krueger
585 N. Dairy Ashford
Houston, TX 77079

Entire Report Reviewed By:



Chris McCord
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



TMW-WWL1 L835353-01 GW

			Collected by	Collected date/time	Received date/time
				05/12/16 08:30	05/13/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872666	5	05/17/16 09:52	05/17/16 17:15	ST
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872936	1	05/18/16 11:41	05/19/16 15:12	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872740	1	05/15/16 18:28	05/17/16 04:33	JNS
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG872894	1	05/17/16 00:32	05/17/16 00:32	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872872	1	05/19/16 00:20	05/19/16 00:20	DAH
Wet Chemistry by Method 9056A	WG874711	1	05/24/16 13:02	05/24/16 13:02	CM
Wet Chemistry by Method 9056A	WG875355	500	05/26/16 11:11	05/26/16 11:11	CM

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

TMW-WWL2 L835353-02 GW

			Collected by	Collected date/time	Received date/time
				05/12/16 09:00	05/13/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872666	5	05/17/16 09:52	05/17/16 17:12	ST
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872936	1	05/18/16 11:41	05/19/16 19:26	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872740	1	05/15/16 18:28	05/17/16 04:50	JNS
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG872894	1	05/17/16 00:53	05/17/16 00:53	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872872	1	05/19/16 00:43	05/19/16 00:43	DAH
Wet Chemistry by Method 9056A	WG874711	1	05/24/16 13:31	05/24/16 13:31	CM
Wet Chemistry by Method 9056A	WG874711	100	05/24/16 13:45	05/24/16 13:45	CM
Wet Chemistry by Method 9056A	WG875355	500	05/26/16 11:25	05/26/16 11:25	CM

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

TMW-WWL2D L835353-03 GW

			Collected by	Collected date/time	Received date/time
				05/12/16 09:05	05/13/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872666	5	05/17/16 09:52	05/17/16 17:18	ST
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872936	1	05/18/16 11:41	05/19/16 19:49	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872740	1	05/15/16 18:28	05/17/16 05:07	JNS
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG872894	1	05/17/16 01:15	05/17/16 01:15	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872872	1	05/19/16 01:05	05/19/16 01:05	DAH
Wet Chemistry by Method 9056A	WG874225	1	05/23/16 13:58	05/23/16 13:58	SAM
Wet Chemistry by Method 9056A	WG874225	500	05/23/16 12:55	05/23/16 12:55	SAM

TRIP BLANK L835353-04 GW

			Collected by	Collected date/time	Received date/time
				05/12/16 00:00	05/13/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872872	1	05/18/16 20:12	05/18/16 20:12	DAH

TRIP BLANK L835353-05 GW

			Collected by	Collected date/time	Received date/time
				05/12/16 00:00	05/13/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872872	1	05/18/16 20:34	05/18/16 20:34	DAH

ACCOUNT:

AMEC Foster Wheeler - Houston, TX

PROJECT:

6703160012.001

SDG:

L835353

DATE/TIME:

05/27/16 16:17

PAGE:

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



WWL-SPC L835353-06 Solid

Collected by

Collected date/time

Received date/time

05/12/16 00:00

05/13/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG873476	1	05/18/16 17:22	05/19/16 09:44	NJB
Metals (ICP) by Method 6010B	WG873554	1	05/20/16 11:08	05/20/16 13:52	BRJ
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG873908	1	05/19/16 22:56	05/20/16 14:58	SNR
Semi-Volatile Organic Compounds (GC) by Method 8015	WG873587	1	05/19/16 21:44	05/20/16 19:28	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG874253	5	05/20/16 17:57	05/20/16 22:59	JAH
Volatile Organic Compounds (GC/MS) by Method 8260B	WG874942	5	05/24/16 16:07	05/25/16 02:00	DWR
Wet Chemistry by Method 9056A	WG874228	1	05/23/16 09:00	05/23/16 17:37	CM
Wet Chemistry by Method 9056A	WG874228	10	05/23/16 09:00	05/23/16 18:01	CM
Wet Chemistry by Method 9056A	WG874228	50	05/23/16 09:00	05/24/16 09:03	CM

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

ACCOUNT:

AMEC Foster Wheeler - Houston, TX

PROJECT:

6703160012.001

SDG:

L835353

DATE/TIME:

05/27/16 16:17

PAGE:

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All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Chris McCord
Technical Service Representative

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	12200		26.0	500	500	05/26/2016 11:11	WG875355
Fluoride	6.21		0.00990	0.100	1	05/24/2016 13:02	WG874711
Sulfate	18800		38.7	2500	500	05/26/2016 11:11	WG875355

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Iron	0.234	J	0.0705	0.500	5	05/17/2016 17:15	WG872666
Manganese	0.954		0.00600	0.0500	5	05/17/2016 17:15	WG872666

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
TPH (GC/FID) Low Fraction	U		0.0314	0.100	1	05/17/2016 00:32	WG872894
(S) a,a,a-Trifluorotoluene(FID) 99.2				62.0-128		05/17/2016 00:32	WG872894

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	1	05/19/2016 00:20	WG872872
Toluene	U		0.000780	0.00500	1	05/19/2016 00:20	WG872872
Ethylbenzene	U		0.000384	0.00100	1	05/19/2016 00:20	WG872872
Total Xylenes	U		0.00106	0.00300	1	05/19/2016 00:20	WG872872
(S) Toluene-d8	104			90.0-115		05/19/2016 00:20	WG872872
(S) Dibromofluoromethane	109			79.0-121		05/19/2016 00:20	WG872872
(S) a,a,a-Trifluorotoluene	104			90.4-116		05/19/2016 00:20	WG872872
(S) 4-Bromofluorobenzene	101			80.1-120		05/19/2016 00:20	WG872872

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
C10-C28 Diesel Range	0.0851	J	0.0222	0.100	1	05/17/2016 04:33	WG872740
C28-C40 Oil Range	0.0419	J	0.0118	0.100	1	05/17/2016 04:33	WG872740
(S) o-Terphenyl	95.3			50.0-150		05/17/2016 04:33	WG872740

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
4-Chloro-3-methylphenol	U		0.000263	0.0100	1	05/19/2016 15:12	WG872936
2-Chlorophenol	U		0.000283	0.0100	1	05/19/2016 15:12	WG872936
2,4-Dichlorophenol	U		0.000284	0.0100	1	05/19/2016 15:12	WG872936
2,4-Dimethylphenol	U		0.000624	0.0100	1	05/19/2016 15:12	WG872936
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100	1	05/19/2016 15:12	WG872936
2,4-Dinitrophenol	U	J3	0.00325	0.0100	1	05/19/2016 15:12	WG872936
2-Nitrophenol	U		0.000320	0.0100	1	05/19/2016 15:12	WG872936
4-Nitrophenol	U		0.00201	0.0100	1	05/19/2016 15:12	WG872936
Pentachlorophenol	U		0.000313	0.0100	1	05/19/2016 15:12	WG872936
Phenol	U		0.000334	0.0100	1	05/19/2016 15:12	WG872936
2,4,6-Trichlorophenol	U		0.000297	0.0100	1	05/19/2016 15:12	WG872936
(S) 2-Fluorophenol	43.8			10.0-77.9		05/19/2016 15:12	WG872936
(S) Phenol-d5	32.9			5.00-70.1		05/19/2016 15:12	WG872936
(S) Nitrobenzene-d5	76.8			21.8-123		05/19/2016 15:12	WG872936
(S) 2-Fluorobiphenyl	87.2			29.5-131		05/19/2016 15:12	WG872936



Collected date/time: 05/12/16 08:30

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Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	71.9			11.2-130		05/19/2016 15:12	WG872936
(S) p-Terphenyl-d14	98.2			29.3-137		05/19/2016 15:12	WG872936

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	7130		5.19	100	100	05/24/2016 13:45	WG874711
Fluoride	2.59		0.00990	0.100	1	05/24/2016 13:31	WG874711
Sulfate	14600		38.7	2500	500	05/26/2016 11:25	WG875355

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Iron	0.169	J	0.0705	0.500	5	05/17/2016 17:12	WG872666
Manganese	0.836		0.00600	0.0500	5	05/17/2016 17:12	WG872666

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
TPH (GC/FID) Low Fraction	U		0.0314	0.100	1	05/17/2016 00:53	WG872894
(S) a,a,a-Trifluorotoluene(FID) 99.5				62.0-128		05/17/2016 00:53	WG872894

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	1	05/19/2016 00:43	WG872872
Toluene	U		0.000780	0.00500	1	05/19/2016 00:43	WG872872
Ethylbenzene	U		0.000384	0.00100	1	05/19/2016 00:43	WG872872
Total Xylenes	U		0.00106	0.00300	1	05/19/2016 00:43	WG872872
(S) Toluene-d8	104			90.0-115		05/19/2016 00:43	WG872872
(S) Dibromofluoromethane	110			79.0-121		05/19/2016 00:43	WG872872
(S) a,a,a-Trifluorotoluene	103			90.4-116		05/19/2016 00:43	WG872872
(S) 4-Bromofluorobenzene	114			80.1-120		05/19/2016 00:43	WG872872

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
C10-C28 Diesel Range	0.182		0.0222	0.100	1	05/17/2016 04:50	WG872740
C28-C40 Oil Range	0.175		0.0118	0.100	1	05/17/2016 04:50	WG872740
(S) o-Terphenyl	104			50.0-150		05/17/2016 04:50	WG872740

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
4-Chloro-3-methylphenol	U		0.000263	0.0100	1	05/19/2016 19:26	WG872936
2-Chlorophenol	U		0.000283	0.0100	1	05/19/2016 19:26	WG872936
2,4-Dichlorophenol	U		0.000284	0.0100	1	05/19/2016 19:26	WG872936
2,4-Dimethylphenol	U		0.000624	0.0100	1	05/19/2016 19:26	WG872936
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100	1	05/19/2016 19:26	WG872936
2,4-Dinitrophenol	U	J3	0.00325	0.0100	1	05/19/2016 19:26	WG872936
2-Nitrophenol	U		0.000320	0.0100	1	05/19/2016 19:26	WG872936
4-Nitrophenol	U		0.00201	0.0100	1	05/19/2016 19:26	WG872936
Pentachlorophenol	U		0.000313	0.0100	1	05/19/2016 19:26	WG872936
Phenol	U		0.000334	0.0100	1	05/19/2016 19:26	WG872936
2,4,6-Trichlorophenol	U		0.000297	0.0100	1	05/19/2016 19:26	WG872936
(S) 2-Fluorophenol	52.9			10.0-77.9		05/19/2016 19:26	WG872936
(S) Phenol-d5	38.1			5.00-70.1		05/19/2016 19:26	WG872936
(S) Nitrobenzene-d5	84.9			21.8-123		05/19/2016 19:26	WG872936
(S) 2-Fluorobiphenyl	88.9			29.5-131		05/19/2016 19:26	WG872936



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	78.3			11.2-130		05/19/2016 19:26	WG872936
(S) p-Terphenyl-d14	99.5			29.3-137		05/19/2016 19:26	WG872936

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	7100		26.0	500	500	05/23/2016 12:55	WG874225
Fluoride	3.10		0.00990	0.100	1	05/23/2016 13:58	WG874225
Sulfate	16800		38.7	2500	500	05/23/2016 12:55	WG874225

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Iron	0.981		0.0705	0.500	5	05/17/2016 17:18	WG872666
Manganese	0.910		0.00600	0.0500	5	05/17/2016 17:18	WG872666

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
TPH (GC/FID) Low Fraction	U		0.0314	0.100	1	05/17/2016 01:15	WG872894
(S) a,a,a-Trifluorotoluene(FID) 98.8				62.0-128		05/17/2016 01:15	WG872894

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	1	05/19/2016 01:05	WG872872
Toluene	U		0.000780	0.00500	1	05/19/2016 01:05	WG872872
Ethylbenzene	U		0.000384	0.00100	1	05/19/2016 01:05	WG872872
Total Xylenes	U		0.00106	0.00300	1	05/19/2016 01:05	WG872872
(S) Toluene-d8	103			90.0-115		05/19/2016 01:05	WG872872
(S) Dibromofluoromethane	110			79.0-121		05/19/2016 01:05	WG872872
(S) a,a,a-Trifluorotoluene	103			90.4-116		05/19/2016 01:05	WG872872
(S) 4-Bromofluorobenzene	116			80.1-120		05/19/2016 01:05	WG872872

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
C10-C28 Diesel Range	0.0892	J	0.0222	0.100	1	05/17/2016 05:07	WG872740
C28-C40 Oil Range	0.0898	J	0.0118	0.100	1	05/17/2016 05:07	WG872740
(S) o-Terphenyl	97.7			50.0-150		05/17/2016 05:07	WG872740

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
4-Chloro-3-methylphenol	U		0.000263	0.0100	1	05/19/2016 19:49	WG872936
2-Chlorophenol	U		0.000283	0.0100	1	05/19/2016 19:49	WG872936
2,4-Dichlorophenol	U		0.000284	0.0100	1	05/19/2016 19:49	WG872936
2,4-Dimethylphenol	U		0.000624	0.0100	1	05/19/2016 19:49	WG872936
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100	1	05/19/2016 19:49	WG872936
2,4-Dinitrophenol	U	J3	0.00325	0.0100	1	05/19/2016 19:49	WG872936
2-Nitrophenol	U		0.000320	0.0100	1	05/19/2016 19:49	WG872936
4-Nitrophenol	U		0.00201	0.0100	1	05/19/2016 19:49	WG872936
Pentachlorophenol	U		0.000313	0.0100	1	05/19/2016 19:49	WG872936
Phenol	U		0.000334	0.0100	1	05/19/2016 19:49	WG872936
2,4,6-Trichlorophenol	U		0.000297	0.0100	1	05/19/2016 19:49	WG872936
(S) 2-Fluorophenol	40.0			10.0-77.9		05/19/2016 19:49	WG872936
(S) Phenol-d5	32.2			5.00-70.1		05/19/2016 19:49	WG872936
(S) Nitrobenzene-d5	70.2			21.8-123		05/19/2016 19:49	WG872936
(S) 2-Fluorobiphenyl	81.9			29.5-131		05/19/2016 19:49	WG872936



Collected date/time: 05/12/16 09:05

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Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	63.3			11.2-130		05/19/2016 19:49	WG872936
(S) p-Terphenyl-d14	94.9			29.3-137		05/19/2016 19:49	WG872936

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	U		0.000331	0.00100	1	05/18/2016 20:12	WG872872
Toluene	U		0.000780	0.00500	1	05/18/2016 20:12	WG872872
Ethylbenzene	U		0.000384	0.00100	1	05/18/2016 20:12	WG872872
Total Xylenes	U		0.00106	0.00300	1	05/18/2016 20:12	WG872872
(S) Toluene-d8	104			90.0-115		05/18/2016 20:12	WG872872
(S) Dibromofluoromethane	109			79.0-121		05/18/2016 20:12	WG872872
(S) a,a,a-Trifluorotoluene	104			90.4-116		05/18/2016 20:12	WG872872
(S) 4-Bromofluorobenzene	99.5			80.1-120		05/18/2016 20:12	WG872872

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	U		0.000331	0.00100	1	05/18/2016 20:34	WG872872
Toluene	U		0.000780	0.00500	1	05/18/2016 20:34	WG872872
Ethylbenzene	U		0.000384	0.00100	1	05/18/2016 20:34	WG872872
Total Xylenes	U		0.00106	0.00300	1	05/18/2016 20:34	WG872872
(S) Toluene-d8	108			90.0-115		05/18/2016 20:34	WG872872
(S) Dibromofluoromethane	99.3			79.0-121		05/18/2016 20:34	WG872872
(S) a,a,a-Trifluorotoluene	108			90.4-116		05/18/2016 20:34	WG872872
(S) 4-Bromofluorobenzene	105			80.1-120		05/18/2016 20:34	WG872872

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	1660		7.95	100	10	05/23/2016 18:01	WG874228
Fluoride	18.3		0.261	1.00	1	05/23/2016 17:37	WG874228
Sulfate	20000		28.5	2500	50	05/24/2016 09:03	WG874228

Mercury by Method 7471A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	U		0.00280	0.0200	1	05/19/2016 09:44	WG873476

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Arsenic	2.87		0.650	2.00	1	05/20/2016 13:52	WG873554
Barium	95.9		0.170	0.500	1	05/20/2016 13:52	WG873554
Cadmium	0.222	J	0.0700	0.500	1	05/20/2016 13:52	WG873554
Chromium	5.89		0.140	1.00	1	05/20/2016 13:52	WG873554
Iron	5120		1.41	10.0	1	05/20/2016 13:52	WG873554
Lead	7.90		0.190	0.500	1	05/20/2016 13:52	WG873554
Manganese	390		0.120	1.00	1	05/20/2016 13:52	WG873554
Selenium	U		0.740	2.00	1	05/20/2016 13:52	WG873554
Silver	U		0.280	1.00	1	05/20/2016 13:52	WG873554

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/20/2016 22:59	WG874253
(S) a,a,a-Trifluorotoluene(FID) 87.3				59.0-128		05/20/2016 22:59	WG874253

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/25/2016 02:00	WG874942
Toluene	U		0.00217	0.0250	5	05/25/2016 02:00	WG874942
Ethylbenzene	U		0.00148	0.00500	5	05/25/2016 02:00	WG874942
Total Xylenes	U		0.00349	0.0150	5	05/25/2016 02:00	WG874942
(S) Toluene-d8	106			88.7-115		05/25/2016 02:00	WG874942
(S) Dibromofluoromethane	102			76.3-123		05/25/2016 02:00	WG874942
(S) a,a,a-Trifluorotoluene	103			87.2-117		05/25/2016 02:00	WG874942
(S) 4-Bromofluorobenzene	103			69.7-129		05/25/2016 02:00	WG874942

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/20/2016 19:28	WG873587
C28-C40 Oil Range	4.12		0.274	4.00	1	05/20/2016 19:28	WG873587
(S) o-Terphenyl	87.5			50.0-150		05/20/2016 19:28	WG873587

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/20/2016 14:58	WG873908
2-Chlorophenol	U	<u>J3</u>	0.00831	0.333	1	05/20/2016 14:58	WG873908
2,4-Dichlorophenol	U		0.00746	0.333	1	05/20/2016 14:58	WG873908
2,4-Dimethylphenol	U		0.0471	0.333	1	05/20/2016 14:58	WG873908
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/20/2016 14:58	WG873908
2,4-Dinitrophenol	U		0.0980	0.333	1	05/20/2016 14:58	WG873908
2-Nitrophenol	U		0.0130	0.333	1	05/20/2016 14:58	WG873908
4-Nitrophenol	U		0.0525	0.333	1	05/20/2016 14:58	WG873908
Pentachlorophenol	U		0.0480	0.333	1	05/20/2016 14:58	WG873908
Phenol	U		0.00695	0.333	1	05/20/2016 14:58	WG873908
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/20/2016 14:58	WG873908
(S) 2-Fluorophenol	61.1			21.1-116		05/20/2016 14:58	WG873908
(S) Phenol-d5	55.3			26.3-121		05/20/2016 14:58	WG873908
(S) Nitrobenzene-d5	67.6			21.9-129		05/20/2016 14:58	WG873908
(S) 2-Fluorobiphenyl	62.2			34.9-129		05/20/2016 14:58	WG873908
(S) 2,4,6-Tribromophenol	46.7			21.6-142		05/20/2016 14:58	WG873908
(S) p-Terphenyl-d14	52.9			21.5-128		05/20/2016 14:58	WG873908

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Method Blank (MB)

(MB) R3139265-1 05/23/16 09:07

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.0099	0.100
Sulfate	U		0.0774	5.00

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3139265-2 05/23/16 09:23 • (LCSD) R3139265-3 05/23/16 09:38

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chloride	40.0	38.9	38.9	97	97	80-120			0	15
Fluoride	8.00	7.73	7.76	97	97	80-120			0	15
Sulfate	40.0	38.5	38.6	96	97	80-120			0	15

L835977-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835977-10 05/23/16 17:41 • (MS) R3139265-4 05/23/16 17:57 • (MSD) R3139265-5 05/23/16 18:13

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Fluoride	5.00	0.361	5.34	5.28	100	98	1	80-120			1	15
Sulfate	50.0	ND	50.8	51.0	99	99	1	80-120			0	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3139346-1 05/24/16 08:33

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.0099	0.100

L836606-01 Original Sample (OS) • Duplicate (DUP)

(OS) L836606-01 05/24/16 16:53 • (DUP) R3139346-5 05/24/16 17:07

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Chloride	ND	0.611	1	0		15
Fluoride	ND	0.0818	1	0		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3139346-2 05/24/16 08:47 • (LCSD) R3139346-3 05/24/16 10:27

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Chloride	40.0	39.0	39.2	97	98	90-110			0	20
Fluoride	8.00	7.82	7.84	98	98	90-110			0	20

L836505-07 Original Sample (OS) • Matrix Spike (MS)

(OS) L836505-07 05/24/16 14:28 • (MS) R3139346-4 05/24/16 14:43

	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Analyte	mg/l	mg/l	mg/l	%		%	
Chloride	50.0	17.2	67.6	101	1	80-120	
Fluoride	5.00	0.122	5.04	98	1	80-120	

L836606-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836606-06 05/24/16 18:36 • (MS) R3139346-6 05/24/16 18:50 • (MSD) R3139346-7 05/24/16 19:04

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Chloride	50.0	ND	50.1	51.6	100	103	1	80-120			3	15
Fluoride	5.00	ND	4.98	5.18	98	102	1	80-120			4	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3140117-1 05/26/16 09:06

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Chloride	U		0.0519	1.00
Sulfate	U		0.0774	5.00

L837803-06 Original Sample (OS) • Duplicate (DUP)

(OS) L837803-06 05/26/16 15:51 • (DUP) R3140117-4 05/26/16 16:06

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Sulfate	35.7	35.6	1	0		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3140117-2 05/26/16 09:21 • (LCSD) R3140117-3 05/26/16 09:36

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Chloride	40.0	39.4	39.3	99	98	80-120			0	15
Sulfate	40.0	39.8	39.8	100	100	80-120			0	15

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc

Method Blank (MB)

(MB) R3139258-1 05/23/16 10:37

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Chloride	U		0.795	10.0
Fluoride	U		0.261	1.00
Sulfate	U		0.57	50.0

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

L836501-15 Original Sample (OS) • Duplicate (DUP)

(OS) L836501-15 05/23/16 20:25 • (DUP) R3139258-4 05/23/16 20:49

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	86.9	80.8	1	7		15
Fluoride	7.38	6.69	1	10		15
Sulfate	215	177	1	19	P1	15

L836501-21 Original Sample (OS) • Duplicate (DUP)

(OS) L836501-21 05/24/16 00:48 • (DUP) R3139258-7 05/24/16 01:12

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	75.8	83.5	1	10		15
Fluoride	16.2	13.3	1	20	J3	15
Sulfate	257	235	1	9		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3139258-2 05/23/16 11:01 • (LCSD) R3139258-3 05/23/16 11:25

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chloride	200	199	199	99	99	80-120			0	15
Fluoride	20.0	20.4	20.5	102	103	80-120			0	15
Sulfate	200	200	200	100	100	80-120			0	15



L836501-16 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836501-16 05/23/16 22:00 • (MS) R3139258-5 05/23/16 22:24 • (MSD) R3139258-6 05/23/16 22:48

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	538	78.6	643	629	105	102	1	80-120			2	15
Fluoride	53.8	5.67	49.6	49.1	82	81	1	80-120			1	15
Sulfate	538	269	822	816	103	102	1	80-120			1	15

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



Method Blank (MB)

(MB) R3138224-1 05/19/16 09:36

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Mercury	U		0.0028	0.0200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138224-2 05/19/16 09:39 • (LCSD) R3138224-3 05/19/16 09:41

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Mercury	0.300	0.260	0.274	87	91	80-120			5	20

L835353-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835353-06 05/19/16 09:44 • (MS) R3138224-4 05/19/16 09:47 • (MSD) R3138224-5 05/19/16 09:54

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Mercury	0.300	U	0.282	0.276	94	92	1	75-125			2	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3137501-1 05/17/16 12:02

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Iron	U		0.0141	0.100
Manganese	U		0.0012	0.0100

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137501-2 05/17/16 12:04 • (LCSD) R3137501-3 05/17/16 12:07

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Iron	10.0	9.70	9.78	97	98	80-120			1	20
Manganese	1.00	0.973	0.980	97	98	80-120			1	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3138672-1 05/20/16 13:30

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Arsenic	U		0.65	2.00
Barium	0.278	J	0.17	0.500
Cadmium	U		0.07	0.500
Chromium	U		0.14	1.00
Iron	U		1.41	10.0
Lead	U		0.19	0.500
Manganese	U		0.12	1.00
Selenium	U		0.74	2.00
Silver	U		0.28	1.00

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138672-2 05/20/16 13:33 • (LCSD) R3138672-3 05/20/16 13:35

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	100	99.2	97.4	99	97	80-120			2	20
Barium	100	104	102	104	102	80-120			1	20
Cadmium	100	103	101	103	101	80-120			2	20
Chromium	100	99.2	97.9	99	98	80-120			1	20
Iron	1000	974	963	97	96	80-120			1	20
Lead	100	104	102	104	102	80-120			2	20
Manganese	100	99.7	98.4	100	98	80-120			1	20
Selenium	100	103	102	103	102	80-120			1	20
Silver	100	98.4	97.0	98	97	80-120			1	20

L836003-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836003-08 05/20/16 13:38 • (MS) R3138672-6 05/20/16 13:46 • (MSD) R3138672-7 05/20/16 13:48

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	105	4.07	102	106	94	97	1	75-125			3	20
Barium	105	47.6	155	166	102	113	1	75-125			7	20
Cadmium	105	U	106	108	101	103	1	75-125			2	20
Chromium	105	7.15	105	111	93	99	1	75-125			6	20
Iron	1050	11300	10800	12600	0	118	1	75-125	V		16	20

L836003-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836003-08 05/20/16 13:38 • (MS) R3138672-6 05/20/16 13:46 • (MSD) R3138672-7 05/20/16 13:48

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Lead	105	6.62	114	116	102	105	1	75-125			2	20
Manganese	105	293	362	353	65	57	1	75-125	J6	J6	2	20
Selenium	105	U	92.7	98.3	88	94	1	75-125			6	20
Silver	105	U	100	104	95	99	1	75-125			4	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3137306-3 05/16/16 22:25

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
TPH (GC/FID) Low Fraction	U		0.0314	0.100
(S) a,a,a-Trifluorotoluene(FID) 100				62.0-128

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137306-1 05/16/16 21:22 • (LCSD) R3137306-2 05/16/16 21:43

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	6.14	6.04	112	110	67.0-132			1.66	20
(S) a,a,a-Trifluorotoluene(FID)				102	101	62.0-128				

L834446-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L834446-01 05/16/16 23:50 • (MS) R3137306-4 05/16/16 22:46 • (MSD) R3137306-5 05/16/16 23:07

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	ND	2.91	3.00	52.9	54.6	1	50.0-143			3.25	20
(S) a,a,a-Trifluorotoluene(FID)					100	100		62.0-128				

Method Blank (MB)

(MB) R3138993-3 05/20/16 19:11

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	88.2			59.0-128

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138993-1 05/20/16 18:01 • (LCSD) R3138993-2 05/20/16 18:24

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
TPH (GC/FID) Low Fraction	5.50	5.12	4.92	93.0	89.4	63.5-137			3.96	20
(S) a,a,a-Trifluorotoluene(FID)				89.1	89.0	59.0-128				

L835353-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835353-06 05/20/16 22:59 • (MS) R3138993-4 05/20/16 21:50 • (MSD) R3138993-5 05/20/16 22:13

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
TPH (GC/FID) Low Fraction	5.50	U	17.6	19.8	63.9	71.9	5	28.5-138			11.7	23.6
(S) a,a,a-Trifluorotoluene(FID)					86.7	87.5		59.0-128				

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3138238-3 05/18/16 18:41

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.000331	0.00100
Ethylbenzene	U		0.000384	0.00100
Toluene	U		0.000780	0.00500
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	102			90.0-115
(S) Dibromofluoromethane	109			79.0-121
(S) a,a,a-Trifluorotoluene	103			90.4-116
(S) 4-Bromofluorobenzene	101			80.1-120

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138238-1 05/18/16 16:49 • (LCSD) R3138238-2 05/18/16 17:11

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0256	0.0267	102	107	73.0-122			4.33	20
Ethylbenzene	0.0250	0.0251	0.0260	100	104	80.9-121			3.74	20
Toluene	0.0250	0.0235	0.0244	93.9	97.4	77.9-116			3.63	20
Xylenes, Total	0.0750	0.0736	0.0765	98.2	102	79.2-122			3.82	20
(S) Toluene-d8				105	106	90.0-115				
(S) Dibromofluoromethane				110	103	79.0-121				
(S) a,a,a-Trifluorotoluene				103	106	90.4-116				
(S) 4-Bromofluorobenzene				101	106	80.1-120				

L835321-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835321-02 05/18/16 21:19 • (MS) R3138238-4 05/18/16 19:04 • (MSD) R3138238-5 05/18/16 19:27

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	ND	0.0233	0.0247	93.2	98.8	1	58.6-133			5.89	20
Ethylbenzene	0.0250	ND	0.0234	0.0253	93.5	101	1	62.7-136			7.89	20
Toluene	0.0250	ND	0.0215	0.0228	85.9	91.4	1	67.8-124			6.16	20
Xylenes, Total	0.0750	ND	0.0695	0.0740	92.6	98.7	1	65.6-133			6.31	20
(S) Toluene-d8					106	105		90.0-115				
(S) Dibromofluoromethane					108	109		79.0-121				
(S) a,a,a-Trifluorotoluene					104	104		90.4-116				
(S) 4-Bromofluorobenzene					104	104		80.1-120				



Method Blank (MB)

(MB) R3139540-3 05/24/16 21:59

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000270	0.00100
Ethylbenzene	U		0.000297	0.00100
Toluene	U		0.000434	0.00500
Xylenes, Total	U		0.000698	0.00300
(S) Toluene-d8	106			88.7-115
(S) Dibromofluoromethane	99.4			76.3-123
(S) a,a,a-Trifluorotoluene	105			87.2-117
(S) 4-Bromofluorobenzene	103			69.7-129

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3139540-1 05/24/16 20:22 • (LCSD) R3139540-2 05/24/16 20:42

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0216	0.0216	86.5	86.4	72.6-120			0.0900	20
Ethylbenzene	0.0250	0.0236	0.0232	94.6	92.8	78.6-124			1.85	20
Toluene	0.0250	0.0224	0.0225	89.5	90.1	76.7-116			0.740	20
Xylenes, Total	0.0750	0.0711	0.0715	94.8	95.3	78.1-123			0.510	20
(S) Toluene-d8				108	108	88.7-115				
(S) Dibromofluoromethane				101	101	76.3-123				
(S) a,a,a-Trifluorotoluene				107	106	87.2-117				
(S) 4-Bromofluorobenzene				103	102	69.7-129				

L836637-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836637-05 05/26/16 11:45 • (MS) R3139988-1 05/26/16 12:04 • (MSD) R3139988-2 05/26/16 12:24

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0285	29.5	137	134	81.9	79.6	4600	47.8-131			2.25	22.8
Ethylbenzene	0.0285	108	229	232	91.7	94.6	4600	44.8-135			1.67	26.9
Toluene	0.0285	222	339	347	89.5	95.7	4600	47.8-127			2.37	24.3
Xylenes, Total	0.0855	527	895	913	93.6	98.1	4600	42.7-135			1.94	26.6
(S) Toluene-d8					108	107		88.7-115				
(S) Dibromofluoromethane					102	99.1		76.3-123				
(S) a,a,a-Trifluorotoluene					106	107		87.2-117				



L836637-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836637-05 05/26/16 11:45 • (MS) R3139988-1 05/26/16 12:04 • (MSD) R3139988-2 05/26/16 12:24

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
(S) 4-Bromofluorobenzene					104	105		69.7-129				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3137334-1 05/17/16 03:42

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
C10-C28 Diesel Range	U		0.0222	0.100
C28-C40 Oil Range	U		0.0118	0.100
(S) o-Terphenyl	105			50.0-150

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137334-2 05/17/16 03:59 • (LCSD) R3137334-3 05/17/16 04:16

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	1.50	1.48	1.44	98.5	96.1	70.0-130			2.44	20
(S) o-Terphenyl				104	97.9	50.0-150				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3138554-1 05/20/16 10:03

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	88.1			50.0-150

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138554-2 05/20/16 10:17 • (LCSD) R3138554-3 05/20/16 10:31

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	47.4	48.5	78.9	80.9	50.0-100			2.44	20
(S) o-Terphenyl				88.9	91.0	50.0-150				

L835353-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835353-06 05/20/16 19:28 • (MS) R3138554-4 05/20/16 19:42 • (MSD) R3138554-5 05/20/16 19:57

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	U	43.1	44.1	71.8	73.6	1	50.0-100			2.39	20
(S) o-Terphenyl					67.2	65.3		50.0-150				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3138702-3 05/19/16 14:49

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
4-Chloro-3-methylphenol	U		0.000263	0.0100
2-Chlorophenol	U		0.000283	0.0100
2,4-Dichlorophenol	U		0.000284	0.0100
2,4-Dimethylphenol	U		0.000624	0.0100
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100
2,4-Dinitrophenol	U		0.00325	0.0100
2-Nitrophenol	U		0.000320	0.0100
4-Nitrophenol	U		0.00201	0.0100
Pentachlorophenol	U		0.000313	0.0100
Phenol	U		0.000334	0.0100
2,4,6-Trichlorophenol	U		0.000297	0.0100
(S) Nitrobenzene-d5	77.9			21.8-123
(S) 2-Fluorobiphenyl	84.2			29.5-131
(S) p-Terphenyl-d14	93.8			29.3-137
(S) Phenol-d5	38.1			5.00-70.1
(S) 2-Fluorophenol	55.7			10.0-77.9
(S) 2,4,6-Tribromophenol	70.6			11.2-130

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138702-1 05/19/16 14:02 • (LCSD) R3138702-2 05/19/16 14:25

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.0500	0.0439	0.0424	87.8	84.8	35.7-100			3.47	22.9
2-Chlorophenol	0.0500	0.0377	0.0354	75.3	70.8	26.2-91.5			6.19	26.5
2,4-Dichlorophenol	0.0500	0.0441	0.0428	88.1	85.7	31.4-103			2.83	24.9
2,4-Dimethylphenol	0.0500	0.0430	0.0431	86.1	86.2	31.9-107			0.150	25.7
4,6-Dinitro-2-methylphenol	0.0500	0.0375	0.0383	75.0	76.7	18.4-148			2.20	24.4
2,4-Dinitrophenol	0.0500	0.0258	0.0157	51.5	31.3	24.2-128		J3	48.8	20.5
2-Nitrophenol	0.0500	0.0447	0.0434	89.3	86.7	25.9-106			2.97	26.9
4-Nitrophenol	0.0500	0.0190	0.0153	38.0	30.6	10.0-52.7			21.7	40
Pentachlorophenol	0.0500	0.0392	0.0347	78.3	69.4	10.0-97.4			12.0	35.1
Phenol	0.0500	0.0200	0.0177	40.0	35.5	10.0-57.9			12.1	35
2,4,6-Trichlorophenol	0.0500	0.0452	0.0456	90.5	91.2	29.8-107			0.790	24.1
(S) Nitrobenzene-d5				84.3	87.2	21.8-123				
(S) 2-Fluorobiphenyl				86.0	90.9	29.5-131				



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138702-1 05/19/16 14:02 • (LCSD) R3138702-2 05/19/16 14:25

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
(S) p-Terphenyl-d14				96.1	98.8	29.3-137				
(S) Phenol-d5				37.7	32.4	5.00-70.1				
(S) 2-Fluorophenol				52.3	43.9	10.0-77.9				
(S) 2,4,6-Tribromophenol				88.7	88.5	11.2-130				

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



Method Blank (MB)

(MB) R3138667-3 05/20/16 10:56

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
4-Chloro-3-methylphenol	U		0.00477	0.333
2-Chlorophenol	U		0.00831	0.333
2,4-Dichlorophenol	U		0.00746	0.333
2,4-Dimethylphenol	U		0.0471	0.333
4,6-Dinitro-2-methylphenol	U		0.124	0.333
2,4-Dinitrophenol	U		0.0980	0.333
2-Nitrophenol	U		0.0130	0.333
4-Nitrophenol	U		0.0525	0.333
Pentachlorophenol	U		0.0480	0.333
Phenol	U		0.00695	0.333
2,4,6-Trichlorophenol	U		0.00779	0.333
(S) Nitrobenzene-d5	61.8			21.9-129
(S) 2-Fluorobiphenyl	61.7			34.9-129
(S) p-Terphenyl-d14	68.7			21.5-128
(S) Phenol-d5	70.1			26.3-121
(S) 2-Fluorophenol	64.2			21.1-116
(S) 2,4,6-Tribromophenol	52.9			21.6-142

Cp

Tc

Ss

Cn

Sr

Qc

Gl

Al

Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138667-1 05/20/16 10:08 • (LCSD) R3138667-2 05/20/16 10:32

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.667	0.451	0.496	67.7	74.4	51.1-113			9.51	20
2-Chlorophenol	0.667	0.345	0.432	51.7	64.8	40.8-103		J3	22.6	20
2,4-Dichlorophenol	0.667	0.452	0.451	67.8	67.5	46.2-109			0.350	20
2,4-Dimethylphenol	0.667	0.420	0.451	62.9	67.6	42.2-110			7.12	20
4,6-Dinitro-2-methylphenol	0.667	0.457	0.470	68.5	70.5	23.1-119			2.97	23.7
2,4-Dinitrophenol	0.667	0.430	0.404	64.5	60.6	10.0-105			6.29	36.5
2-Nitrophenol	0.667	0.421	0.463	63.1	69.4	44.2-113			9.50	20.9
4-Nitrophenol	0.667	0.393	0.365	58.9	54.7	34.8-109			7.41	20
Pentachlorophenol	0.667	0.517	0.487	77.5	73.0	16.2-102			5.87	22.9
Phenol	0.667	0.367	0.442	55.0	66.3	41.5-106			18.6	20
2,4,6-Trichlorophenol	0.667	0.512	0.479	76.8	71.8	44.4-108			6.68	20
(S) Nitrobenzene-d5				59.1	63.6	21.9-129				
(S) 2-Fluorobiphenyl				69.2	60.8	34.9-129				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138667-1 05/20/16 10:08 • (LCSD) R3138667-2 05/20/16 10:32

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
(S) p-Terphenyl-d14				65.8	64.2	21.5-128				
(S) Phenol-d5				56.0	67.8	26.3-121				
(S) 2-Fluorophenol				59.1	73.1	21.1-116				
(S) 2,4,6-Tribromophenol				57.7	55.4	21.6-142				

L835349-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835349-02 05/20/16 13:46 • (MS) R3138667-4 05/20/16 14:10 • (MSD) R3138667-5 05/20/16 14:34

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.767	U	0.592	0.713	77.2	93.1	1	27.0-154			18.6	26.6
2-Chlorophenol	0.767	U	0.450	0.513	58.8	67.0	1	33.2-121			13.1	29.3
2,4-Dichlorophenol	0.767	U	0.536	0.619	70.0	80.7	1	34.8-134			14.3	27.3
2,4-Dimethylphenol	0.767	U	0.502	0.634	65.4	82.8	1	12.3-149			23.4	32.3
4,6-Dinitro-2-methylphenol	0.767	U	0.558	0.641	72.8	83.6	1	10.0-144			13.8	32.7
2,4-Dinitrophenol	0.767	U	0.495	0.577	64.6	75.2	1	10.0-121			15.2	39.4
2-Nitrophenol	0.767	U	0.523	0.563	68.3	73.4	1	29.5-144			7.26	29.9
4-Nitrophenol	0.767	U	0.493	0.569	64.3	74.2	1	20.0-133			14.3	30.2
Pentachlorophenol	0.767	U	0.648	0.726	84.5	94.7	1	10.0-139			11.4	28.3
Phenol	0.767	U	0.581	0.646	75.8	84.3	1	25.1-130			10.6	29.6
2,4,6-Trichlorophenol	0.767	U	0.602	0.649	78.5	84.6	1	33.8-133			7.56	28.1
(S) Nitrobenzene-d5					67.5	80.4		21.9-129				
(S) 2-Fluorobiphenyl					59.8	65.2		34.9-129				
(S) p-Terphenyl-d14					47.5	54.0		21.5-128				
(S) Phenol-d5					63.4	68.3		26.3-121				
(S) 2-Fluorophenol					66.7	73.0		21.1-116				
(S) 2,4,6-Tribromophenol					68.4	64.6		21.6-142				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.

Qualifier Description

J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
V	The sample concentration is too high to evaluate accurate spike recoveries.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina ¹	DW21704
Florida	E87487	North Carolina ²	41
Georgia	NELAP	North Dakota	R-140
Georgia ¹	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky ¹	90010	South Dakota	n/a
Kentucky ²	16	Tennessee ¹⁴	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

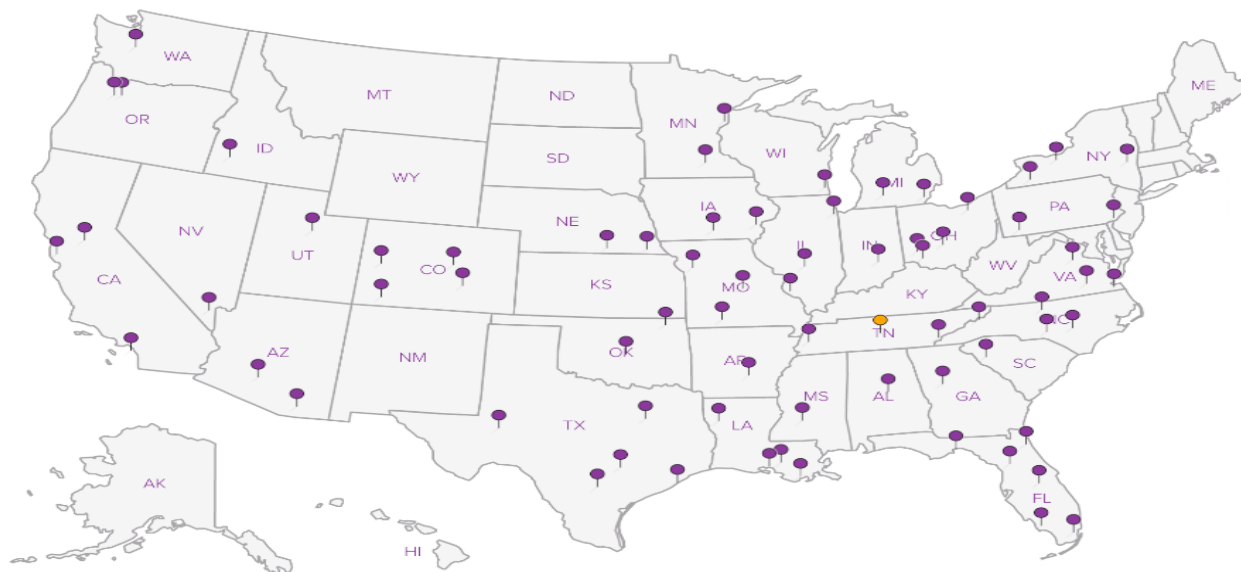
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ^{n/a} Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



AMEC Foster Wheeler - Houston, TX

585 N. Dairy Ashford
Houston, TX 77079

Billing Information:

Accounts Payable
585 N. Dairy Ashford
Houston, TX 77079

Email To: pamela.krueger@amecfw.com

Report to:
Pamela Krueger

Project: **WASTE WATER LINE**
Description: **Slurry Slinger Sump Investigation**

Phone: 713-929-5674
Fax:

Client Project #
6703160012.00

City/State
Collected:

Lab Project #
AMECFWHTX-SLURRY

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Rush? (Lab MUST Be Notified)
☐ Same Day200%
☐ Next Day100%
☐ Two Day50%
☐ Three Day25%

Date Results Needed

Email? ☐ No ☒ Yes
FAX? ☐ No ☐ Yes

Immediately
Packed on Ice N ☐ Y ☐

No.
of
Cntrs

8270 100ml Amb NoPres

DROOROLVI 40mlAmb-HCl-BT

DRORLA,SV8270 40zClr-NoPres

GRO 40mlAmb HCl

GRO,V8260 20zClr-NoPres

Skinner's List Mtls. 250mlHDPE-HNO3

Skinner's List Mtls. 20zClr-NoPres

V8260 40mlAmb-HCl

V8260- Trip Blank 40mlAmb-HCl-Bik

Chain of Custody Page 1 of 1



ESC
L.A.B. S.C.I.E.N.C.E.S.

YOUR LAB OF CHOICE

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859



L# **1835353**

1198

Acctnum: AMECFWHTX

Template: T112081

Prelogin: P552543

TSR: 526 - Chris McCord

PB: **5-4-10 KM**

Shipped Via: **FedEX Ground**

Rem./Contaminant Sample # (lab only)

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8270 100ml Amb NoPres	DROOROLVI 40mlAmb-HCl-BT	DRORLA,SV8270 40zClr-NoPres	GRO 40mlAmb HCl	GRO,V8260 20zClr-NoPres	Skinner's List Mtls. 250mlHDPE-HNO3	Skinner's List Mtls. 20zClr-NoPres	V8260 40mlAmb-HCl	V8260- Trip Blank 40mlAmb-HCl-Bik	Rem./Contaminant	Sample # (lab only)
		SS				3			X		X		X				
		SS				3			X		X		X				
		SS				3			X		X		X				
TMW-WWL1		GW	5/12/16	8:30		10	X	X		X		X		X			-01
TMW-WWL2		GW	5/12/16	9:00		10	X	X		X		X		X			02
TMW-WWL2D		GW	5/12/16	9:05		10	X	X		X		X		X			03
TRIP Blank		GW				1									X		04
TRIP Blank		GW				1									X		05
TRIP Blank		GW				1									X		

WWL-SPC*

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other

Remarks:

* Pamela Krueger will call in analysis for WWL1 Soil Pit Composite Sample

Relinquished by: (Signature)

Date: 5/12/16

Time: 11:00

Received by: (Signature)

Samples returned via: ☐ UPS

☐ FedEx ☐ Courier ☐

Relinquished by: (Signature)

Date:

Time:

Received by: (Signature)

Temp: 2.4 °C Bottles Received: 35

Relinquished by: (Signature)

Date:

Time:

Received for lab by: (Signature)

Date: 5-12-16 Time: 9:00

Condition: (lab use only)

5-054

COC Seal Intact: ☒ Y ☐ N ☐ NA

pH Checked: NCF:

6711 0132 9017

JW7
OK

ESC Lab Sciences Non-Conformance Form

Login #: L835353	Client: AMECFWHTX	Date: 5/13/16	Evaluated by: Jeremy
------------------	-------------------	---------------	----------------------

Non-Conformance (check applicable items)

Sample Integrity		Chain of Custody Clarification	
Parameter(s) past holding time	x	Login Clarification Needed	If Broken Container:
Improper temperature		Chain of custody is incomplete	Insufficient packing material around container
Improper container type		Please specify Metals requested.	Insufficient packing material inside cooler
Improper preservation		Please specify TCLP requested.	Improper handling by carrier (FedEx / UPS / Courier)
Insufficient sample volume.		Received additional samples not listed on coc.	Sample was frozen
Sample is biphasic.		Sample ids on containers do not match ids on coc	Container lid not intact
Vials received with headspace.		Trip Blank not received.	If no Chain of Custody:
Broken container		Client did not "X" analysis.	Received by:
Broken container:		Chain of Custody is missing	Date/Time:
Sufficient sample remains			Temp./Cont. Rec./pH:
			Carrier:
			Tracking#

Login Comments: Received a 125ml-NP for Anions for all TMW ID's not listed on COC.

Client informed by:	Call	Email	Voice Mail	Date:	Time:
TSR Initials: CM	Client Contact:				

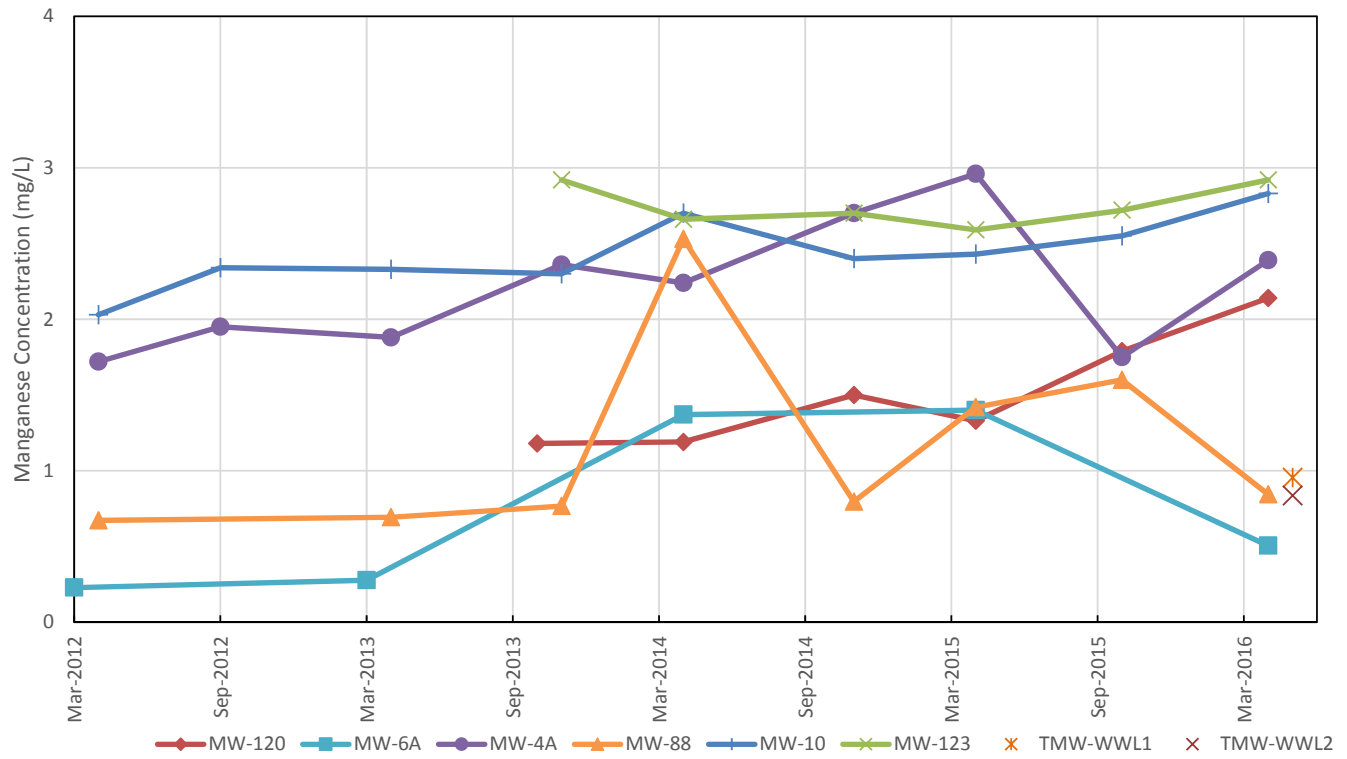
Login Instructions:

Log 125mL-NP for CHLORIDE, FLUORIDE and SULFATE.

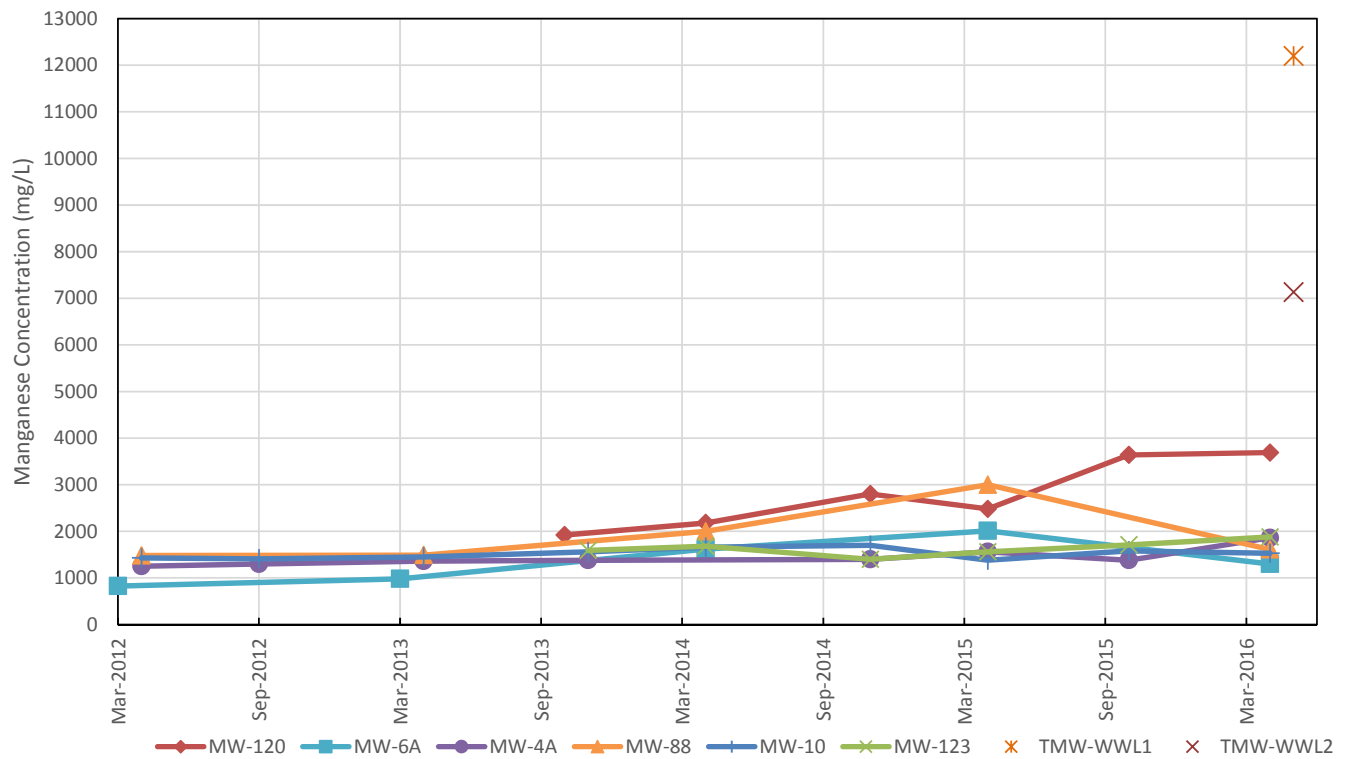
Also, change on all IDs: 8270 to 8270ACID; V8260 to V8260BTEX and only log metals FEICP and MNICP.

This E-mail and any attached files are confidential, and may be copyright protected. If you are not the addressee, any dissemination of this communication is strictly prohibited. If you have received this message in error, please contact the sender immediately and delete/destroy all information received.

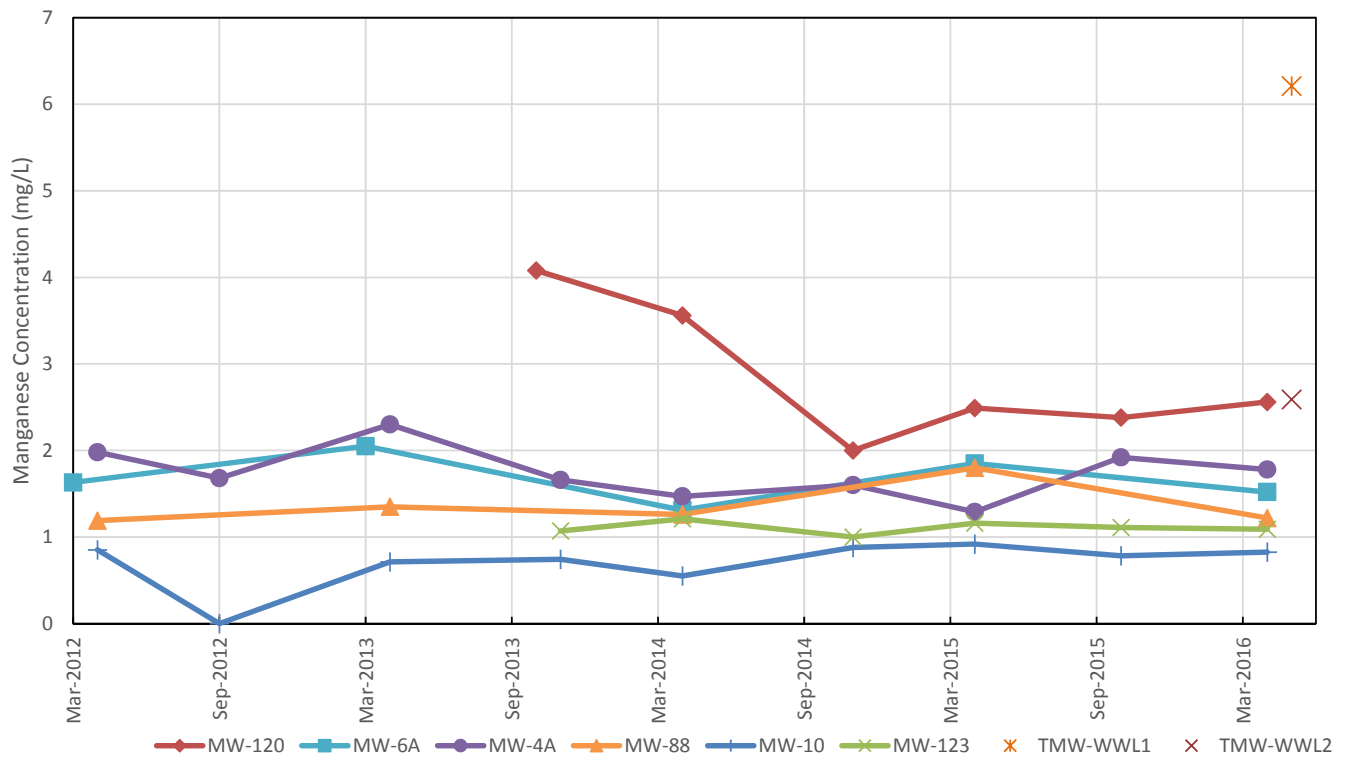
Manganese



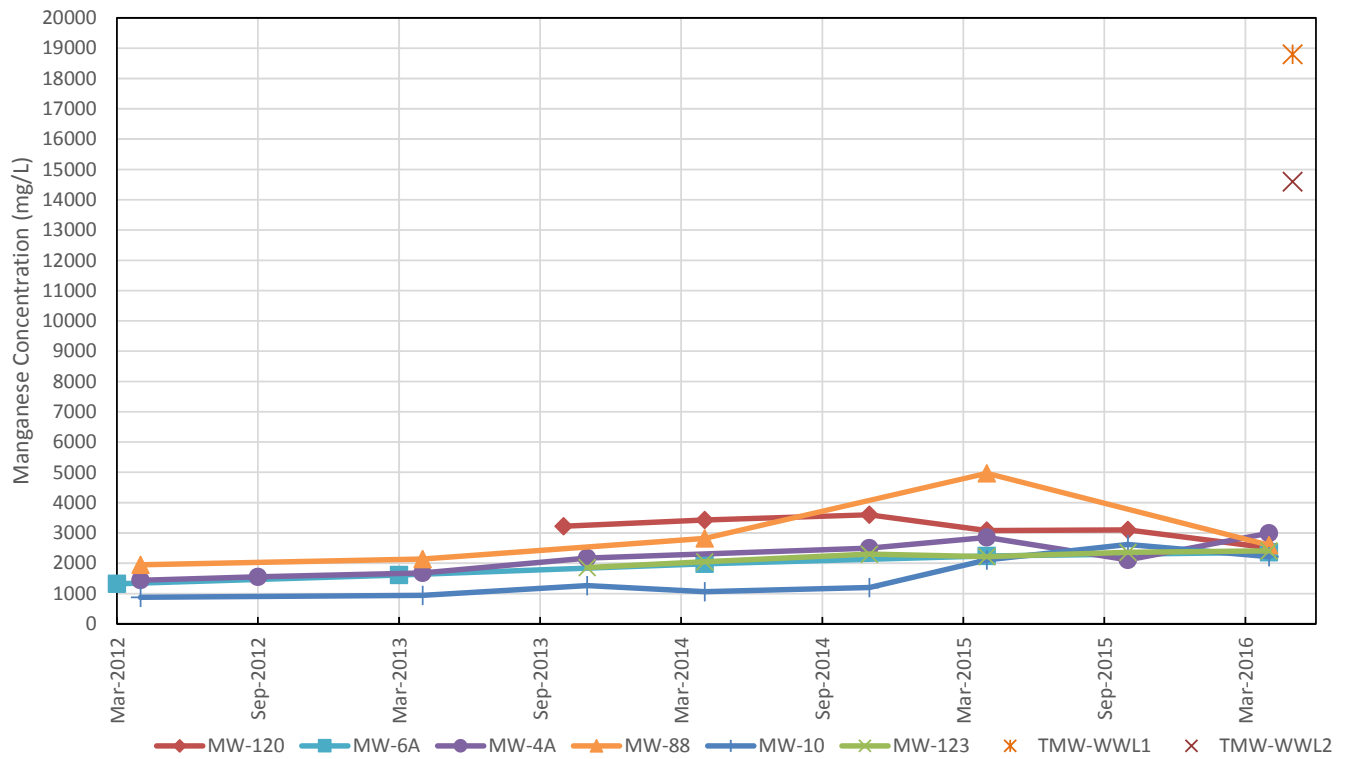
Chloride



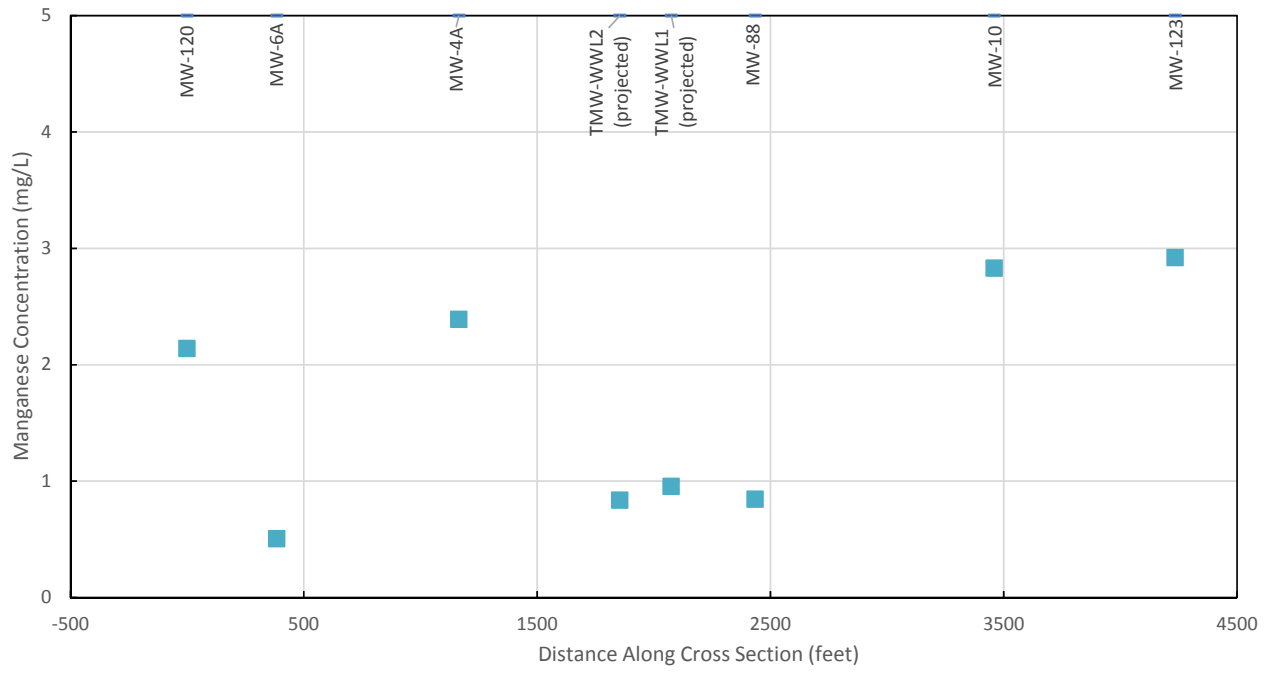
Fluoride



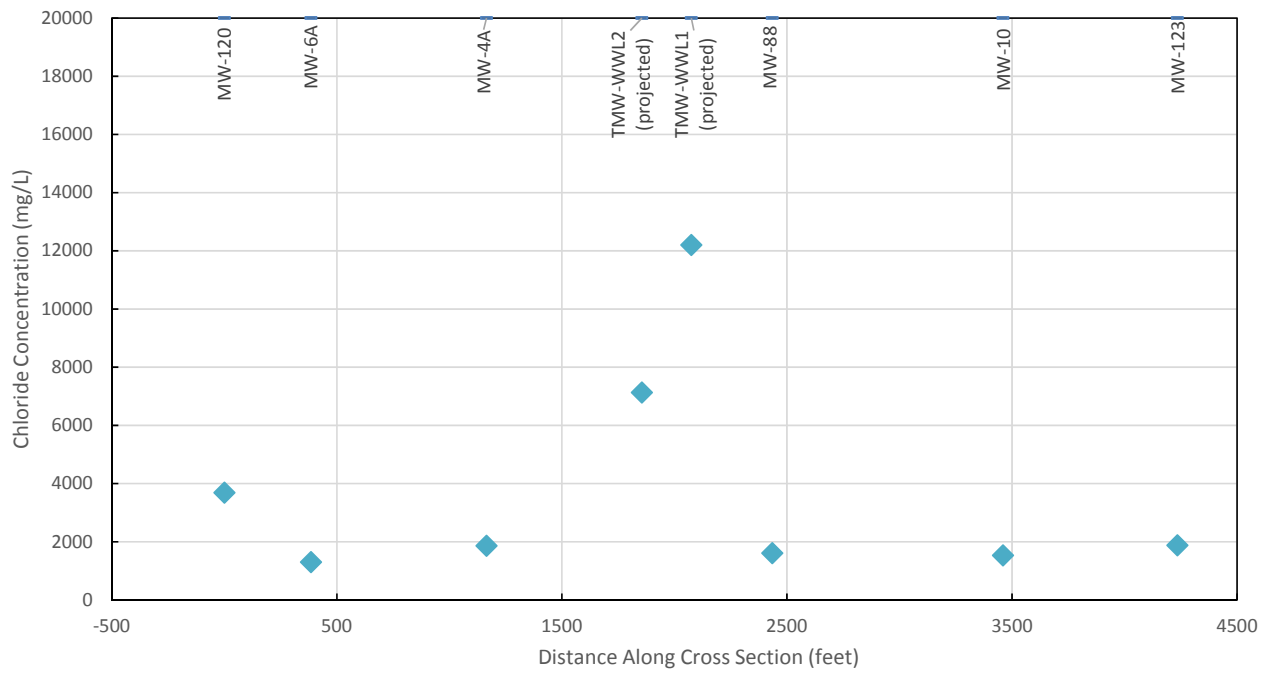
Sulfate



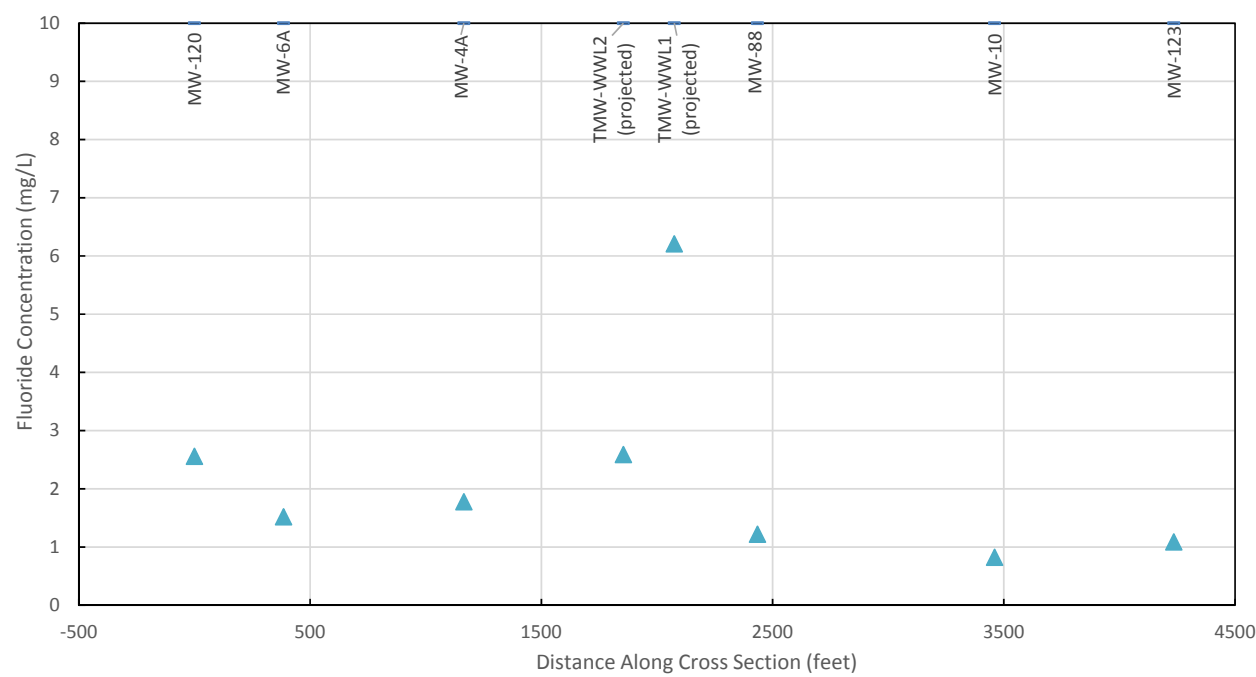
Manganese



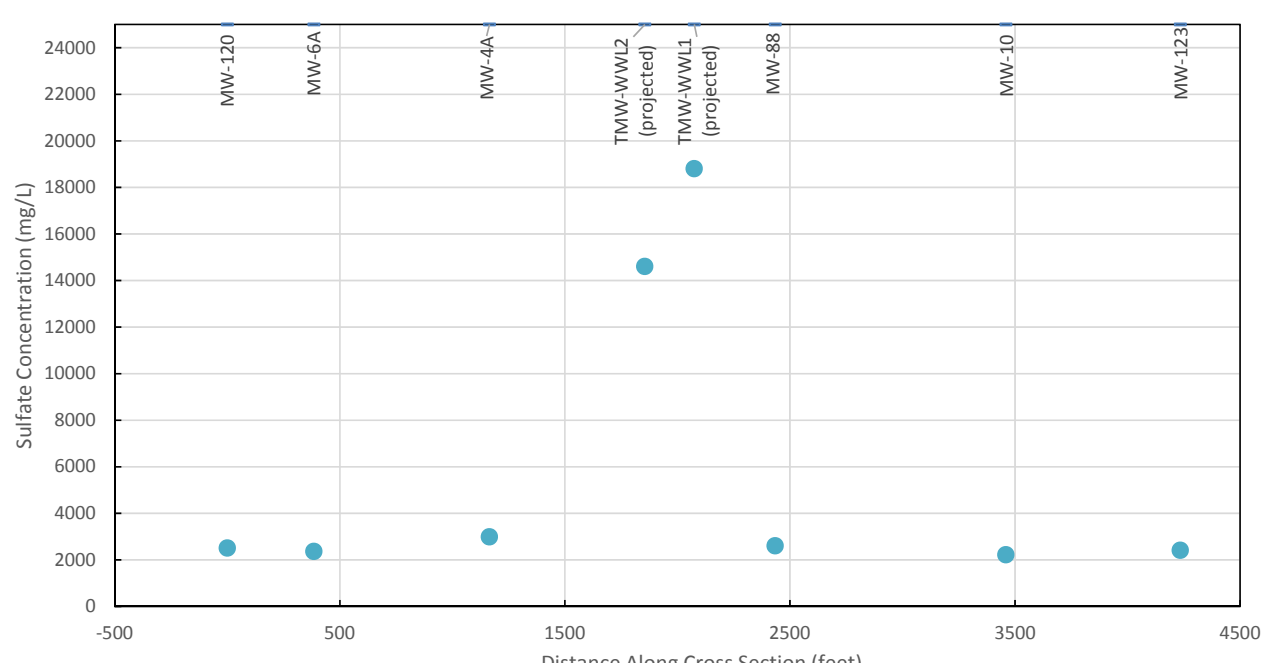
Chloride



Fluoride



Sulfate





July 28, 2016

Mr. Carl Chavez
Oil Conservation Division-Environmental Bureau
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

**RE: Investigation of the June 2015 Wastewater Pipeline Break near the Former Evaporation Ponds Area
HollyFrontier Navajo Refining LLC – Artesia Refinery
GW-028**

Dear Mr. Chavez:

Enclosed is a letter describing the investigation performed in response to the HollyFrontier Navajo Refining LLC (Navajo) Artesia Refinery June 2015 wastewater pipeline break near the former evaporation ponds. The investigation was performed according to the approved work plan for this investigation.

If you have any questions or comments regarding this request, 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

c: Robert Combs, Navajo

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Form C-141
Revised August 8, 2011

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Submit 1 Copy to appropriate District Office in
accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☐ Initial Report ☒ Final Report

Name of Company: Navajo Refining Company, L.L.C.	Contact: Robert Combs	
Address: 501 E. Main St., Artesia, NM 88210	Telephone No.: 575-746-5382	
Facility Name: Navajo Refining Company, L.L.C.	Facility Type: Petroleum Refinery	
Surface Owner: Navajo Refining Company, L.L.C.	Mineral Owner N/A	API No. N/A

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
-------------	---------	----------	-------	---------------	------------------	---------------	----------------	--------

Latitude_32°51'0.32"N Longitude_104°20'20.03"W

NATURE OF RELEASE

Type of Release: Non-hazardous treated wastewater effluent	Volume of Release: > 25 bbls	Volume Recovered: 75 bbls
Source of Release: Small hole in pipeline approximately 3 miles east of Artesia	Date and Hour of Occurrence: 04/12/15, Unknown time	Date and Hour of Discovery: 04/12/15 10:30 am
Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required	If YES, To Whom? NM Oil Conservation Division Santa Fe- Left message to Carl Chavez NM Oil Conservation Division Artesia - Left message, return call by Randy Dade NMED Hazardous Waste Bureau - Left message National Response Center - Incident report # 1113386	
By Whom? Ray Smalts	Date and Hour 04/12/15 ~13:15 - 13:30	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse. None	
If a Watercourse was Impacted, Describe Fully.* N/A		
Describe Cause of Problem and Remedial Action Taken.* Pipeline leak was discovered during daily visual monitoring of the pipeline route. Wastewater effluent discharge pumps located at the refinery were shut down and a vacuum truck was dispatched to the scene to remove the water which had accumulated with rain water in a low-lying depression in the pipeline path across a field. The vacuumed water was returned to the refinery wastewater treatment unit.		
Describe Area Affected and Cleanup Action Taken.* The release area is located approximately 3 miles from the refinery in a vacant field in the flood plane of the Pecos River. Pooled water was removed by vacuum truck and the pipeline was repaired. Investigation of the soil and groundwater in the vicinity of the release was performed, including the installation and sampling of two soil borings, conversion to temporary monitor wells and collection groundwater samples. The temporary wells were plugged after sampling was complete. The investigation report is attached. No further action for soil or groundwater was recommended.		
I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.		
Signature: 	<u>OIL CONSERVATION DIVISION</u>	
Printed Name: Robert Combs	Approved by Environmental Specialist:	
Title: Environmental Specialist	Approval Date:	Expiration Date:
E-mail Address:	Conditions of Approval:	
Date: 7/28/16 Phone: 575-746-5382	Attached <input type="checkbox"/>	

* Attach Additional Sheets If Necessary

July 27, 2016



Mr. Robert Combs
HollyFrontier Navajo LLC
510 East Main Street
Artesia, New Mexico 88210

**Investigation of the June 2015 Wastewater Pipeline Break near the
Former Evaporation Ponds Area
HollyFrontier Navajo Refinery, Artesia, New Mexico
Discharge Permit GW-028**

Dear Robert:

This release response report describes investigation of the soil and shallow groundwater near a wastewater pipeline break that occurred near the former evaporation ponds located east of the HollyFrontier Navajo LLC (Navajo) Refinery in Artesia, New Mexico. This investigation was performed according to the revised work plan¹ submitted to the New Mexico Energy, Minerals and Natural Resources Department Oil Conservation Division (OCD) in October 2015.

Release History

The release occurred due to a break in the pipeline that conveys treated wastewater from the Refinery to injection wells located approximately 12 miles east of the Refinery. The break occurred approximately three miles east of the Refinery, and south of the Evaporation Ponds (Figure 1).

The wastewater that is conveyed through the pipeline is sampled quarterly and analyzed for waste characterization purposes. A copy of the first quarter 2015 wastewater analytical report was provided in Attachment 1 to the work plan. The sample was analyzed for total metals, anions, cations, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), corrosivity, reactivity, ignitability, specific conductance, specific gravity, total dissolved solids (TDS), and pH. In addition, the sample was analyzed for eight metals using the toxicity characteristic leaching procedure (TCLP). The analytical suite includes the majority of the constituents of concern (COCs) listed in the New Mexico Water Quality Control Commission (WQCC) standards found at New Mexico Administrative Code 20.6.2.3013 and additional analyses required for waste characterization purposes.

¹ Arcadis. *Final Work Plan for the Soil and Groundwater Investigation at the Wastewater Pipeline Break near the Evaporation Ponds Area, Navajo Refining Company Artesia Refinery*. October 14, 2015.

The analytical results indicate that the wastewater is not corrosive, not reactive, not ignitable, not toxic (no TCLP metals detected), and contains no VOCs above the WQCC standards. The following compounds were reported above the WQCC standards:

- ▶ Phenol was reported at 0.0081 mg/L, above the WQCC standard of 0.005mg/L
- ▶ Iron was reported at 3.7 mg/L, above the WQCC standard of 1.0 mg/L
- ▶ Manganese was reported at 0.25 mg/L, above the WQCC standard of 0.2 mg/L
- ▶ Chloride was reported at 300 mg/L, above the WQCC standard of 250 mg/L
- ▶ Fluoride was reported at 11 mg/L, above the WQCC standard of 1.6 mg/L
- ▶ Sulfate was reported at 2,100 mg/L, above the WQCC standard of 600 mg/L
- ▶ TDS was reported at 3,710 mg/L, above the WQCC standard of 1,000 mg/L

Based on the analytical results of the wastewater, OCD requested that soil and shallow groundwater samples be collected from the vicinity of the pipeline break to evaluate whether impacts had occurred as a result of the break. An initial work plan was submitted in June 2015 and a final work plan, incorporating requested revisions from OCD, was submitted in October 2015.

Scope of Work Performed

Sample Locations

Two soil borings were advanced at the locations specified in the work plan and were converted to temporary monitoring wells. Figure 2 shows the locations of the two borings/temporary wells. Location TMW-WWL2 was located northwest of the pipeline break, in the upgradient direction, while TMW-WWL1 was located as close as possible to the pipeline break location, within the spill area in the downgradient direction. The borings/temporary wells were located a minimum of 25 feet from the pipeline due to subsurface clearance policies.

Prior to initiating the investigation, well drilling permits were obtained from the Office of the State Engineer (OSE) and a plugging plan for the temporary wells was filed with the OSE. A copy of the permits and plugging plan is provided in Attachment A to this letter.

Soil Samples

Soil samples were collected continuously by advancing a sample collection tool lined with acetate sleeves using a convertible Geoprobe™ 9520 rig, followed by the use of a hollow-stem auger to enlarge the boring. The soil samples were screened using a photo-ionization detector (PID) and were visually inspected. Field observations were recorded on boring logs, which are provided in Attachment B to this letter.

Soil samples were collected at depths of 1, 5, and 12 feet below ground surface (ft bgs) in both borings. The soil samples were placed in containers provided by the analytical laboratory, labelled, and placed into a sample cooler. The samples were shipped by overnight courier to the laboratory under proper chain of custody to be analyzed for the following:

- ▶ Total Petroleum Hydrocarbons (TPH):
 - Gasoline Range Organics (GRO)
 - Diesel Range Organics (DRO)
 - Oil Range Organics (ORO)
- ▶ Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)
- ▶ Chloride
- ▶ Fluoride
- ▶ Sulfate
- ▶ Iron
- ▶ Manganese
- ▶ Phenol

One field duplicate sample was collected and one equipment blank was collected during the soil sampling effort. A copy of the laboratory report is provided, in electronic format, in Attachment C to this letter. Analytical results are discussed below.

Groundwater Samples

Shallow groundwater was encountered at a depth of 12 ft bgs in each boring. Each boring was advanced to a depth of approximately 16 ft bgs and a temporary well screen was installed from 15 ft bgs to 5 ft bgs. The well screen was schedule 40 polyvinyl chloride (PVC) with 0.010 inch slots. A solid PVC riser was installed from 5 ft bgs to slightly above the ground surface. Silica sand, grade 20/40, was installed in the annular space around the well screen, extending 2 feet above the well screen. A 2-foot thick bentonite seal was placed above the sand pack.

The temporary wells were developed by pumping, with the intention of purging the wells until the water quality parameters stabilized. During the initial development efforts on May 10, 2016, both wells pumped dry. The wells were developed by allowing the groundwater to recover overnight, then purging them dry two more times each on May 11, 2016. The wells were then allowed to settle overnight prior to sample collection on May 12, 2016. Table 1 provides a summary of the well development process.

Groundwater samples were collected from each well and placed into containers provided by the laboratory. A duplicate sample was collected from TMW-WWL2, located on the eastern (downgradient) side of the pipeline break. The normal and duplicate samples were analyzed for the same parameters as the soil samples. A copy of the laboratory report is provided, in electronic format, in Attachment C to this letter. Analytical results are discussed below.

Data Evaluation

Soil Screening Values

Table 2 provides a summary of the soil analytical results, along with screening levels used in the soil data evaluation. The three sources of screening levels included:

- ▶ OCD Spill Guidance document²
- ▶ New Mexico Environment Department (NMED) Soil Screening Levels (SSLs) for the soil leaching to groundwater pathway with a diffusion attenuation factor of 20 (DAF 20)³
- ▶ Background threshold values (BTVs) developed from background soil samples collected near the former evaporation ponds⁴

As discussed in the work plan, previous investigations of the former evaporation ponds performed under the guidance of the NMED Hazardous Waste Bureau (HWB) included collection and analysis of shallow soil samples for inorganic parameters from background areas not affected by historical operations associated with the Refinery, including operation of the evaporation ponds. These background soil samples were used to determine BTVs for inorganics that are known to be present naturally in the soils in this area. The background soil sample locations are shown in Figure 2 and are within similar soil types to those observed in the borings installed as part of this investigation. The Phase IV Corrective Action Investigation Report – Revised⁴ contained the results of the background soil investigation and statistical evaluation of those results, including calculation of upper tolerance limits (UTLs) to be used as BTVs for this area. Because these BTVs are from similar soil types located within 1,000 to 5,000 feet of the investigation area, it is appropriate to apply these BTVs as a screening level for this investigation. OCD had previously stated that the BTVs would not be accepted because they had not yet been approved; however, subsequent to that discussion, the NMED approved the report⁵. Therefore, the BTVs for inorganic compounds are shown in Table 2 along with the NMED SSLs.

Soil Analytical Results

TPH: The analytical results for TPH were either not detectable or were significantly below the OCD Spill Guidance screening value of 100 mg/kg.

BTEX: None of the soil samples contained BTEX above the method detection limits and all method detection limits were at least one order of magnitude below the SSLs.

Phenol: None of the soil samples contained phenol above the method detection limit and the method detection limit was four orders of magnitude below the SSL.

² New Mexico Oil Conservation Division. *Guidelines for Remediation of Leaks, Spills and Releases*. August 13, 1993.

³ New Mexico Environment Department. *Risk Assessment Guidance for Site Investigations and Remediation*. July 2015.

⁴ Arcadis. *Evaporation Ponds Phase IV Corrective Action Investigation Report – Revised*. May 2015.

⁵ New Mexico Environment Department. *Approval with Modifications: Evaporation Ponds Phase IV Corrective Action Investigation Report – Revised*, May 2015. October 6, 2015.

Iron: All of the soil samples contained iron at concentrations above the method detection limits. The samples collected from 1 ft bgs at both locations, and from 5 ft bgs from TMW-WWL1, contained iron at a concentration above the DAF 20 SSL, but below the BTV. The concentrations from the 1 and 5 ft bgs intervals were slightly higher from locations TMW-WWL1 than from location TMW-WWL2. Because the iron concentrations are below the BTV, this constituent is not considered to indicate the presence of impacts from the wastewater pipeline break.

Manganese: All of the soil samples contained manganese at concentrations above the method detection limits. All of the reported manganese concentrations were below both the DAF 20 SSL and the BTV for manganese. Therefore, there does not appear to have been any impact to the shallow soil.

Chloride: All of the soil samples contained chloride at concentrations above the method detection limits. All of the reported chloride concentrations were below the BTV for chloride and there is no DAF 20 SSL for chloride. Therefore, there does not appear to have been a significant impact to the shallow soil.

Fluoride: All of the soil samples contained fluoride at concentrations above the method detection limits. All of the reported fluoride concentrations were below both the DAF 20 SSL and the BTV for fluoride. Therefore, there does not appear to have been any impact to the shallow soil.

Sulfate: All of the soil samples contained sulfate at concentrations above the method detection limits. All of the reported sulfate concentrations were below the BTV for sulfate and there is no DAF 20 SSL for sulfate. Therefore, there does not appear to have been an impact to the shallow soil.

Groundwater Screening Values

Table 3 provides a summary of the groundwater analytical results, along with screening levels used in the groundwater data evaluation. The screening levels include the NMED TPH screening levels for TPH in groundwater³, the WQCC standards for groundwater with total dissolved solids (TDS) less than 10,000 milligrams per liter (mg/L).

Groundwater Analytical Results

TPH: The analytical results for TPH were either not detectable or were below the NMED TPH screening level of 0.2 mg/L.

BTEX: None of the groundwater samples contained BTEX above the method detection limits and all method detection limits were at least two orders of magnitude below the WQCC standards.

Phenol: None of the groundwater samples contained phenol above the method detection limit and the method detection limit was five orders of magnitude below the WQCC standard.

Iron: All of the groundwater samples contained iron at concentrations above the method detection limits; however, all of the concentrations were below the WQCC standard.

Manganese: All of the groundwater samples contained manganese at concentrations above the method detection limits and all of the concentrations were above the WQCC standard for manganese.

Chloride: All of the groundwater samples contained chloride at concentrations above the method detection limits. All of the reported chloride concentrations were above the WQCC standard. However, the chloride concentrations in the groundwater are three orders of magnitude higher than the chloride concentration in the wastewater sample. Thus, the wastewater could not have caused the elevated concentrations of chloride in the groundwater.

Fluoride: All of the groundwater samples contained fluoride at concentrations above the method detection limits. All of the reported fluoride concentrations were above the WQCC standard.

Sulfate: All of the groundwater samples contained sulfate at concentrations above the method detection limits. All of the reported sulfate concentrations were above the WQCC standard. However, the sulfate concentrations in the groundwater are an order of magnitude above the concentration of sulfate in the wastewater sample. Thus, the wastewater could not have caused the elevated concentrations of sulfate in the groundwater.

Comparison of Groundwater Analytical Results to Nearby Monitoring Wells

A comparison of the reported concentrations of manganese, chloride, fluoride and sulfate in the temporary wells to the reported concentrations in nearby permanent groundwater monitoring wells was performed to further evaluate the potential impacts from the wastewater pipeline break. The shallow groundwater flow direction in the vicinity of the former Evaporation Ponds and the wastewater pipeline break is to the south-southeast at a gradient of approximately 0.0012 feet per foot. The following monitoring wells were selected for comparison to the temporary wells:

- ▶ MW-120, located outside of the former Evaporation Ponds, near the termination of Three Mile Ditch, approximately 1600 feet north of the pipeline break
- ▶ MW-6A, located approximately 330 feet downgradient from MW-120, approximately 1430 feet north of the pipeline break
- ▶ MW-4A, located approximately 800 feet downgradient and slightly cross-gradient from MW-6A, approximately 1460 feet northeast of the pipeline break
- ▶ MW-88, located approximately 1270 feet downgradient of MW-6A, approximately 1250 feet east of the pipeline break
- ▶ MW-10, located approximately 1035 feet downgradient of MW-88, approximately 2100 east-southeast of the pipeline break
- ▶ MW-123, located approximately 780 feet south of MW-10, approximately 2560 feet southeast of the pipeline break

Trend charts were constructed using the reported concentrations of manganese, chloride, fluoride, and sulfate for each of these wells from the spring sampling event of 2012 through the spring sampling event of 2016. The trend charts are provided in Attachment D to this letter. As can be seen in the trend charts, the concentrations of these compounds fluctuate over time;

however, no obvious increasing trend in concentrations is observed in the well closest to the pipeline break area (MW-88) or in the downgradient direction (MW-10 and MW-123) following the June 2015 release.

In addition to the trend charts, a plot of the concentration reported from the April 2016 sampling for the wells listed above was constructed as a function of distance along a line connecting the wells from northwest to southeast. The locations of the temporary wells were projected onto the line between MW-4A and MW-88 and the concentrations reported from the May 2016 samples from the temporary wells were added to the plots. A concentration versus distance plot was constructed for manganese, chloride, fluoride, and sulfate and are included in Attachment D to this letter.

The comparisons of the temporary well sample results to the nearby monitoring well data (plots of concentration versus distance and trend plots over time) demonstrate that the manganese concentrations from the temporary wells are similar to the manganese concentrations in the general area. The concentrations of chloride, fluoride, and sulfate in the temporary wells appear to be elevated in one or both of the temporary wells when compared to the concentrations in the general area. Based on the concentrations of the chloride and sulfate in the wastewater sample, the wastewater is not the source of the elevated inorganic compounds in this area.

Conclusions and Recommendations

The investigation results indicate that no significant impact to soil has occurred. Although the reported concentrations of iron in the shallow soil samples are above the DAF 20 SSL, the concentrations are below the BTV for shallow soil in this area. The concentrations of chloride and sulfate in the shallow soil at location TMW-WWL1 are higher than those observed at location TMW-WWL2, but are below the BTV for shallow soil in this area. Therefore, no further action is recommended for soils.

The investigation results indicate that no impact from organic COCs has been observed in shallow groundwater; however, chloride, fluoride, and sulfate concentrations appear to be elevated in the temporary wells samples when compared to nearby downgradient monitoring wells. Based on the concentrations of the chloride and sulfate in the wastewater sample, the wastewater is not the source of the elevated inorganic compounds in this area. Because the wastewater is not a likely source for the elevated concentrations observed in the shallow groundwater, it is recommended that monitoring of the existing downgradient permanent monitoring wells continue according to the facility-wide monitoring program.

Mr. Robert Combs
July 27, 2016
Page 8

If you have any questions or comments, please feel free to contact me at 713-929-5674 or 713-249-8548.

Sincerely,
Amec Foster Wheeler Environment & Infrastructure, Inc.



Pamela R. Krueger
Senior Associate

c: David R. Hoffman, PE, Amec Foster Wheeler

Figures:

- 1 – Site Location Map
- 2 – Boring/Temporary Well Location Map

Tables:

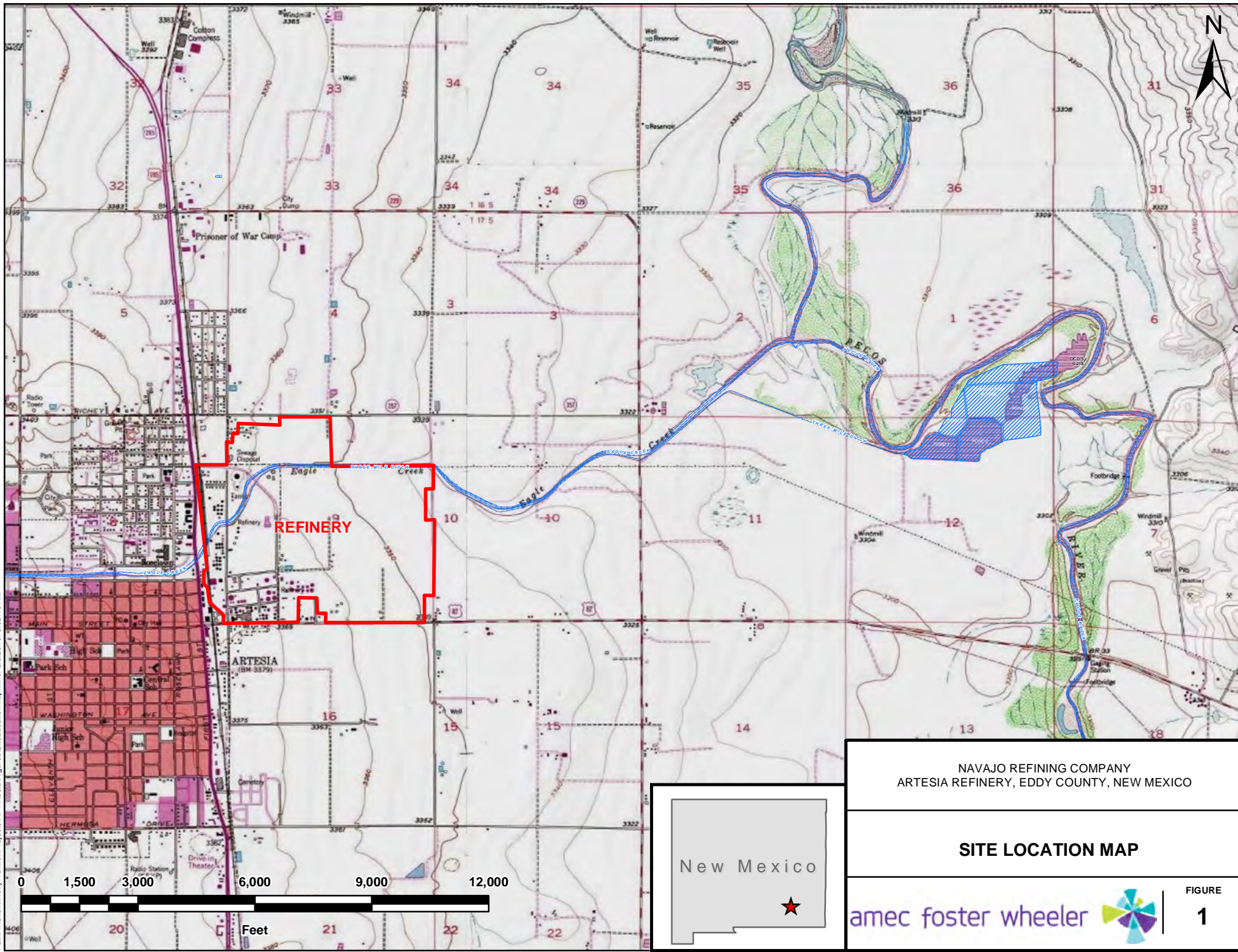
- 1 – Temporary Well Development Purge Parameters
- 2 – Soil Analytical Results from the Wastewater Pipeline Investigation
- 3 – Groundwater Analytical Results from the Wastewater Pipeline Investigation

Attachments:

- A – Well Installation Permits and Plugging Plan
- B – Boring and Temporary Well Completion Logs
- C – Laboratory Reports (electronic format)
- D – Trend Plots of Inorganic in Nearby Monitoring Wells

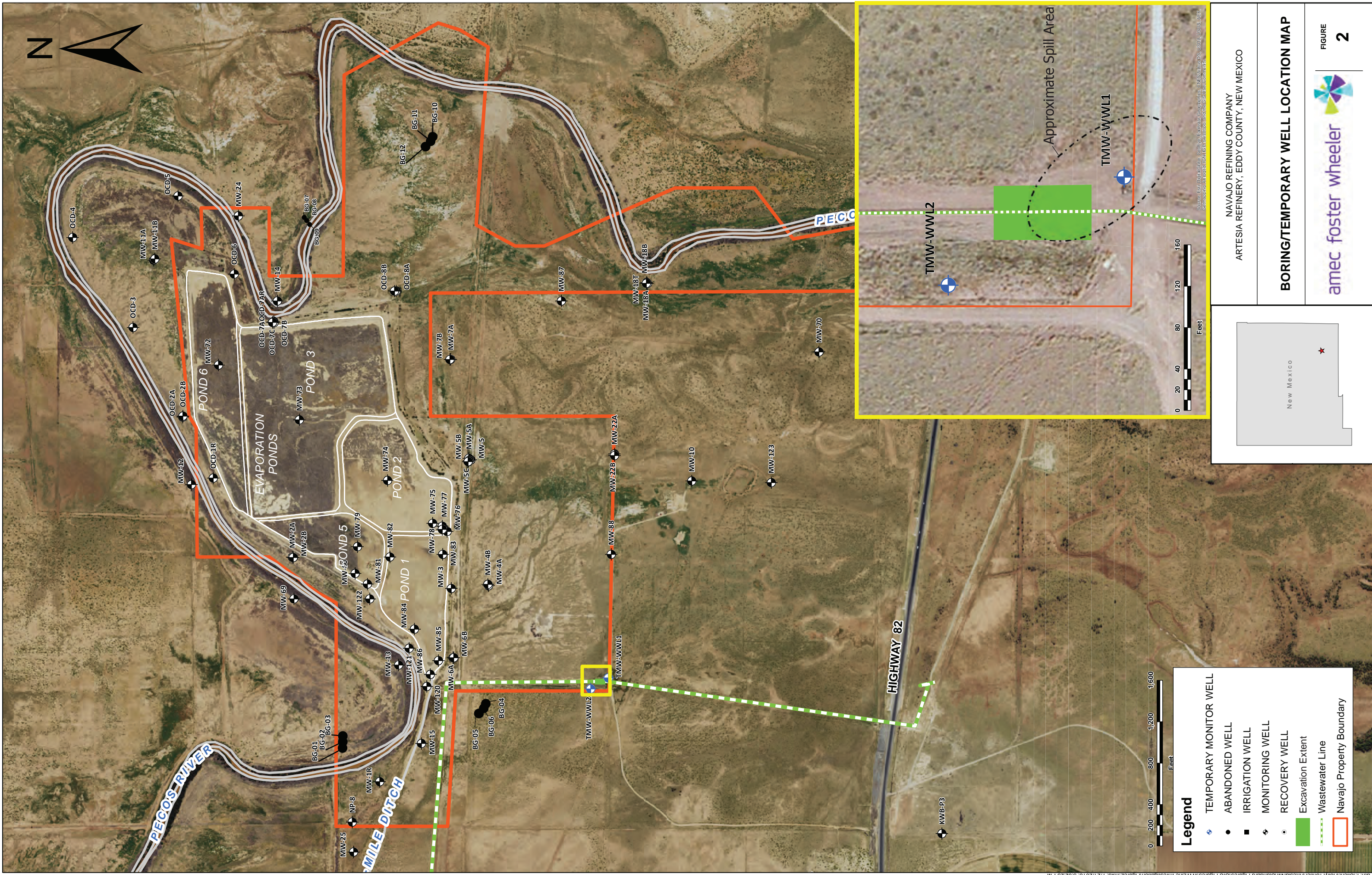
FIGURES

DB: C RICHARDS PM: P KRUEGER Project (Project #) 6703160002
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NAVAJO REFINING COMPANY
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

SITE LOCATION MAP



TABLES

Table 1 - Temporary Well Development Purge Parameters
HollyFrontier Navajo Refining LLC - Artesia, New Mexico

Location	TOC (ft msl)	Date	Time	Depth to Water (feet)	GW Elevation (ft msl)	Volume Purged (gallons)	Temperature (°C)	pH (SU)	Comments
TMW-WWL1	3284.25	5/10/2016	5:10 PM	6.95	3277.30	10	--	--	Purged dry
		5/11/2016	1:10 PM	6.98	3277.27	--	18.8	7.19	Slightly cloudy, no odor, fines
			1:12 PM	--	--	--	18.3	7.15	
			1:14 PM	--	--	--	18.2	7.20	
			1:15 PM	9.60	3274.65	5	18.1	7.17	Dry, rising
			5:25 PM	6.98	3277.27	--	18.8	7.23	Slow recovery
			5:27 PM	--	--	--	18.0	7.21	
			5:29 PM	9.00	3275.25	5	17.9	7.20	
		5/12/2016	8:30 AM	7.02	3277.23	--	--	--	Sampled
TMW-WWL2	3284.36	5/10/2016	5:10 PM	7.00	3277.36	10	--	--	Purged dry
		5/11/2016	1:00 PM	7.12	3277.24	--	19.1	7.15	Cloudy, fines
			1:01 PM	--	--	--	17.9	7.20	
			1:03 PM	--	--	--	17.6	7.21	
			1:05 PM	7.85	3276.51	5	17.5	7.17	
			5:14 PM	7.12	3277.24	--	18.0	7.25	Slow recovery
			5:16 PM	--	--	--	17.9	7.17	
			5:19 PM	7.50	3276.86	5	17.9	7.16	
		5/12/2016	9:00 AM	7.16	3277.20	--	--	--	Sampled

Definitions

°C = degrees Celsius

ft msl = feet mean sea level

GW = groundwater

SU = standard units

Table 2 - Soil Analytical Results from the Wastewater Line Investigation
HollyFrontier Navajo Refining LLC - Artesia, New Mexico

Location: Depth (ft bgs): Date:					TMW-WWL1			TMW-WWL2			
					1	5	12	1	5	12	12 (Duplicate)
					05/10/2016	05/10/2016	05/10/2016	05/10/2016	05/10/2016	05/10/2016	05/10/2016
Analyte	Units	Screening Levels									
		OCD Spill Guidance	NMED DAF 20 SSL	Former EP BTV							
GRO	mg/kg	100	--	--	< 0.108	< 0.108	< 0.108	0.255 J	< 0.108	< 0.108 J3 J6	< 0.108
DRO	mg/kg	100	--	--	7.31	< 1.61	< 1.61	< 1.61	< 1.61	< 1.61	< 1.61
ORO	mg/kg	100	--	--	3.15 J	< 0.274	< 0.274	0.687 J	< 0.274	< 0.274	< 0.274
Benzene	mg/kg	10	0.038	--	< 0.00135	< 0.00135	< 0.00135	< 0.00135	< 0.00135	< 0.00135	< 0.00135
Ethylbenzene	mg/kg	--	0.262	--	< 0.00148	< 0.00148	< 0.00148	< 0.00148	< 0.00148	< 0.00148	< 0.00148
Toluene	mg/kg	--	12.1	--	< 0.00217	< 0.00217	< 0.00217	< 0.00217	< 0.00217	< 0.00217	< 0.00148
Total Xylenes	mg/kg	--	2.98	--	< 0.00349	< 0.00349	< 0.00349	< 0.00349	< 0.00349	< 0.00349	< 0.00349
Phenol	mg/kg	--	52.3	--	< 0.00695	< 0.00695	< 0.00695	< 0.00695	< 0.00695	< 0.00695	< 0.00695
Iron	mg/kg	--	6,960	17,344	12,200	7,850	2,710	10,500	5,580	2,880	3,950
Manganese	mg/kg	--	2,630	488	388	162	65	344	71	80	95
Chloride	mg/kg	--	--	5,264	1,730	1,070	1,690	113	712	712	899
Fluoride	mg/kg	--	3,560	17.9	5.61	16.1	11.8	4.56	15.8	8.01	11.2
Sulfate	mg/kg	--	--	21,620	7,580	18,300	18,300	2,590	18,300	17,200	18,200

Notes and Definitions:

< X = Result reported as not detectable with a method detection limit equal to X
Values shown in bold font with blue shading indicate that the result was above the lower of the DAF 20 SSL or BTV, but less than the higher of the DAF 20 SSL or BTV.
Values shown in bold italics font with lavendar shading indicate that the result was above both the DAF 20 SSL and the BTV. No results met this screening criteria.

BTV = Background Threshold Value
DAF 20 = Soil leaching to groundwater pathway with dilution attenuation factor of 20
DRO = Diesel Range Organics
EP = Evaporation Ponds
GRO = Gasoline Range Organics
J = Estimated result reported at a concentration above the method detection limit but below the reporting limit.
J3 = Associated laboratory batch quality control sample was outsied the established control range for precision.
J6 = Sample matrix interfered with the ability to make an accurate determination of concentration; spike value is low.
mg/kg = milligrams per kilogram
NMED = New Mexico Environment Department
OCD = Oil Conservation Division
ORO = Motor Oil Range Organics
SSL = Soil Screening Level

Table 3 - Groundwater Analytical Results from the Wastewater Line Investigation

HollyFrontier Navajo Refining LLC - Artesia, New Mexico

Analyte	Units	NMED TPH	WQCC	Wastewater	TMW-WWL1	TMW-WWL2	
				2/23/2105	5/12/2016	5/12/2016	5/12/2016 (Duplicate)
GRO	mg/L	--	--	--	< 0.0314	< 0.0314	< 0.0314
DRO	mg/L	0.2	--	--	0.0851 J	0.182	0.0892 J
ORO	mg/L	0.2	--	--	0.0419 J	0.175	0.0898 J
Benzene	mg/L	--	0.01	< 0.0005	< 0.000331	< 0.000331	< 0.000331
Ethylbenzene	mg/L	--	0.75	< 0.0005	< 0.000384	< 0.000384	< 0.000384
Toluene	mg/L	--	0.75	< 0.0005	< 0.000780	< 0.000780	< 0.000780
Total Xylenes	mg/L	--	0.62	0.0041	< 0.00106	< 0.00106	< 0.00106
Phenol	mg/L	--	0.005	0.0081	< 0.000297	< 0.000297	< 0.000297
Iron	mg/L	--	1.0	3.7	0.234 J	0.169 J	0.981
Manganese	mg/L	--	0.2	0.25	0.954	0.836	0.910
Chloride	mg/L	--	250	300	12,200	7,130	7,100
Fluoride	mg/L	--	1.6	11	6.21	2.59	3.10
Sulfate	mg/L	--	600	2,100	18,800	14,600	16,800

Notes and Definitions:

< X = Result reported as not detectable with a method detection limit equal to X

Values shown in bold font with blue shading indicate that the result was above the lower of the WQCC or BTV, but less than the higher of the WQCC or BTV.

Values shown in bold italics font with lavender shading indicate that the result was above both the WQCC and the BTV.

DRO = Diesel Range Organics

GRO = Gasoline Range Organics

J = Estimated result reported at a concentration above the method detection limit but below the reporting limit.

mg/L = milligrams per liter

NMED = New Mexico Environment Department

ORO = Motor Oil Range Organics

TPH = Total Petroleum Hydrocarbons

WQCC = Water Quality Control Commission



ATTACHMENTS



ATTACHMENT A

Tom Blaine, P.E.
State Engineer



Roswell Office
1900 WEST SECOND STREET
ROSWELL, NM 88201

**STATE OF NEW MEXICO
OFFICE OF THE STATE ENGINEER**

Trn Nbr: 586987
File Nbr: RA 12403

May. 10, 2016

SCOTT DENTON
HOLLYFRONTIER NAVAJO REFINING
501 EAST MAIN STREET
ARTESIA, NM 88210


Greetings:

Enclosed is your copy of the above numbered permit that has been approved subject to the conditions set forth on the approval page. In accordance with the conditions of approval, the well can only be tested for 10 cumulative days, and the well is to be plugged on or before 05/31/2017, unless a permit to use the water is acquired from this office.

A Well Record & Log (OSE Form wr-20) shall be filed in this office within twenty (20) days after completion of drilling, but no later than 05/31/2017.

Appropriate forms can be downloaded from the OSE website www.ose.state.nm.us or will be mailed upon request.

Sincerely,


Juan Hernandez
(575) 622-6521

Enclosure

explore

File No.

RA-12403



NEW MEXICO OFFICE OF THE STATE ENGINEER

APPLICATION FOR PERMIT TO DRILL A WELL
WITH NO CONSUMPTIVE USE OF WATER

(check applicable box):

For fees, see State Engineer website: <http://www.ose.state.nm.us/>

- Purpose:
- ☐ Pollution Control And / Or Recovery ☐ Geo-Thermal
- ☐ Exploratory ☐ Construction Site De-Watering ☐ Other (Describe):
- ☒ Monitoring ☐ Mineral De-Watering

A separate permit will be required to apply water to beneficial use.

☒ Temporary Request - Requested Start Date: 5/1/2016

Requested End Date: 6/1/2016

Plugging Plan of Operations Submitted? ☒ Yes ☐ No

1. APPLICANT(S)

Name: HollyFrontier Navajo Refining LLC	Name:
Contact or Agent: check here if Agent <input type="checkbox"/> Scott Denton	Contact or Agent: check here if Agent <input type="checkbox"/>
Mailing Address: 501 East Main Street	Mailing Address:
City: Artesia	City:
State: NM Zip Code: 88210	State: Zip Code:
Phone: <input checked="" type="checkbox"/> Home <input type="checkbox"/> Cell Phone (Work): 575-746-5487	Phone: <input type="checkbox"/> Home <input type="checkbox"/> Cell Phone (Work): 575-746-5487
E-mail (optional): Scott.Denton@HollyFrontier.com	E-mail (optional):

FOR OSE INTERNAL USE

Application for Permit, Form wr-07, Rev 6/14/12

File No.: RA-12403	Trn. No.: 586987	Receipt No.:
Trans Description (optional): POD 1,2		
Sub-Basin:	PCW/LOG Due Date: 5-31-17	

2. WELL(S) Describe the well(s) applicable to this application.

Location Required: Coordinate location must be reported in NM State Plane (NAD 83), UTM (NAD 83), or Latitude/Longitude (Lat/Long - WGS84). District II (Roswell) and District VII (Cimarron) customers, provide a PLSS location in addition to above.

☐ NM State Plane (NAD83) (Feet)
 ☐ UTM (NAD83) (Meters)
 ☒ Lat/Long (WGS84) (to the nearest 1/10th of second)

☐ NM West Zone
 ☐ Zone 12N

☐ NM East Zone
 ☐ Zone 13N

☐ NM Central Zone

Well Number (if known):	X or Easting or Longitude:	Y or Northing or Latitude:	Provide if known: -Public Land Survey System (PLSS) (Quarters or Halves, Section, Township, Range) OR - Hydrographic Survey Map & Tract; OR - Lot, Block & Subdivision; OR - Land Grant Name
TMW-WWLine1	104 20' 20.1" W	32 51' 0.1" N	T17S, R26E, S12, Q4 1, Q16 3
TMW-WWLine2	104 20' 20.3" W	32 51' 0.7" N	T17S, R26E, S12, Q4 1, Q16 3

NOTE: If more well locations need to be described, complete form WR-08 (Attachment 1 – POD Descriptions)

Additional well descriptions are attached: ☐ Yes ☒ No If yes, how many _____

Other description relating well to common landmarks, streets, or other:
Temporary wells to be installed on either side of underground wastewater line south of former evaporation ponds, north of US Highway 82.

Well is on land owned by: HollyFrontier Navajo Refining, LLC

Well Information: **NOTE: If more than one (1) well needs to be described, provide attachment.** Attached? ☐ Yes ☒ No
If yes, how many _____

Approximate depth of well (feet): 10 to 12 feet Outside diameter of well casing (inches): 2

Driller Name: Envirotech Drilling Services LLC Driller License Number: WD-1757

3. ADDITIONAL STATEMENTS OR EXPLANATIONS

Temporary monitoring wells will be installed and developed, allowed to rest for 24 hours, sampled (once only), then plugged and abandoned. The purpose of the temporary monitoring wells is to determine whether wastewater released from an identified line break may have impacted the shallow groundwater beneath the pipeline.

2016 MAY -2 PM 4:20

FOR USE INTERNAL USE

Application for Permit, Form wr-07

File No.: RA-12403

Trn No.: 586987

4. SPECIFIC REQUIREMENTS: The applicant must include the following, as applicable to each well type. Please check the appropriate boxes, to indicate the information has been included and/or attached to this application:

Exploratory: <input type="checkbox"/> Include a description of any proposed pump test, if applicable.	Pollution Control and/or Recovery: <input type="checkbox"/> Include a plan for pollution control/recovery, that includes the following: <input type="checkbox"/> A description of the need for the pollution control or recovery operation. <input type="checkbox"/> The estimated maximum period of time for completion of the operation. <input type="checkbox"/> The annual diversion amount. <input type="checkbox"/> The annual consumptive use amount. <input type="checkbox"/> The maximum amount of water to be diverted and injected for the duration of the operation. <input type="checkbox"/> The method and place of discharge. <input type="checkbox"/> The method of measurement of water produced and discharged. <input type="checkbox"/> The source of water to be injected. <input type="checkbox"/> The method of measurement of water injected. <input type="checkbox"/> The characteristics of the aquifer. <input type="checkbox"/> The method of determining the resulting annual consumptive use of water and depletion from any related stream system. <input type="checkbox"/> Proof of any permit required from the New Mexico Environment Department. <input type="checkbox"/> An access agreement if the applicant is not the owner of the land on which the pollution plume control or recovery well is to be located.	Construction De-Watering: <input type="checkbox"/> Include a description of the proposed dewatering operation, <input type="checkbox"/> The estimated duration of the operation, <input type="checkbox"/> The maximum amount of water to be diverted, <input type="checkbox"/> A description of the need for the dewatering operation, and, <input type="checkbox"/> A description of how the diverted water will be disposed of.	Mine De-Watering: <input type="checkbox"/> Include a plan for pollution control/recovery, that includes the following: <input type="checkbox"/> A description of the need for mine dewatering. <input type="checkbox"/> The estimated maximum period of time for completion of the operation. <input type="checkbox"/> The source(s) of the water to be diverted. <input type="checkbox"/> The geohydrologic characteristics of the aquifer(s). <input type="checkbox"/> The maximum amount of water to be diverted per annum. <input type="checkbox"/> The maximum amount of water to be diverted for the duration of the operation. <input type="checkbox"/> The quality of the water. <input type="checkbox"/> The method of measurement of water diverted. <input type="checkbox"/> The recharge of water to the aquifer. <input type="checkbox"/> Description of the estimated area of hydrologic effect of the project. <input type="checkbox"/> The method and place of discharge. <input type="checkbox"/> An estimation of the effects on surface water rights and underground water rights from the mine dewatering project. <input type="checkbox"/> A description of the methods employed to estimate effects on surface water rights and underground water rights. <input type="checkbox"/> Information on existing wells, rivers, springs, and wetlands within the area of hydrologic effect.
Monitoring: <input checked="" type="checkbox"/> Include the reason for the monitoring well, and, <input checked="" type="checkbox"/> The duration of the planned monitoring.		Geo-Thermal: <input type="checkbox"/> Include a description of the geothermal heat exchange project, <input type="checkbox"/> The amount of water to be diverted and re-injected for the project, <input type="checkbox"/> The time frame for constructing the geothermal heat exchange project, and, <input type="checkbox"/> The duration of the project. <input type="checkbox"/> Preliminary surveys, design data, and additional information shall be included to provide all essential facts relating to the request.	

ACKNOWLEDGEMENT

I, We (name of applicant(s)), Scott Denton on behalf of HollyFrontier Navajo Refining LLC

Print Name(s)

affirm that the foregoing statements are true to the best of (my, our) knowledge and belief.

Robert Combs for Scott M. Denton

Applicant Signature

Applicant Signature

ACTION OF THE STATE ENGINEER

This application is:

☒ approved

☐ partially approved

☐ denied

provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare and further subject to the attached conditions of approval.

Witness my hand and seal this 10th day of May 20 16, for the State Engineer,

Tom Blaine, P.E.

State Engineer

By:

Signature

Print

Title: Juan Hernandez, Engr Specialist Supervisor

Print

FOR USE INTERNAL USE

Application for Permit, Form wr-07

File No.:

RA-12403

Trn No.:

586987

**NEW MEXICO STATE ENGINEER OFFICE
PERMIT TO EXPLORE**

SPECIFIC CONDITIONS OF APPROVAL

- 1A Depth of the well shall not exceed the thickness of the valley fill.
- 4 No water shall be appropriated and beneficially used under this permit.
- 6 The well shall be plugged upon completion of the permitted use, and a plugging report shall be filed with the State Engineer within 10 days.
- 7 The Permittee shall utilize the highest and best technology available to ensure conservation of water to the maximum extent practical.
- B The well shall be drilled by a driller licensed in the State of New Mexico in accordance with Section 72-12-12 New Mexico Statutes Annotated.
- C Driller's well record must be filed with the State Engineer within 20 days after the well is drilled or driven. Well record forms will be provided by the State Engineer upon request.
- C2 No water shall be diverted from this well except for testing purposes which shall not exceed ten (10) cumulative days, and well shall be plugged or capped on or before , unless a permit to use water from this well is acquired from the Office of the State Engineer.
- P The well shall be constructed, maintained, and operated to prevent inter-aquifer exchange of water and to prevent loss of hydraulic head between geologic zones.

**NEW MEXICO STATE ENGINEER OFFICE
PERMIT TO EXPLORE**

SPECIFIC CONDITIONS OF APPROVAL (Continued)

Q The State Engineer retains jurisdiction over this permit.

LOG The Point of Diversion RA 12403 POD1 must be completed and the Well Log filed on or before 05/31/2017.

LOG The Point of Diversion RA 12403 POD2 must be completed and the Well Log filed on or before 05/31/2017.

IT IS THE PERMITTEES RESPONSIBILITY TO OBTAIN ALL AUTHORIZATIONS AND PERMISSIONS TO DRILL ON PROPERTY OF OTHER OWNERSHIP BEFORE COMMENCING ACTIVITIES UNDER THIS PERMIT.

SHOULD THE PERMITTEE CHANGE THE PURPOSE OF USE TO OTHER THAN MONITORING PURPOSES, AN APPLICATION SHALL BE ACQUIRED FROM THE OFFICE OF THE STATE ENGINEER.

ACTION OF STATE ENGINEER

Notice of Intention Rcvd:	Date Rcvd. Corrected:
Formal Application Rcvd: 05/02/2016	Pub. of Notice Ordered:
Date Returned - Correction:	Affidavit of Pub. Filed:

This application is approved provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare of the state; and further subject to the specific conditions listed previously.

Witness my hand and seal this 10 day of May A.D., 2016

Tom Blaine, P.E., State Engineer

By: 

Juan Hernandez

Trn Desc: RA 12403 POD1,2

File Number: RA 12403

Trn Number: 586987

Locator Tool Report

General Information:

Application ID: 29 Date: 05-10-2016 Time: 08:42:10

WR File Number: RA
Purpose: POINT OF DIVERSION

Applicant First Name: HOLLY FRONTIER NAVAJO REFINING LC
Applicant Last Name: TMW-WWLINE2

GW Basin: ROSWELL ARTESIAN
County: EDDY

Critical Management Area Name(s): NONE
Special Condition Area Name(s): NONE
Land Grant Name: NON GRANT

PLSS Description (New Mexico Principal Meridian):

SW 1/4 of SW 1/4 of SE 1/4 of NW 1/4 of Section 12, Township 17S, Range 26E.

Coordinate System Details:

Geographic Coordinates:

Latitude: 32 Degrees 51 Minutes 0.7 Seconds N
Longitude: 104 Degrees 20 Minutes 20.3 Seconds W

Universal Transverse Mercator Zone: 13N

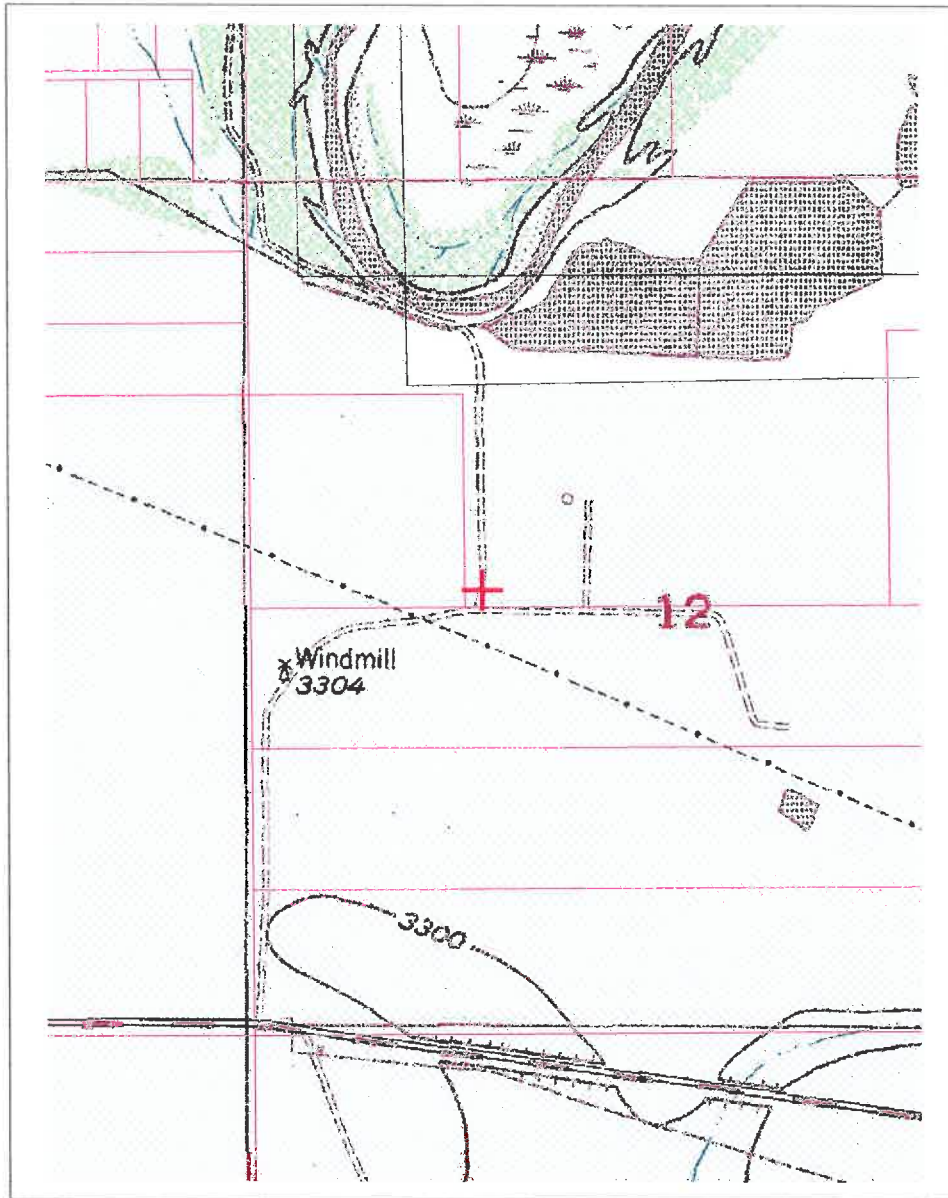
NAD 1983(92) (Meters)	N: 3,634,873	E: 561,855
NAD 1983(92) (Survey Feet)	N: 11,925,413	E: 1,843,353
NAD 1927 (Meters)	N: 3,634,670	E: 561,905
NAD 1927 (Survey Feet)	N: 11,924,748	E: 1,843,516

State Plane Coordinate System Zone: New Mexico East

NAD 1983(92) (Meters)	N: 205,141	E: 164,472
NAD 1983(92) (Survey Feet)	N: 673,034	E: 539,606
NAD 1927 (Meters)	N: 205,122	E: 151,921
NAD 1927 (Survey Feet)	N: 672,971	E: 498,427

NEW MEXICO OFFICE OF STATE ENGINEER

Locator Tool Report



WR File Number: RA

Scale: 1:14,368

Northing/Easting: UTM83(92) (Meter): N: 3,634,873

E: 561,855

Northing/Easting: SPCS83(92) (Feet): N: 673,034

E: 539,606

GW Basin: Roswell Artesian

Locator Tool Report

General Information:

Application ID:29 Date: 05-10-2016 Time: 08:40:32

WR File Number: RA
Purpose: POINT OF DIVERSION

Applicant First Name: HOLLY FRONTIER NAVAJO REFINING LC
Applicant Last Name: TMW-WWLINE1

GW Basin: ROSWELL ARTESIAN
County: EDDY

Critical Management Area Name(s): NONE
Special Condition Area Name(s): NONE
Land Grant Name: NON GRANT

PLSS Description (New Mexico Principal Meridian):

SW 1/4 of SW 1/4 of SE 1/4 of NW 1/4 of Section 12, Township 17S, Range 26E.

Coordinate System Details:

Geographic Coordinates:

Latitude: 32 Degrees 51 Minutes 0.1 Seconds N
Longitude: 104 Degrees 20 Minutes 20.1 Seconds W

Universal Transverse Mercator Zone: 13N

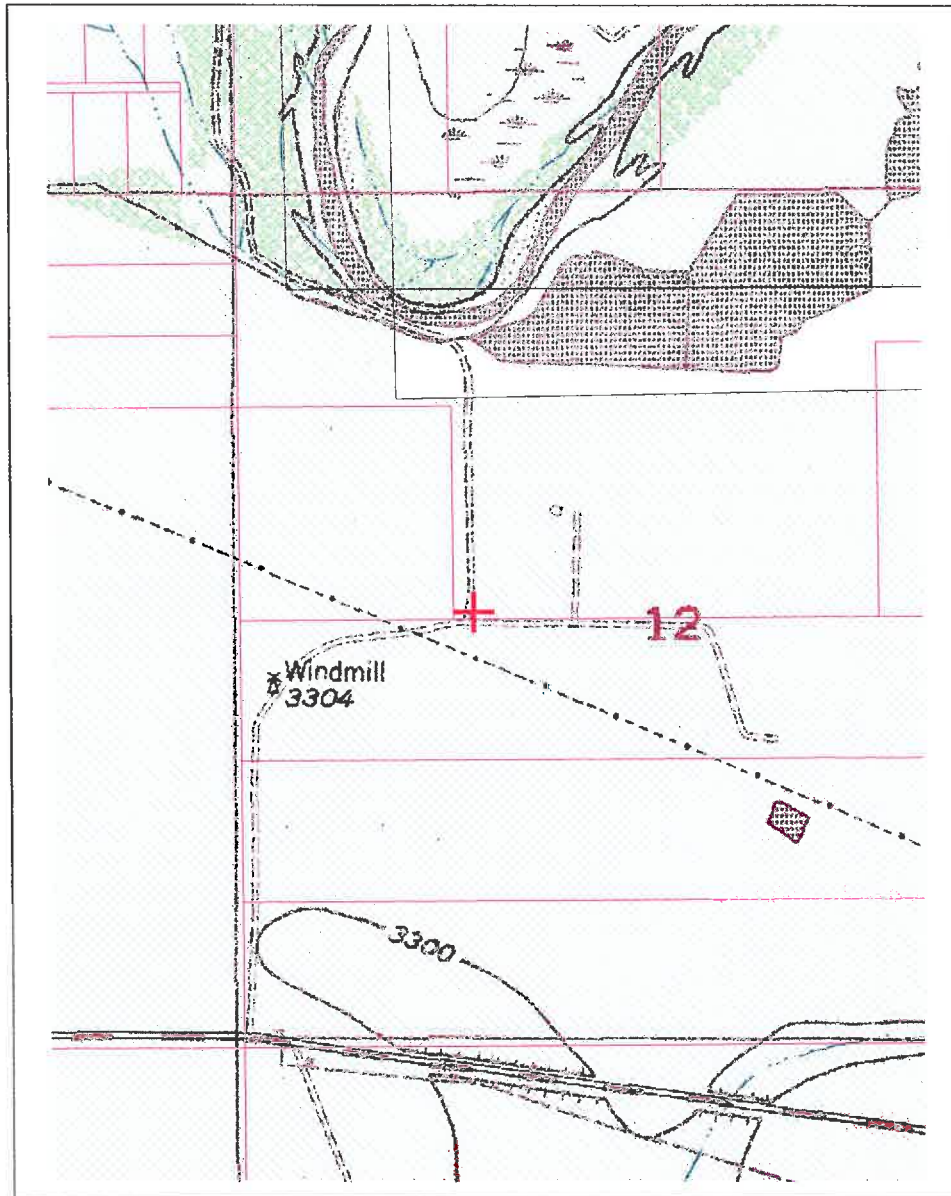
NAD 1983(92) (Meters)	N: 3,634,855	E: 561,860
NAD 1983(92) (Survey Feet)	N: 11,925,353	E: 1,843,371
NAD 1927 (Meters)	N: 3,634,652	E: 561,910
NAD 1927 (Survey Feet)	N: 11,924,687	E: 1,843,534

State Plane Coordinate System Zone: New Mexico East

NAD 1983(92) (Meters)	N: 205,123	E: 164,477
NAD 1983(92) (Survey Feet)	N: 672,973	E: 539,623
NAD 1927 (Meters)	N: 205,103	E: 151,926
NAD 1927 (Survey Feet)	N: 672,910	E: 498,444

NEW MEXICO OFFICE OF STATE ENGINEER

Locator Tool Report



WR File Number: RA

Scale: 1:14,368

Northing/Easting: UTM83(92) (Meter): N: 3,634,855

E: 561,860

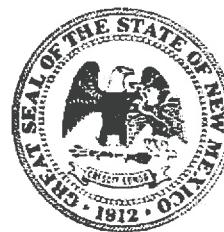
Northing/Easting: SPCS83(92) (Feet): N: 672,973

E: 539,623

GW Basin: Roswell Artesian



WELL PLUGGING PLAN OF OPERATIONS



NOTE: A Well Plugging Plan of Operations shall be filed with and accepted by the Office of the State Engineer prior to plugging.

I. FILING FEE: There is no filing fee for this form.

II. GENERAL / WELL OWNERSHIP:

Existing Office of the State Engineer POD Number (Well Number) for well to be plugged: RA-12403
Name of well owner: HollyFrontier Navajo Refining, LLC
Mailing address: 501 East Main Street
City: Artesia State: NM Zip code: 88210
Phone number: 575-746-5487 E-mail: Scott.Denton@HollyFrontier.com

III. WELL DRILLER INFORMATION:

Well Driller contracted to provide plugging services: Envirotech Drilling Services LLC
New Mexico Well Driller License No.: WD-1757 Expiration Date: 1/31/2018

IV. WELL INFORMATION:

Note: A copy of the existing Well Record for the well to be plugged should be attached to this plan.

- 1) GPS Well Location: Latitude: 32 deg, 51 min, 0.1 sec
Longitude: 104 deg, 20 min, 20.1 sec, NAD 83
- 2) Reason(s) for plugging well:

This plan is for two temporary monitoring wells that will only be sampled one time, and will be plugged and abandoned once the sample collection has been completed.
- 3) Was well used for any type of monitoring program? Yes If yes, please use section VII of this form to detail what hydrogeologic parameters were monitored. If the well was used to monitor contaminated or poor quality water, authorization from the New Mexico Environment Department may be required prior to plugging.
- 4) Does the well tap brackish, saline, or otherwise poor quality water? Yes If yes, provide additional detail, including analytical results and/or laboratory report(s):

Temporary wells are located south of former Evaporation Ponds, near monitoring wells that are included in a semiannual monitoring program. Data from those wells are reported to NMED and OCD annually, and have TDS values ranging from 5,000 to 11,000 mg/L.
- 5) Static water level: 5 - 7 feet below land surface feet above land surface (circle one)
- 6) Depth of the well: 10 - 12 feet

- 7) Inside diameter of innermost casing: 2 inches.
- 8) Casing material: PVC
- 9) The well was constructed with:
☐ an open-hole production interval, state the open interval: _____
☒ a well screen or perforated pipe, state the screened interval(s): 2 to 10 (or 2 to 12)
- 10) What annular interval surrounding the artesian casing of this well is cement-grouted? N/A
- 11) Was the well built with surface casing? No No If yes, is the annulus surrounding the surface casing grouted or otherwise sealed? _____ If yes, please describe:
- 12) Has all pumping equipment and associated piping been removed from the well? N/A If not, describe remaining equipment and intentions to remove prior to plugging in Section VII of this form.

V. DESCRIPTION OF PLANNED WELL PLUGGING:

Note: If this plan proposes to plug an artesian well in a way other than with cement grout, placed bottom to top with a tremie pipe, a detailed diagram of the well showing proposed final plugged configuration shall be attached, as well as any additional technical information, such as geophysical logs, that are necessary to adequately describe the proposal.

- 1) Describe the method by which cement grout shall be placed in the well, or describe requested plugging methodology proposed for the well:

Lean cement grout will be placed in the boring from the bottom up using a tremie pipe.
- 2) Will well head be cut-off below land surface after plugging? PVC casing will be removed

VI. PLUGGING AND SEALING MATERIALS:

Note: The plugging of a well that taps poor quality water may require the use of a specialty cement or specialty sealant

- 1) For plugging intervals that employ cement grout, complete and attach Table A.
- 2) For plugging intervals that will employ approved non-cement based sealant(s), complete and attach Table B.
- 3) Theoretical volume of grout required to plug the well to land surface: 1.6 - 2 gallons
- 4) Type of Cement proposed: Portland cement
- 5) Proposed cement grout mix: 5 gallons of water per 94 pound sack of Portland cement.
- 6) Will the grout be: _____ batch-mixed and delivered to the site
X mixed on site

02:41:20 PM 4/20

APPROVED FOR PLUGGING

- 7) Grout additives requested, and percent by dry weight relative to cement:

- 8) Additional notes and calculations:

VII. ADDITIONAL INFORMATION: List additional information below, or on separate sheet(s):

VIII. SIGNATURE:

I, Scott Denton, say that I have carefully read the foregoing Well Plugging Plan of Operations and any attachments, which are a part hereof; that I am familiar with the rules and regulations of the State Engineer pertaining to the plugging of wells and will comply with them, and that each and all of the statements in the Well Plugging Plan of Operations and attachments are true to the best of my knowledge and belief.

Robert Conks for Scott M. Denton 5/2/16

Signature of Applicant

Date

IX. ACTION OF THE STATE ENGINEER:

This Well Plugging Plan of Operations is:

X Approved subject to the attached conditions.
 Not approved for the reasons provided on the attached letter.

Witness my hand and official seal this 16th day of May, 2016

Tom Blaine P.E., New Mexico State Engineer

By: Andy Morley C. Goetz

Fox Andy Morley
District II Manager

2016 MAY -2 PM 4:20
NEW MEXICO STATE ENGINEER
OFFICE OF THE STATE ENGINEER

TABLE A - For plugging intervals that employ cement grout. Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of grout placement (ft bgl)			0
Bottom of proposed interval of grout placement (ft bgl)			10-12
Theoretical volume of grout required per interval (gallons)			1.6 to 2
Proposed cement grout mix gallons of water per 94-lb. sack of Portland cement			5
Mixed on-site or batch-mixed and delivered?			mixed on-site
Grout additive 1 requested			
Additive 1 percent by dry weight relative to cement			
Grout additive 2 requested			
Additive 2 percent by dry weight relative to cement			

2016 MAY -2 PM 4:20

WELL PLUGGING PLAN
VERSION: AUGUST 11, 2015

TABLE B - For plugging intervals that will employ approved non-cement based sealant(s). Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow
			Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of sealant placement (ft bgl)			
Bottom of proposed sealant or grout placement (ft bgl)			
Theoretical volume of sealant required per interval (gallons)			
Proposed abandonment sealant (manufacturer and trade name)			

2016 MAY -2 PM 4: 20

STATE OF TEXAS
COMMISSIONER OF AGRICULTURE

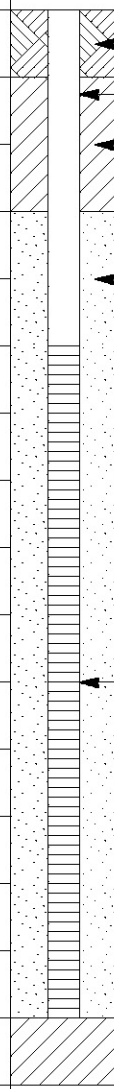


ATTACHMENT B

PROJECT: HollyFrontier Navajo Wastewater Line Release Investigation					Log of Well No. TMW-WWL-1	
BORING LOCATION:					GROUND SURFACE ELEVATION AND DATUM:	
DRILLING CONTRACTOR: Envirotech Services					DATE STARTED: 5/10/16	DATE FINISHED: 5/10/16
DRILLING METHOD: Hollow Stem Auger					TOTAL DEPTH (ft.): 16.0	SCREEN INTERVAL (ft.): 10'
DRILLING EQUIPMENT: Geoprobe 9520					DEPTH TO WATER ATD: 12'	CASING: 2'
SAMPLING METHOD: Auger					LOGGED BY: William Smith	
HAMMER WEIGHT: NA		DROP: NA			RESPONSIBLE PROFESSIONAL: William Smith	REG. NO.

DEPTH (feet)	SAMPLES		OVM Reading	DESCRIPTION	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample Blows/ Foot		NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	
0			0	SANDY CLAY (CL): reddish-brown, dry, low carbonate induration, low-medium plasticity, no odor, no staining	<p>Open</p> <p>2" Diameter Casing</p> <p>Bentonite</p> <p>20/40 Grade Silica Sand</p> <p>Sch 40 0.010 Slot PVC Screen</p>
5			0	SANDY CLAY (CL): reddish-brown, low carbonate induration, medium-high plasticity, no odor, no staining	
			0	SANDY CLAY (CL): light brown, low plasticity, no odor, no staining	
			0	SANDY CLAY (CL): brown, low plasticity, gypsum crystals, no odor, no staining	
10			0	SANDY CLAY (CL): light reddish-brown, low carbonate induration, low-medium plasticity, damp, contains some gypsum crystals, no odor, no staining	
15			0	Gypsiferous SANDY CLAY (CL): whitish-green, low plasticity, moist, no odor, no staining	
				Total Depth = 15.5'	
				Sampler Stopped at 16' Auger Stopped at 15' TMW-WWL-1 Set to 15.5'	

PROJECT: HollyFrontier Navajo Wastewater Line Release Investigation					Log of Well No. TMW-WWL-2	
BORING LOCATION:					GROUND SURFACE ELEVATION AND DATUM:	
DRILLING CONTRACTOR: Envirotech Services					DATE STARTED: 5/10/16	DATE FINISHED: 5/10/16
DRILLING METHOD: Hollow Stem Auger					TOTAL DEPTH (ft.): 16.0	SCREEN INTERVAL (ft.): 10'
DRILLING EQUIPMENT: Geoprobe 9520					DEPTH TO WATER ATD: 12'	CASING: 2'
SAMPLING METHOD: Auger					LOGGED BY: William Smith	
HAMMER WEIGHT: NA		DROP: NA			RESPONSIBLE PROFESSIONAL: William Smith	REG. NO.

DEPTH (feet)	SAMPLES		OVM Reading	DESCRIPTION	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample Blows/ Foot		NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	
0			0	SILTY SAND (SM): light brown, damp, non-plastic, no odor, no stain	 <p>Open</p> <p>2" Diameter Casing</p> <p>Bentonite</p> <p>20/40 Grade Silica Sand</p> <p>Sch 40 0.010 Slot PVC Screen</p>
5			0	SANDY CLAY (CL): brown, damp, medium plasticity, contains some gypsum crystals, no odor, no stain, SANDY CLAY (CL): light reddish-brown, damp, medium to high plasticity, contains some gypsum crystals, no odor, no stain,	
10			0		
15			0	SANDY CLAY (CL): reddish-brown, moist, low plasticity, low-moderate carbonate induration becomes more gymsiferous with depth, no odor, organic, no stain	
20				TOTAL DEPTH = 16' Sampler Stopped at 16' Auger Stopped at 15' TMW-WWL-1 Set to 15'	

ATTACHMENT C

May 24, 2016

AMEC Foster Wheeler - Houston, TX

Sample Delivery Group: L835078
Samples Received: 05/12/2016
Project Number: 6703160012.001
Description: Wastewater Line Investigation
Site: HOLLEY FRONTIER NAVAJO
Report To: Pamela Krueger
585 N. Dairy Ashford
Houston, TX 77079

Entire Report Reviewed By:



Chris McCord
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



TMW-WWL1-01 L835078-01 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 15:00

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:06	BRJ
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 16:05	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 12:02	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873092	5	05/17/16 17:13	05/18/16 07:06	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872230	5	05/19/16 00:02	05/19/16 08:15	DWR
Wet Chemistry by Method 9056A	WG872631	20	05/16/16 17:26	05/17/16 11:40	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 01:04	CM

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

TMW-WWL1-05 L835078-02 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 15:10

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:08	CCE
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 16:29	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 10:49	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873092	5	05/17/16 17:13	05/18/16 09:12	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872230	5	05/19/16 00:02	05/19/16 08:37	DWR
Wet Chemistry by Method 9056A	WG872631	50	05/16/16 17:26	05/17/16 12:04	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 01:52	CM

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

TMW-WWL1-12 L835078-03 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 15:20

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:17	CCE
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 16:52	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 11:02	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873092	5	05/17/16 17:13	05/18/16 09:35	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872230	5	05/19/16 00:02	05/19/16 09:00	DWR
Wet Chemistry by Method 9056A	WG872631	50	05/16/16 17:26	05/17/16 12:28	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 02:16	CM

TMW-WWL2-01 L835078-04 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 16:20

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:20	BRJ
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 17:15	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 11:50	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873092	5	05/17/16 17:13	05/18/16 09:58	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872230	5	05/19/16 00:02	05/19/16 09:22	DWR
Wet Chemistry by Method 9056A	WG872631	1	05/16/16 17:26	05/17/16 06:29	CM
Wet Chemistry by Method 9056A	WG872631	10	05/16/16 17:26	05/17/16 12:52	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 02:40	CM

TMW-WWL2-05 L835078-05 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 16:30

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:23	BRJ
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 17:39	JF

ACCOUNT:

AMEC Foster Wheeler - Houston, TX

PROJECT:

6703160012.001

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05/24/16 18:07

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



TMW-WWL2-05 L835078-05 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 16:30

Received date/time
05/12/16 09:00

¹Cp

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 11:14	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873092	5	05/17/16 17:13	05/18/16 10:21	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG873800	5	05/19/16 11:42	05/19/16 15:29	BMB
Wet Chemistry by Method 9056A	WG872631	1	05/16/16 17:26	05/17/16 06:53	CM
Wet Chemistry by Method 9056A	WG872631	50	05/16/16 17:26	05/17/16 13:16	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 03:04	CM

²Tc

³Ss

⁴Cn

⁵Sr

TMW-WWL2-12 L835078-06 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 16:50

Received date/time
05/12/16 09:00

⁶Qc

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:26	CCE
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 18:02	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 11:26	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873220	5	05/18/16 18:29	05/18/16 20:23	JAH
Volatile Organic Compounds (GC/MS) by Method 8260B	WG873800	5	05/19/16 11:42	05/19/16 15:53	BMB
Wet Chemistry by Method 9056A	WG872631	1	05/16/16 17:26	05/17/16 07:17	CM
Wet Chemistry by Method 9056A	WG872631	50	05/16/16 17:26	05/17/16 13:40	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 04:16	CM

⁷Gl

⁸Al

⁹Sc

TMW-WWL2-12D L835078-07 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 16:55

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:29	CCE
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG873908	1	05/19/16 22:56	05/20/16 12:33	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 11:38	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873220	5	05/18/16 18:29	05/18/16 20:46	JAH
Volatile Organic Compounds (GC/MS) by Method 8260B	WG873800	5	05/19/16 11:42	05/19/16 16:17	BMB
Wet Chemistry by Method 9056A	WG872631	1	05/16/16 17:26	05/17/16 09:36	CM
Wet Chemistry by Method 9056A	WG872631	50	05/16/16 17:26	05/17/16 14:04	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 04:40	CM

TMW-WW6-EQ L835078-08 GW

Collected by
William R. Smith

Collected date/time
05/10/16 18:00

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872401	1	05/16/16 10:43	05/16/16 15:27	ST
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872427	1	05/12/16 21:03	05/15/16 18:23	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872369	1	05/12/16 20:58	05/15/16 10:41	JNS
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG872916	1	05/17/16 19:24	05/17/16 19:24	LRL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872248	1	05/13/16 18:16	05/13/16 18:16	LRL
Wet Chemistry by Method 9056A	WG873772	1	05/20/16 04:02	05/20/16 04:02	SAM

ACCOUNT:

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PROJECT:

6703160012.001

SDG:

L835078

DATE/TIME:

05/24/16 18:07

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All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Chris McCord
Technical Service Representative

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	1730		15.9	200	20	05/17/2016 11:40	WG872631
Fluoride	5.61		0.261	1.00	1	05/19/2016 01:04	WG873240
Sulfate	7580		11.4	1000	20	05/17/2016 11:40	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	12200		1.41	10.0	1	05/14/2016 14:06	WG872357
Manganese	388		0.120	1.00	1	05/14/2016 14:06	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/18/2016 07:06	WG873092
(S) a,a,a-Trifluorotoluene(FID) 99.2				59.0-128		05/18/2016 07:06	WG873092

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 08:15	WG872230
Toluene	U		0.00217	0.0250	5	05/19/2016 08:15	WG872230
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 08:15	WG872230
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 08:15	WG872230
(S) Toluene-d8	105			88.7-115		05/19/2016 08:15	WG872230
(S) Dibromofluoromethane	103			76.3-123		05/19/2016 08:15	WG872230
(S) a,a,a-Trifluorotoluene	95.8			87.2-117		05/19/2016 08:15	WG872230
(S) 4-Bromofluorobenzene	96.7			69.7-129		05/19/2016 08:15	WG872230

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	7.31		1.61	4.00	1	05/17/2016 12:02	WG872902
C28-C40 Oil Range	3.15	J	0.274	4.00	1	05/17/2016 12:02	WG872902
(S) o-Terphenyl	91.8			50.0-150		05/17/2016 12:02	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 16:05	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 16:05	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 16:05	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 16:05	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 16:05	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 16:05	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 16:05	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 16:05	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 16:05	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 16:05	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 16:05	WG872189
(S) 2-Fluorophenol	67.0			21.1-116		05/18/2016 16:05	WG872189
(S) Phenol-d5	68.0			26.3-121		05/18/2016 16:05	WG872189
(S) Nitrobenzene-d5	83.5			21.9-129		05/18/2016 16:05	WG872189
(S) 2-Fluorobiphenyl	74.9			34.9-129		05/18/2016 16:05	WG872189



Collected date/time: 05/10/16 15:00

L835078

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	62.6			21.6-142		05/18/2016 16:05	WG872189
(S) p-Terphenyl-d14	63.6			21.5-128		05/18/2016 16:05	WG872189

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	1070		39.8	500	50	05/17/2016 12:04	WG872631
Fluoride	16.1		0.261	1.00	1	05/19/2016 01:52	WG873240
Sulfate	18300		28.5	2500	50	05/17/2016 12:04	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	7850		1.41	10.0	1	05/14/2016 14:08	WG872357
Manganese	162		0.120	1.00	1	05/14/2016 14:08	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/18/2016 09:12	WG873092
(S) a,a,a-Trifluorotoluene(FID) 98.8				59.0-128		05/18/2016 09:12	WG873092

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 08:37	WG872230
Toluene	U		0.00217	0.0250	5	05/19/2016 08:37	WG872230
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 08:37	WG872230
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 08:37	WG872230
(S) Toluene-d8	105			88.7-115		05/19/2016 08:37	WG872230
(S) Dibromofluoromethane	104			76.3-123		05/19/2016 08:37	WG872230
(S) a,a,a-Trifluorotoluene	95.5			87.2-117		05/19/2016 08:37	WG872230
(S) 4-Bromofluorobenzene	99.6			69.7-129		05/19/2016 08:37	WG872230

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 10:49	WG872902
C28-C40 Oil Range	U		0.274	4.00	1	05/17/2016 10:49	WG872902
(S) o-Terphenyl	98.1			50.0-150		05/17/2016 10:49	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 16:29	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 16:29	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 16:29	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 16:29	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 16:29	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 16:29	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 16:29	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 16:29	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 16:29	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 16:29	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 16:29	WG872189
(S) 2-Fluorophenol	57.1			21.1-116		05/18/2016 16:29	WG872189
(S) Phenol-d5	46.4			26.3-121		05/18/2016 16:29	WG872189
(S) Nitrobenzene-d5	64.5			21.9-129		05/18/2016 16:29	WG872189
(S) 2-Fluorobiphenyl	66.2			34.9-129		05/18/2016 16:29	WG872189



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	39.8			21.6-142		05/18/2016 16:29	WG872189
(S) p-Terphenyl-d14	39.6			21.5-128		05/18/2016 16:29	WG872189

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	1690		39.8	500	50	05/17/2016 12:28	WG872631
Fluoride	11.8		0.261	1.00	1	05/19/2016 02:16	WG873240
Sulfate	18300		28.5	2500	50	05/17/2016 12:28	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	2710		1.41	10.0	1	05/14/2016 14:17	WG872357
Manganese	64.7		0.120	1.00	1	05/14/2016 14:17	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/18/2016 09:35	WG873092
(S) a,a,a-Trifluorotoluene(FID)	99.0			59.0-128		05/18/2016 09:35	WG873092

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 09:00	WG872230
Toluene	U		0.00217	0.0250	5	05/19/2016 09:00	WG872230
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 09:00	WG872230
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 09:00	WG872230
(S) Toluene-d8	106			88.7-115		05/19/2016 09:00	WG872230
(S) Dibromofluoromethane	104			76.3-123		05/19/2016 09:00	WG872230
(S) a,a,a-Trifluorotoluene	96.3			87.2-117		05/19/2016 09:00	WG872230
(S) 4-Bromofluorobenzene	98.8			69.7-129		05/19/2016 09:00	WG872230

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 11:02	WG872902
C28-C40 Oil Range	U		0.274	4.00	1	05/17/2016 11:02	WG872902
(S) o-Terphenyl	95.4			50.0-150		05/17/2016 11:02	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 16:52	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 16:52	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 16:52	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 16:52	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 16:52	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 16:52	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 16:52	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 16:52	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 16:52	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 16:52	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 16:52	WG872189
(S) 2-Fluorophenol	64.9			21.1-116		05/18/2016 16:52	WG872189
(S) Phenol-d5	58.7			26.3-121		05/18/2016 16:52	WG872189
(S) Nitrobenzene-d5	64.9			21.9-129		05/18/2016 16:52	WG872189
(S) 2-Fluorobiphenyl	56.2			34.9-129		05/18/2016 16:52	WG872189



Collected date/time: 05/10/16 15:20

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Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	51.6			21.6-142		05/18/2016 16:52	WG872189
(S) p-Terphenyl-d14	46.8			21.5-128		05/18/2016 16:52	WG872189

- 1Cp
- 2Tc
- 3Ss
- 4Cn
- 5Sr
- 6Qc
- 7Gl
- 8Al
- 9Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	113		0.795	10.0	1	05/17/2016 06:29	WG872631
Fluoride	4.56		0.261	1.00	1	05/19/2016 02:40	WG873240
Sulfate	2590		5.70	500	10	05/17/2016 12:52	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	10500		1.41	10.0	1	05/14/2016 14:20	WG872357
Manganese	344		0.120	1.00	1	05/14/2016 14:20	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	0.255	J	0.108	0.500	5	05/18/2016 09:58	WG873092
(S) a,a,a-Trifluorotoluene(FID) 99.7				59.0-128		05/18/2016 09:58	WG873092

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 09:22	WG872230
Toluene	U		0.00217	0.0250	5	05/19/2016 09:22	WG872230
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 09:22	WG872230
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 09:22	WG872230
(S) Toluene-d8	106			88.7-115		05/19/2016 09:22	WG872230
(S) Dibromofluoromethane	103			76.3-123		05/19/2016 09:22	WG872230
(S) a,a,a-Trifluorotoluene	97.8			87.2-117		05/19/2016 09:22	WG872230
(S) 4-Bromofluorobenzene	100			69.7-129		05/19/2016 09:22	WG872230

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 11:50	WG872902
C28-C40 Oil Range	0.687	J	0.274	4.00	1	05/17/2016 11:50	WG872902
(S) o-Terphenyl	84.3			50.0-150		05/17/2016 11:50	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 17:15	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 17:15	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 17:15	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 17:15	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 17:15	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 17:15	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 17:15	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 17:15	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 17:15	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 17:15	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 17:15	WG872189
(S) 2-Fluorophenol	63.6			21.1-116		05/18/2016 17:15	WG872189
(S) Phenol-d5	67.5			26.3-121		05/18/2016 17:15	WG872189
(S) Nitrobenzene-d5	72.4			21.9-129		05/18/2016 17:15	WG872189
(S) 2-Fluorobiphenyl	77.4			34.9-129		05/18/2016 17:15	WG872189



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	71.5			21.6-142		05/18/2016 17:15	WG872189
(S) p-Terphenyl-d14	67.0			21.5-128		05/18/2016 17:15	WG872189

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	712		0.795	10.0	1	05/17/2016 06:53	WG872631
Fluoride	15.8		0.261	1.00	1	05/19/2016 03:04	WG873240
Sulfate	18300		28.5	2500	50	05/17/2016 13:16	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	5580		1.41	10.0	1	05/14/2016 14:23	WG872357
Manganese	70.6		0.120	1.00	1	05/14/2016 14:23	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/18/2016 10:21	WG873092
(S) a,a,a-Trifluorotoluene(FID) 99.0				59.0-128		05/18/2016 10:21	WG873092

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 15:29	WG873800
Toluene	U		0.00217	0.0250	5	05/19/2016 15:29	WG873800
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 15:29	WG873800
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 15:29	WG873800
(S) Toluene-d8	101			88.7-115		05/19/2016 15:29	WG873800
(S) Dibromofluoromethane	102			76.3-123		05/19/2016 15:29	WG873800
(S) a,a,a-Trifluorotoluene	101			87.2-117		05/19/2016 15:29	WG873800
(S) 4-Bromofluorobenzene	101			69.7-129		05/19/2016 15:29	WG873800

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 11:14	WG872902
C28-C40 Oil Range	U		0.274	4.00	1	05/17/2016 11:14	WG872902
(S) o-Terphenyl	96.4			50.0-150		05/17/2016 11:14	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 17:39	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 17:39	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 17:39	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 17:39	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 17:39	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 17:39	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 17:39	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 17:39	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 17:39	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 17:39	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 17:39	WG872189
(S) 2-Fluorophenol	59.4			21.1-116		05/18/2016 17:39	WG872189
(S) Phenol-d5	58.8			26.3-121		05/18/2016 17:39	WG872189
(S) Nitrobenzene-d5	64.1			21.9-129		05/18/2016 17:39	WG872189
(S) 2-Fluorobiphenyl	56.5			34.9-129		05/18/2016 17:39	WG872189



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	58.0			21.6-142		05/18/2016 17:39	WG872189
(S) p-Terphenyl-d14	66.9			21.5-128		05/18/2016 17:39	WG872189

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	712		0.795	10.0	1	05/17/2016 07:17	WG872631
Fluoride	8.01		0.261	1.00	1	05/19/2016 04:16	WG873240
Sulfate	17200		28.5	2500	50	05/17/2016 13:40	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	2880		1.41	10.0	1	05/14/2016 14:26	WG872357
Manganese	80.3		0.120	1.00	1	05/14/2016 14:26	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U	J3 J6	0.108	0.500	5	05/18/2016 20:23	WG873220
(S) a,a,a-Trifluorotoluene(FID) 99.8				59.0-128		05/18/2016 20:23	WG873220

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 15:53	WG873800
Toluene	U		0.00217	0.0250	5	05/19/2016 15:53	WG873800
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 15:53	WG873800
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 15:53	WG873800
(S) Toluene-d8	103			88.7-115		05/19/2016 15:53	WG873800
(S) Dibromofluoromethane	103			76.3-123		05/19/2016 15:53	WG873800
(S) a,a,a-Trifluorotoluene	100			87.2-117		05/19/2016 15:53	WG873800
(S) 4-Bromofluorobenzene	101			69.7-129		05/19/2016 15:53	WG873800

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 11:26	WG872902
C28-C40 Oil Range	U		0.274	4.00	1	05/17/2016 11:26	WG872902
(S) o-Terphenyl	102			50.0-150		05/17/2016 11:26	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 18:02	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 18:02	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 18:02	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 18:02	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 18:02	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 18:02	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 18:02	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 18:02	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 18:02	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 18:02	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 18:02	WG872189
(S) 2-Fluorophenol	45.8			21.1-116		05/18/2016 18:02	WG872189
(S) Phenol-d5	45.5			26.3-121		05/18/2016 18:02	WG872189
(S) Nitrobenzene-d5	52.8			21.9-129		05/18/2016 18:02	WG872189
(S) 2-Fluorobiphenyl	48.0			34.9-129		05/18/2016 18:02	WG872189



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	44.1			21.6-142		05/18/2016 18:02	WG872189
(S) p-Terphenyl-d14	42.5			21.5-128		05/18/2016 18:02	WG872189

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	899		0.795	10.0	1	05/17/2016 09:36	WG872631
Fluoride	11.2		0.261	1.00	1	05/19/2016 04:40	WG873240
Sulfate	18200		28.5	2500	50	05/17/2016 14:04	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	3950		1.41	10.0	1	05/14/2016 14:29	WG872357
Manganese	95.4		0.120	1.00	1	05/14/2016 14:29	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/18/2016 20:46	WG873220
(S) a,a,a-Trifluorotoluene(FID) 99.5				59.0-128		05/18/2016 20:46	WG873220

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 16:17	WG873800
Toluene	U		0.00217	0.0250	5	05/19/2016 16:17	WG873800
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 16:17	WG873800
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 16:17	WG873800
(S) Toluene-d8	106			88.7-115		05/19/2016 16:17	WG873800
(S) Dibromofluoromethane	98.9			76.3-123		05/19/2016 16:17	WG873800
(S) a,a,a-Trifluorotoluene	105			87.2-117		05/19/2016 16:17	WG873800
(S) 4-Bromofluorobenzene	99.8			69.7-129		05/19/2016 16:17	WG873800

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 11:38	WG872902
C28-C40 Oil Range	U		0.274	4.00	1	05/17/2016 11:38	WG872902
(S) o-Terphenyl	94.5			50.0-150		05/17/2016 11:38	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/20/2016 12:33	WG873908
2-Chlorophenol	U	J3	0.00831	0.333	1	05/20/2016 12:33	WG873908
2,4-Dichlorophenol	U		0.00746	0.333	1	05/20/2016 12:33	WG873908
2,4-Dimethylphenol	U		0.0471	0.333	1	05/20/2016 12:33	WG873908
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/20/2016 12:33	WG873908
2,4-Dinitrophenol	U		0.0980	0.333	1	05/20/2016 12:33	WG873908
2-Nitrophenol	U		0.0130	0.333	1	05/20/2016 12:33	WG873908
4-Nitrophenol	U		0.0525	0.333	1	05/20/2016 12:33	WG873908
Pentachlorophenol	U		0.0480	0.333	1	05/20/2016 12:33	WG873908
Phenol	U		0.00695	0.333	1	05/20/2016 12:33	WG873908
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/20/2016 12:33	WG873908
(S) 2-Fluorophenol	77.5			21.1-116		05/20/2016 12:33	WG873908
(S) Phenol-d5	72.1			26.3-121		05/20/2016 12:33	WG873908
(S) Nitrobenzene-d5	67.2			21.9-129		05/20/2016 12:33	WG873908
(S) 2-Fluorobiphenyl	75.7			34.9-129		05/20/2016 12:33	WG873908



Collected date/time: 05/10/16 16:55

L835078

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
(S) 2,4,6-Tribromophenol	64.1			21.6-142		05/20/2016 12:33	WG873908
(S) p-Terphenyl-d14	64.6			21.5-128		05/20/2016 12:33	WG873908

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	0.244	J	0.0519	1.00	1	05/20/2016 04:02	WG873772
Fluoride	U		0.00990	0.100	1	05/20/2016 04:02	WG873772
Sulfate	0.269	J	0.0774	5.00	1	05/20/2016 04:02	WG873772

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Iron	0.0241	B J	0.0141	0.100	1	05/16/2016 15:27	WG872401
Manganese	U		0.00120	0.0100	1	05/16/2016 15:27	WG872401

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
TPH (GC/FID) Low Fraction	U		0.0314	0.100	1	05/17/2016 19:24	WG872916
(S) a,a,a-Trifluorotoluene(FID) 94.6				62.0-128		05/17/2016 19:24	WG872916

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Benzene	0.000509	J	0.000331	0.00100	1	05/13/2016 18:16	WG872248
Toluene	U		0.000780	0.00500	1	05/13/2016 18:16	WG872248
Ethylbenzene	U		0.000384	0.00100	1	05/13/2016 18:16	WG872248
Total Xylenes	U		0.00106	0.00300	1	05/13/2016 18:16	WG872248
(S) Toluene-d8	105			90.0-115		05/13/2016 18:16	WG872248
(S) Dibromofluoromethane	106			79.0-121		05/13/2016 18:16	WG872248
(S) a,a,a-Trifluorotoluene	98.5			90.4-116		05/13/2016 18:16	WG872248
(S) 4-Bromofluorobenzene	102			80.1-120		05/13/2016 18:16	WG872248

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
C10-C28 Diesel Range	0.0358	J	0.0222	0.100	1	05/15/2016 10:41	WG872369
C28-C40 Oil Range	U		0.0118	0.100	1	05/15/2016 10:41	WG872369
(S) o-Terphenyl	109			50.0-150		05/15/2016 10:41	WG872369

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
4-Chloro-3-methylphenol	U	J4	0.000263	0.0100	1	05/15/2016 18:23	WG872427
2-Chlorophenol	U		0.000283	0.0100	1	05/15/2016 18:23	WG872427
2,4-Dichlorophenol	U		0.000284	0.0100	1	05/15/2016 18:23	WG872427
2,4-Dimethylphenol	U		0.000624	0.0100	1	05/15/2016 18:23	WG872427
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100	1	05/15/2016 18:23	WG872427
2,4-Dinitrophenol	U		0.00325	0.0100	1	05/15/2016 18:23	WG872427
2-Nitrophenol	U		0.000320	0.0100	1	05/15/2016 18:23	WG872427
4-Nitrophenol	U		0.00201	0.0100	1	05/15/2016 18:23	WG872427
Pentachlorophenol	U		0.000313	0.0100	1	05/15/2016 18:23	WG872427
Phenol	U	J4	0.000334	0.0100	1	05/15/2016 18:23	WG872427
2,4,6-Trichlorophenol	U		0.000297	0.0100	1	05/15/2016 18:23	WG872427
(S) 2-Fluorophenol	71.8			10.0-77.9		05/15/2016 18:23	WG872427
(S) Phenol-d5	58.8			5.00-70.1		05/15/2016 18:23	WG872427
(S) Nitrobenzene-d5	82.5			21.8-123		05/15/2016 18:23	WG872427
(S) 2-Fluorobiphenyl	79.0			29.5-131		05/15/2016 18:23	WG872427



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	51.3			11.2-130		05/15/2016 18:23	WG872427
(S) p-Terphenyl-d14	91.0			29.3-137		05/15/2016 18:23	WG872427

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc



Method Blank (MB)

(MB) R3137464-1 05/16/16 20:07

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Chloride	U		0.795	10.0
Sulfate	U		0.57	50.0

L835458-01 Original Sample (OS) • Duplicate (DUP)

(OS) L835458-01 05/16/16 22:07 • (DUP) R3137464-4 05/16/16 22:30

	Original Result (dry)	DUP Result (dry)	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Chloride	15.8	17.1	1	8		15
Sulfate	ND	2.85	1	0		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137464-2 05/16/16 20:31 • (LCSD) R3137464-3 05/16/16 20:55

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Chloride	200	192	192	96	96	80-120			0	15
Sulfate	200	194	195	97	97	80-120			0	15

L834994-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L834994-01 05/17/16 03:18 • (MS) R3137464-5 05/17/16 03:42 • (MSD) R3137464-6 05/17/16 04:06

	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Chloride	559	13.1	595	564	104	99	1	80-120			5	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3138282-1 05/18/16 23:05

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Fluoride	U		0.261	1.00

L835078-01 Original Sample (OS) • Duplicate (DUP)

(OS) L835078-01 05/19/16 01:04 • (DUP) R3138282-4 05/19/16 01:28

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Fluoride	5.61	5.53	1	1		15

L835938-02 Original Sample (OS) • Duplicate (DUP)

(OS) L835938-02 05/19/16 09:16 • (DUP) R3138282-5 05/19/16 09:50

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Fluoride	6.25	7.86	1	23	J3	15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138282-2 05/18/16 23:28 • (LCSD) R3138282-3 05/18/16 23:52

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Fluoride	20.0	19.9	20.0	100	100	80-120			0	15

L835938-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835938-03 05/19/16 10:14 • (MS) R3138282-6 05/19/16 11:26 • (MSD) R3138282-7 05/19/16 11:50

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Fluoride	50.0	5.27	36.6	33.9	63	57	1	80-120	J6	J6	7	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3138709-1 05/19/16 20:49

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.0099	0.100
Sulfate	U		0.0774	5.00

L834614-04 Original Sample (OS) • Duplicate (DUP)

(OS) L834614-04 05/20/16 02:49 • (DUP) R3138709-5 05/20/16 03:04

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	1.51	1.52	1	0		15
Fluoride	ND	0.0592	1	0		15
Sulfate	18.1	18.1	1	0		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138709-2 05/19/16 21:03 • (LCSD) R3138709-3 05/19/16 21:18

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chloride	40.0	39.2	39.2	98	98	80-120			0	15
Fluoride	8.00	7.89	7.89	99	99	80-120			0	15
Sulfate	40.0	39.6	39.6	99	99	80-120			0	15

L834185-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L834185-02 05/20/16 00:54 • (MS) R3138709-4 05/20/16 01:09

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	40.1	92.4	104	1	80-120	
Fluoride	5.00	0.558	5.88	106	1	80-120	
Sulfate	50.0	6.65	60.4	107	1	80-120	

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



L834409-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L834409-03 05/20/16 04:45 • (MS) R3138709-6 05/20/16 04:59 • (MSD) R3138709-7 05/20/16 05:14

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Chloride	50.0	31.0	80.0	81.0	98	100	1	80-120			1	15
Fluoride	5.00	ND	5.21	5.34	102	105	1	80-120			2	15
Sulfate	50.0	ND	53.0	53.9	101	103	1	80-120			2	15

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



Method Blank (MB)

(MB) R3136806-1 05/14/16 13:43

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Iron	1.56	⌵	1.41	10.0
Manganese	U		0.12	1.00

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3136806-2 05/14/16 13:46 • (LCSD) R3136806-3 05/14/16 13:48

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Iron	1000	937	924	94	92	80-120			1	20
Manganese	100	93.2	92.0	93	92	80-120			1	20

L835281-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835281-01 05/14/16 13:51 • (MS) R3136806-6 05/14/16 14:00 • (MSD) R3136806-7 05/14/16 14:03

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Iron	1090	20800	20900	23500	15	254	1	75-125	⌵	⌵	12	20
Manganese	109	608	701	714	85	97	1	75-125			2	20



Method Blank (MB)

(MB) R3137224-7 05/16/16 19:15

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Iron	0.0473	J	0.0141	0.100
Manganese	U		0.0012	0.0100

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137224-8 05/16/16 19:17 • (LCSD) R3137224-9 05/16/16 19:20

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Iron	10.0	10.2	10.3	102	103	80-120			1	20
Manganese	1.00	0.997	1.00	100	100	80-120			1	20

L835100-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835100-04 05/16/16 19:23 • (MS) R3137224-11 05/16/16 19:28 • (MSD) R3137224-12 05/16/16 19:31

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Iron	10.0	0.0740	10.3	10.3	102	102	1	75-125			0	20
Manganese	1.00	0.00612	1.02	1.02	102	101	1	75-125			1	20



Method Blank (MB)

(MB) R3137716-5 05/17/16 12:58

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
TPH (GC/FID) Low Fraction	0.0333	J	0.0314	0.100
(S) a,a,a-Trifluorotoluene(FID) 94.7				62.0-128

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137716-3 05/17/16 11:43 • (LCSD) R3137716-4 05/17/16 12:06

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	5.24	5.58	95.3	101	67.0-132			6.28	20
(S) a,a,a-Trifluorotoluene(FID)				104	104	62.0-128				

L835661-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835661-01 05/17/16 17:33 • (MS) R3137716-8 05/17/16 16:27 • (MSD) R3137716-9 05/17/16 16:49

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	ND	5.49	5.50	99.1	99.3	1	50.0-143			0.200	20
(S) a,a,a-Trifluorotoluene(FID)					103	104		62.0-128				



Method Blank (MB)

(MB) R3137718-3 05/18/16 01:00

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID) 99.8				59.0-128

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137718-1 05/17/16 23:52 • (LCSD) R3137718-2 05/18/16 00:14

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	6.45	6.44	117	117	63.5-137			0.140	20
(S) a,a,a-Trifluorotoluene(FID)				99.0	99.6	59.0-128				

L835078-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835078-04 05/18/16 09:58 • (MS) R3137718-4 05/18/16 01:46 • (MSD) R3137718-5 05/18/16 02:09

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	0.255	18.3	14.9	65.7	53.1	5	28.5-138			20.9	23.6
(S) a,a,a-Trifluorotoluene(FID)					96.5	97.4		59.0-128				



Method Blank (MB)

(MB) R3138234-3 05/18/16 17:50

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID) 100				59.0-128

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138234-1 05/18/16 16:42 • (LCSD) R3138234-2 05/18/16 17:04

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	5.59	6.61	102	120	63.5-137			16.8	20
(S) a,a,a-Trifluorotoluene(FID)				99.3	99.1	59.0-128				

7Gl

8Al

L835078-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835078-06 05/18/16 20:23 • (MS) R3138234-4 05/18/16 19:15 • (MSD) R3138234-5 05/18/16 19:38

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	U	4.61	9.33	16.8	33.9	5	28.5-138	J6	J3	67.8	23.6
(S) a,a,a-Trifluorotoluene(FID)					98.4	98.4		59.0-128				

9Sc

Method Blank (MB)

(MB) R3138213-3 05/19/16 01:28

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000270	0.00100
Ethylbenzene	U		0.000297	0.00100
Toluene	U		0.000434	0.00500
Xylenes, Total	U		0.000698	0.00300
(S) Toluene-d8	105			88.7-115
(S) Dibromofluoromethane	101			76.3-123
(S) a,a,a-Trifluorotoluene	94.8			87.2-117
(S) 4-Bromofluorobenzene	100			69.7-129

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138213-1 05/18/16 23:58 • (LCSD) R3138213-2 05/19/16 00:21

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0232	0.0234	92.7	93.6	72.6-120			1.03	20
Ethylbenzene	0.0250	0.0248	0.0244	99.2	97.6	78.6-124			1.62	20
Toluene	0.0250	0.0243	0.0247	97.2	98.7	76.7-116			1.52	20
Xylenes, Total	0.0750	0.0724	0.0729	96.5	97.1	78.1-123			0.620	20
(S) Toluene-d8				105	106	88.7-115				
(S) Dibromofluoromethane				103	103	76.3-123				
(S) a,a,a-Trifluorotoluene				95.8	96.3	87.2-117				
(S) 4-Bromofluorobenzene				102	101	69.7-129				

L835057-12 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835057-12 05/19/16 03:21 • (MS) R3138213-4 05/19/16 02:13 • (MSD) R3138213-5 05/19/16 02:36

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	ND	0.0727	0.122	58.2	97.3	5	47.8-131		J3	50.4	22.8
Ethylbenzene	0.0250	ND	0.0847	0.121	67.8	97.1	5	44.8-135		J3	35.6	26.9
Toluene	0.0250	ND	0.0832	0.122	66.5	97.9	5	47.8-127		J3	38.1	24.3
Xylenes, Total	0.0750	ND	0.253	0.362	67.6	96.6	5	42.7-135		J3	35.4	26.6
(S) Toluene-d8					104	103		88.7-115				
(S) Dibromofluoromethane					102	104		76.3-123				
(S) a,a,a-Trifluorotoluene					95.0	94.8		87.2-117				
(S) 4-Bromofluorobenzene					98.2	99.3		69.7-129				

Method Blank (MB)

(MB) R3138352-3 05/19/16 10:31

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000270	0.00100
Ethylbenzene	U		0.000297	0.00100
Toluene	U		0.000434	0.00500
Xylenes, Total	U		0.000698	0.00300
(S) Toluene-d8	105			88.7-115
(S) Dibromofluoromethane	95.5			76.3-123
(S) a,a,a-Trifluorotoluene	106			87.2-117
(S) 4-Bromofluorobenzene	103			69.7-129

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138352-1 05/19/16 08:30 • (LCSD) R3138352-2 05/19/16 08:54

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0228	0.0223	91.1	89.3	72.6-120			2.05	20
Ethylbenzene	0.0250	0.0259	0.0253	103	101	78.6-124			2.09	20
Toluene	0.0250	0.0229	0.0232	91.6	92.9	76.7-116			1.39	20
Xylenes, Total	0.0750	0.0751	0.0738	100	98.4	78.1-123			1.75	20
(S) Toluene-d8				105	106	88.7-115				
(S) Dibromofluoromethane				99.3	96.4	76.3-123				
(S) a,a,a-Trifluorotoluene				105	107	87.2-117				
(S) 4-Bromofluorobenzene				102	103	69.7-129				

L835074-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835074-10 05/19/16 14:41 • (MS) R3138352-6 05/19/16 12:16 • (MSD) R3138352-7 05/19/16 12:40

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0336	ND	1.40	1.36	90.6	87.5	45	47.8-131			3.33	22.8
Ethylbenzene	0.0336	ND	1.38	1.33	87.5	84.4	45	44.8-135			3.38	26.9
Toluene	0.0336	ND	1.40	1.37	90.6	88.7	45	47.8-127			2.13	24.3
Xylenes, Total	0.101	1.60	5.48	5.40	85.5	83.9	45	42.7-135			1.35	26.6
(S) Toluene-d8					104	104		88.7-115				
(S) Dibromofluoromethane					101	98.8		76.3-123				
(S) a,a,a-Trifluorotoluene					102	104		87.2-117				



[L835078-05,06,07](#)

L835074-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835074-10 05/19/16 14:41 • (MS) R3138352-6 05/19/16 12:16 • (MSD) R3138352-7 05/19/16 12:40

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
(S) 4-Bromofluorobenzene					95.1	99.8		69.7-129				

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R3136703-3 05/13/16 13:23

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.000331	0.00100
Ethylbenzene	U		0.000384	0.00100
Toluene	U		0.000780	0.00500
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	105			90.0-115
(S) Dibromofluoromethane	105			79.0-121
(S) a,a,a-Trifluorotoluene	98.8			90.4-116
(S) 4-Bromofluorobenzene	101			80.1-120

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3136703-1 05/13/16 12:14 • (LCSD) R3136703-2 05/13/16 12:31

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0259	0.0255	103	102	73.0-122			1.27	20
Ethylbenzene	0.0250	0.0260	0.0246	104	98.2	80.9-121			5.57	20
Toluene	0.0250	0.0264	0.0251	105	100	77.9-116			5.02	20
Xylenes, Total	0.0750	0.0786	0.0747	105	99.6	79.2-122			5.11	20
(S) Toluene-d8				105	104	90.0-115				
(S) Dibromofluoromethane				102	106	79.0-121				
(S) a,a,a-Trifluorotoluene				99.7	99.5	90.4-116				
(S) 4-Bromofluorobenzene				97.8	98.1	80.1-120				

L835078-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835078-08 05/13/16 18:16 • (MS) R3136703-4 05/13/16 18:33 • (MSD) R3136703-5 05/13/16 18:50

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.000509	0.0233	0.0247	91.1	96.9	1	58.6-133			6.06	20
Ethylbenzene	0.0250	U	0.0217	0.0232	86.9	92.7	1	62.7-136			6.45	20
Toluene	0.0250	U	0.0224	0.0240	89.4	95.8	1	67.8-124			6.96	20
Xylenes, Total	0.0750	U	0.0658	0.0704	87.8	93.9	1	65.6-133			6.70	20
(S) Toluene-d8					104	106		90.0-115				
(S) Dibromofluoromethane					106	108		79.0-121				
(S) a,a,a-Trifluorotoluene					97.8	102		90.4-116				
(S) 4-Bromofluorobenzene					98.4	98.0		80.1-120				



Method Blank (MB)

(MB) R3139237-1 05/15/16 09:51

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
C10-C28 Diesel Range	U		0.0222	0.100
C28-C40 Oil Range	U		0.0118	0.100
(S) o-Terphenyl	112			50.0-150

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3139237-2 05/15/16 10:07 • (LCSD) R3139237-3 05/15/16 10:24

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	1.50	1.53	1.54	102	102	70.0-130			0.680	20
(S) o-Terphenyl				110	117	50.0-150				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3137450-1 05/17/16 10:13

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	103			50.0-150

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137450-2 05/17/16 10:25 • (LCSD) R3137450-3 05/17/16 10:37

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	48.2	52.7	80.3	87.9	50.0-100			9.05	20
(S) o-Terphenyl				93.1	93.4	50.0-150				

L835078-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835078-01 05/17/16 12:02 • (MS) R3137450-4 05/17/16 12:15 • (MSD) R3137450-5 05/17/16 12:27

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	7.31	57.8	64.7	84.1	95.7	1	50.0-100			11.4	20
(S) o-Terphenyl					72.6	68.2		50.0-150				



Method Blank (MB)

(MB) R3138162-3 05/18/16 13:22

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
4-Chloro-3-methylphenol	U		0.00477	0.333
2-Chlorophenol	U		0.00831	0.333
2,4-Dichlorophenol	U		0.00746	0.333
2,4-Dimethylphenol	U		0.0471	0.333
4,6-Dinitro-2-methylphenol	U		0.124	0.333
2,4-Dinitrophenol	U		0.0980	0.333
2-Nitrophenol	U		0.0130	0.333
4-Nitrophenol	U		0.0525	0.333
Pentachlorophenol	U		0.0480	0.333
Phenol	U		0.00695	0.333
2,4,6-Trichlorophenol	U		0.00779	0.333
(S) Nitrobenzene-d5	80.9			21.9-129
(S) 2-Fluorobiphenyl	83.1			34.9-129
(S) p-Terphenyl-d14	85.7			21.5-128
(S) Phenol-d5	80.4			26.3-121
(S) 2-Fluorophenol	74.3			21.1-116
(S) 2,4,6-Tribromophenol	74.1			21.6-142

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138162-1 05/18/16 12:35 • (LCSD) R3138162-2 05/18/16 12:58

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.667	0.587	0.686	88.0	103	51.1-113			15.6	20
2-Chlorophenol	0.667	0.469	0.525	70.3	78.7	40.8-103			11.3	20
2,4-Dichlorophenol	0.667	0.551	0.617	82.6	92.5	46.2-109			11.3	20
2,4-Dimethylphenol	0.667	0.557	0.647	83.6	97.1	42.2-110			15.0	20
4,6-Dinitro-2-methylphenol	0.667	0.536	0.586	80.3	87.8	23.1-119			8.86	23.7
2,4-Dinitrophenol	0.667	0.332	0.345	49.8	51.7	10.0-105			3.82	36.5
2-Nitrophenol	0.667	0.532	0.620	79.7	93.0	44.2-113			15.3	20.9
4-Nitrophenol	0.667	0.538	0.600	80.7	90.0	34.8-109			10.9	20
Pentachlorophenol	0.667	0.550	0.574	82.5	86.1	16.2-102			4.25	22.9
Phenol	0.667	0.497	0.599	74.6	89.8	41.5-106			18.5	20
2,4,6-Trichlorophenol	0.667	0.565	0.620	84.7	93.0	44.4-108			9.39	20
(S) Nitrobenzene-d5				86.7	99.9	21.9-129				
(S) 2-Fluorobiphenyl				83.6	94.3	34.9-129				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138162-1 05/18/16 12:35 • (LCSD) R3138162-2 05/18/16 12:58

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
(S) p-Terphenyl-d14				81.3	84.5	21.5-128				
(S) Phenol-d5				74.6	82.2	26.3-121				
(S) 2-Fluorophenol				71.3	82.1	21.1-116				
(S) 2,4,6-Tribromophenol				83.7	84.4	21.6-142				

L835035-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835035-10 05/19/16 12:00 • (MS) R3138313-1 05/19/16 12:24 • (MSD) R3138313-2 05/19/16 12:47

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.142	U	0.632	0.663	89.0	93.4	5	27.0-154			4.76	26.6
2-Chlorophenol	0.142	U	0.524	0.563	73.8	79.2	5	33.2-121			7.06	29.3
2,4-Dichlorophenol	0.142	U	0.634	0.639	89.2	90.0	5	34.8-134			0.890	27.3
2,4-Dimethylphenol	0.142	U	0.638	0.651	89.9	91.7	5	12.3-149			2.00	32.3
4,6-Dinitro-2-methylphenol	0.142	U	ND	ND	0.000	0.000	5	10.0-144	J6	J6	0.000	32.7
2,4-Dinitrophenol	0.142	U	ND	ND	0.000	0.000	5	10.0-121	J6	J6	0.000	39.4
2-Nitrophenol	0.142	U	0.636	0.652	89.5	91.8	5	29.5-144			2.53	29.9
4-Nitrophenol	0.142	U	0.586	0.569	82.6	80.1	5	20.0-133			3.03	30.2
Pentachlorophenol	0.142	U	0.655	0.671	92.3	94.5	5	10.0-139			2.43	28.3
Phenol	0.142	U	0.565	0.644	79.5	90.7	5	25.1-130			13.1	29.6
2,4,6-Trichlorophenol	0.142	U	0.633	0.675	89.1	95.1	5	33.8-133			6.52	28.1
(S) Nitrobenzene-d5					86.3	94.0		21.9-129				
(S) 2-Fluorobiphenyl					83.0	81.1		34.9-129				
(S) p-Terphenyl-d14					82.2	60.4		21.5-128				
(S) Phenol-d5					80.2	86.0		26.3-121				
(S) 2-Fluorophenol					78.2	82.9		21.1-116				
(S) 2,4,6-Tribromophenol					80.1	84.2		21.6-142				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3138667-3 05/20/16 10:56

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
4-Chloro-3-methylphenol	U		0.00477	0.333
2-Chlorophenol	U		0.00831	0.333
2,4-Dichlorophenol	U		0.00746	0.333
2,4-Dimethylphenol	U		0.0471	0.333
4,6-Dinitro-2-methylphenol	U		0.124	0.333
2,4-Dinitrophenol	U		0.0980	0.333
2-Nitrophenol	U		0.0130	0.333
4-Nitrophenol	U		0.0525	0.333
Pentachlorophenol	U		0.0480	0.333
Phenol	U		0.00695	0.333
2,4,6-Trichlorophenol	U		0.00779	0.333
(S) Nitrobenzene-d5	61.8			21.9-129
(S) 2-Fluorobiphenyl	61.7			34.9-129
(S) p-Terphenyl-d14	68.7			21.5-128
(S) Phenol-d5	70.1			26.3-121
(S) 2-Fluorophenol	64.2			21.1-116
(S) 2,4,6-Tribromophenol	52.9			21.6-142

Cp

Tc

Ss

Cn

Sr

Qc

Gl

Al

Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138667-1 05/20/16 10:08 • (LCSD) R3138667-2 05/20/16 10:32

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.667	0.451	0.496	67.7	74.4	51.1-113			9.51	20
2-Chlorophenol	0.667	0.345	0.432	51.7	64.8	40.8-103		J3	22.6	20
2,4-Dichlorophenol	0.667	0.452	0.451	67.8	67.5	46.2-109			0.350	20
2,4-Dimethylphenol	0.667	0.420	0.451	62.9	67.6	42.2-110			7.12	20
4,6-Dinitro-2-methylphenol	0.667	0.457	0.470	68.5	70.5	23.1-119			2.97	23.7
2,4-Dinitrophenol	0.667	0.430	0.404	64.5	60.6	10.0-105			6.29	36.5
2-Nitrophenol	0.667	0.421	0.463	63.1	69.4	44.2-113			9.50	20.9
4-Nitrophenol	0.667	0.393	0.365	58.9	54.7	34.8-109			7.41	20
Pentachlorophenol	0.667	0.517	0.487	77.5	73.0	16.2-102			5.87	22.9
Phenol	0.667	0.367	0.442	55.0	66.3	41.5-106			18.6	20
2,4,6-Trichlorophenol	0.667	0.512	0.479	76.8	71.8	44.4-108			6.68	20
(S) Nitrobenzene-d5				59.1	63.6	21.9-129				
(S) 2-Fluorobiphenyl				69.2	60.8	34.9-129				



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138667-1 05/20/16 10:08 • (LCSD) R3138667-2 05/20/16 10:32

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
(S) p-Terphenyl-d14				65.8	64.2	21.5-128				
(S) Phenol-d5				56.0	67.8	26.3-121				
(S) 2-Fluorophenol				59.1	73.1	21.1-116				
(S) 2,4,6-Tribromophenol				57.7	55.4	21.6-142				

L835349-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835349-02 05/20/16 13:46 • (MS) R3138667-4 05/20/16 14:10 • (MSD) R3138667-5 05/20/16 14:34

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.767	U	0.592	0.713	77.2	93.1	1	27.0-154			18.6	26.6
2-Chlorophenol	0.767	U	0.450	0.513	58.8	67.0	1	33.2-121			13.1	29.3
2,4-Dichlorophenol	0.767	U	0.536	0.619	70.0	80.7	1	34.8-134			14.3	27.3
2,4-Dimethylphenol	0.767	U	0.502	0.634	65.4	82.8	1	12.3-149			23.4	32.3
4,6-Dinitro-2-methylphenol	0.767	U	0.558	0.641	72.8	83.6	1	10.0-144			13.8	32.7
2,4-Dinitrophenol	0.767	U	0.495	0.577	64.6	75.2	1	10.0-121			15.2	39.4
2-Nitrophenol	0.767	U	0.523	0.563	68.3	73.4	1	29.5-144			7.26	29.9
4-Nitrophenol	0.767	U	0.493	0.569	64.3	74.2	1	20.0-133			14.3	30.2
Pentachlorophenol	0.767	U	0.648	0.726	84.5	94.7	1	10.0-139			11.4	28.3
Phenol	0.767	U	0.581	0.646	75.8	84.3	1	25.1-130			10.6	29.6
2,4,6-Trichlorophenol	0.767	U	0.602	0.649	78.5	84.6	1	33.8-133			7.56	28.1
(S) Nitrobenzene-d5					67.5	80.4		21.9-129				
(S) 2-Fluorobiphenyl					59.8	65.2		34.9-129				
(S) p-Terphenyl-d14					47.5	54.0		21.5-128				
(S) Phenol-d5					63.4	68.3		26.3-121				
(S) 2-Fluorophenol					66.7	73.0		21.1-116				
(S) 2,4,6-Tribromophenol					68.4	64.6		21.6-142				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3136946-3 05/15/16 16:02

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
4-Chloro-3-methylphenol	U		0.000263	0.0100
2-Chlorophenol	U		0.000283	0.0100
2,4-Dichlorophenol	U		0.000284	0.0100
2,4-Dimethylphenol	U		0.000624	0.0100
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100
2,4-Dinitrophenol	U		0.00325	0.0100
2-Nitrophenol	U		0.000320	0.0100
4-Nitrophenol	U		0.00201	0.0100
Pentachlorophenol	U		0.000313	0.0100
Phenol	U		0.000334	0.0100
2,4,6-Trichlorophenol	U		0.000297	0.0100
(S) Nitrobenzene-d5	85.3			21.8-123
(S) 2-Fluorobiphenyl	75.7			29.5-131
(S) p-Terphenyl-d14	88.4			29.3-137
(S) Phenol-d5	53.1			5.00-70.1
(S) 2-Fluorophenol	72.7			10.0-77.9
(S) 2,4,6-Tribromophenol	44.8			11.2-130

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3136946-1 05/15/16 15:16 • (LCSD) R3136946-2 05/15/16 15:39

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.0500	0.0516	0.0536	103	107	35.7-100	J4	J4	3.90	22.9
2-Chlorophenol	0.0500	0.0350	0.0353	70.1	70.6	26.2-91.5			0.760	26.5
2,4-Dichlorophenol	0.0500	0.0414	0.0421	82.8	84.1	31.4-103			1.56	24.9
2,4-Dimethylphenol	0.0500	0.0402	0.0453	80.3	90.6	31.9-107			12.0	25.7
4,6-Dinitro-2-methylphenol	0.0500	0.0450	0.0490	89.9	98.1	18.4-148			8.69	24.4
2,4-Dinitrophenol	0.0500	0.0286	0.0321	57.1	64.3	24.2-128			11.8	20.5
2-Nitrophenol	0.0500	0.0429	0.0419	85.7	83.9	25.9-106			2.18	26.9
4-Nitrophenol	0.0500	0.0259	0.0255	51.9	50.9	10.0-52.7			1.86	40
Pentachlorophenol	0.0500	0.0325	0.0346	65.0	69.1	10.0-97.4			6.22	35.1
Phenol	0.0500	0.0280	0.0295	55.9	59.1	10.0-57.9		J4	5.49	35
2,4,6-Trichlorophenol	0.0500	0.0418	0.0443	83.7	88.6	29.8-107			5.71	24.1
(S) Nitrobenzene-d5				93.0	96.0	21.8-123				
(S) 2-Fluorobiphenyl				80.1	80.5	29.5-131				



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3136946-1 05/15/16 15:16 • (LCSD) R3136946-2 05/15/16 15:39

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
(S) p-Terphenyl-d14				88.1	101	29.3-137				
(S) Phenol-d5				55.5	52.7	5.00-70.1				
(S) 2-Fluorophenol				66.2	67.0	10.0-77.9				
(S) 2,4,6-Tribromophenol				62.1	62.8	11.2-130				

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND,U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.
SDL	Sample Detection Limit.
MQL	Method Quantitation Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
V	The sample concentration is too high to evaluate accurate spike recoveries.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina ¹	DW21704
Florida	E87487	North Carolina ²	41
Georgia	NELAP	North Dakota	R-140
Georgia ¹	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky ¹	90010	South Dakota	n/a
Kentucky ²	16	Tennessee ¹⁴	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

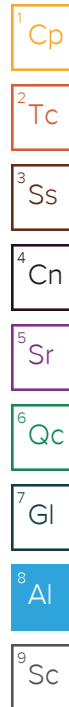
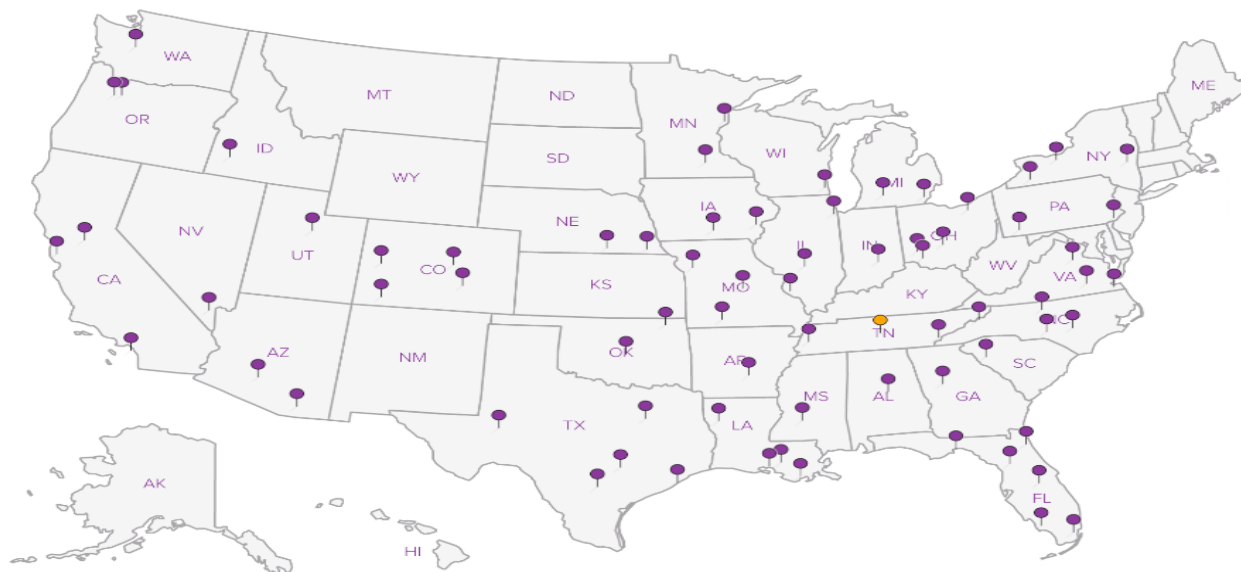
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ^{n/a} Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



AMEC Foster Wheeler - Houston, TX

585 N. Dairy Ashford
Houston, TX 77079

Billing Information:

Accounts Payable
585 N. Dairy Ashford
Houston, TX 77079

Report to:
Pamela Krueger

Email To: pamela.krueger@amecfw.com

Project
Description: Wastewater Line Investigation

City/State
Collected: ARTESIA, NM

Phone: 713-929-5674
Fax:

Client Project #
6703160012.001

Lab Project #
AMECFWHTX-WW LINE

Collected by (print):
William R Smith

Site/Facility ID #
Holley Frontline NAWGO

P.O. #

Collected by (signature):
William R Smith

Rush? (Lab MUST Be Notified)
☐ Same Day200%
☐ Next Day100%
☐ Two Day50%
☐ Three Day25%

Date Results Needed

Email? ☐ No ☒ Yes
FAX? ☐ No ☐ Yes

No.
of
Cntrs

Immediately
Packed on Ice N ☐ Y ☒

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Cntrs	8270ACID 100ml Amb NoPres	CI, FI, SO4 125mlHDPE-NoPres	CI, FI, SO4 4ozClr-NoPres	DROROLVI 40mlAmb-HCl-BT	DRORLA,SV8270ACID 4ozClr-NoPres	FEICP,MN1CP 250mlHDPE-HNO3	FEICP,MN1CP 2ozClr-NoPres	GRO 40mlAmb HCl	GRO,V8260BTEX 2ozClr-NoPres	V8260BTEX 40mlAmb-HCl	Rem./Contaminant	Sample # (lab only)
TMW-WWL1-01		SS	1	5/10/16	15:00	4			X		X		X		X			-01
TMW-WWL1-05		SS	5	5/10/16	15:10	4			X		X		X		X			-02
TMW-WWL1-12		SS	12	5/10/16	15:20	4			X		X		X		X			-03
TMW-WWL2-01		SS	1	5/10/16	16:20	4			X		X		X		X			-04
TMW-WWL2-05		SS	5	5/10/16	16:30	4			X		X		X		X			-05
TMW-WWL2-12		SS	12	5/10/16	16:50	4			X		X		X		X			-06
TMW-WWL2-12D		SS	12	5/10/16	16:55	4			X		X		X		X			-07
		SS				4			X		X		X		X			
TMW-WWL6-EG		GW		5/10/16	18:00	11	X	X		X		X		X		X		-08
		GW				11	X	X		X		X		X		X		

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other

Remarks:

pH _____ Temp _____

Flow _____ Other _____

6711 0132 8168
Hold #

Relinquished by: (Signature)

Date:

Time:

Received by: (Signature)

Samples returned via: ☐ UPS

Condition: (lab use only)

Relinquished by: (Signature)

Date:

Time:

Received by: (Signature)

Temp: °C Bottles Received:

COC Seal Intact: ☒ Y ☐ N ☐ NA

Relinquished by: (Signature)

Date:

Time:

Received for lab by: (Signature)

Date: 5/12/16 Time: 900

pH Checked: 7.2 NCF:

AMEC Foster Wheeler - Houston, TX

Sample Delivery Group: L835353
Samples Received: 05/13/2016
Project Number: 6703160012.001
Description: Wastewater Line Investigation

Report To: Pamela Krueger
585 N. Dairy Ashford
Houston, TX 77079

Entire Report Reviewed By:



Chris McCord
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



TMW-WWL1 L835353-01 GW

			Collected by	Collected date/time	Received date/time
				05/12/16 08:30	05/13/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872666	5	05/17/16 09:52	05/17/16 17:15	ST
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872936	1	05/18/16 11:41	05/19/16 15:12	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872740	1	05/15/16 18:28	05/17/16 04:33	JNS
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG872894	1	05/17/16 00:32	05/17/16 00:32	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872872	1	05/19/16 00:20	05/19/16 00:20	DAH
Wet Chemistry by Method 9056A	WG874711	1	05/24/16 13:02	05/24/16 13:02	CM
Wet Chemistry by Method 9056A	WG875355	500	05/26/16 11:11	05/26/16 11:11	CM

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

TMW-WWL2 L835353-02 GW

			Collected by	Collected date/time	Received date/time
				05/12/16 09:00	05/13/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872666	5	05/17/16 09:52	05/17/16 17:12	ST
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872936	1	05/18/16 11:41	05/19/16 19:26	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872740	1	05/15/16 18:28	05/17/16 04:50	JNS
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG872894	1	05/17/16 00:53	05/17/16 00:53	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872872	1	05/19/16 00:43	05/19/16 00:43	DAH
Wet Chemistry by Method 9056A	WG874711	1	05/24/16 13:31	05/24/16 13:31	CM
Wet Chemistry by Method 9056A	WG874711	100	05/24/16 13:45	05/24/16 13:45	CM
Wet Chemistry by Method 9056A	WG875355	500	05/26/16 11:25	05/26/16 11:25	CM

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

TMW-WWL2D L835353-03 GW

			Collected by	Collected date/time	Received date/time
				05/12/16 09:05	05/13/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872666	5	05/17/16 09:52	05/17/16 17:18	ST
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872936	1	05/18/16 11:41	05/19/16 19:49	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872740	1	05/15/16 18:28	05/17/16 05:07	JNS
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG872894	1	05/17/16 01:15	05/17/16 01:15	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872872	1	05/19/16 01:05	05/19/16 01:05	DAH
Wet Chemistry by Method 9056A	WG874225	1	05/23/16 13:58	05/23/16 13:58	SAM
Wet Chemistry by Method 9056A	WG874225	500	05/23/16 12:55	05/23/16 12:55	SAM

TRIP BLANK L835353-04 GW

			Collected by	Collected date/time	Received date/time
				05/12/16 00:00	05/13/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872872	1	05/18/16 20:12	05/18/16 20:12	DAH

TRIP BLANK L835353-05 GW

			Collected by	Collected date/time	Received date/time
				05/12/16 00:00	05/13/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872872	1	05/18/16 20:34	05/18/16 20:34	DAH

ACCOUNT:

AMEC Foster Wheeler - Houston, TX

PROJECT:

6703160012.001

SDG:

L835353

DATE/TIME:

05/27/16 16:17

PAGE:

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



WWL-SPC L835353-06 Solid

Collected by

Collected date/time

Received date/time

05/12/16 00:00

05/13/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	¹ Cp
Mercury by Method 7471A	WG873476	1	05/18/16 17:22	05/19/16 09:44	NJB	² Tc
Metals (ICP) by Method 6010B	WG873554	1	05/20/16 11:08	05/20/16 13:52	BRJ	³ Ss
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG873908	1	05/19/16 22:56	05/20/16 14:58	SNR	⁴ Cn
Semi-Volatile Organic Compounds (GC) by Method 8015	WG873587	1	05/19/16 21:44	05/20/16 19:28	DMG	⁵ Sr
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG874253	5	05/20/16 17:57	05/20/16 22:59	JAH	⁶ Qc
Volatile Organic Compounds (GC/MS) by Method 8260B	WG874942	5	05/24/16 16:07	05/25/16 02:00	DWR	⁷ Gl
Wet Chemistry by Method 9056A	WG874228	1	05/23/16 09:00	05/23/16 17:37	CM	⁸ Al
Wet Chemistry by Method 9056A	WG874228	10	05/23/16 09:00	05/23/16 18:01	CM	⁹ Sc
Wet Chemistry by Method 9056A	WG874228	50	05/23/16 09:00	05/24/16 09:03	CM	

ACCOUNT:

AMEC Foster Wheeler - Houston, TX

PROJECT:

6703160012.001

SDG:

L835353

DATE/TIME:

05/27/16 16:17

PAGE:

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All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Chris McCord
Technical Service Representative

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	12200		26.0	500	500	05/26/2016 11:11	WG875355
Fluoride	6.21		0.00990	0.100	1	05/24/2016 13:02	WG874711
Sulfate	18800		38.7	2500	500	05/26/2016 11:11	WG875355

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Iron	0.234	J	0.0705	0.500	5	05/17/2016 17:15	WG872666
Manganese	0.954		0.00600	0.0500	5	05/17/2016 17:15	WG872666

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
TPH (GC/FID) Low Fraction	U		0.0314	0.100	1	05/17/2016 00:32	WG872894
(S) a,a,a-Trifluorotoluene(FID) 99.2				62.0-128		05/17/2016 00:32	WG872894

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	1	05/19/2016 00:20	WG872872
Toluene	U		0.000780	0.00500	1	05/19/2016 00:20	WG872872
Ethylbenzene	U		0.000384	0.00100	1	05/19/2016 00:20	WG872872
Total Xylenes	U		0.00106	0.00300	1	05/19/2016 00:20	WG872872
(S) Toluene-d8	104			90.0-115		05/19/2016 00:20	WG872872
(S) Dibromofluoromethane	109			79.0-121		05/19/2016 00:20	WG872872
(S) a,a,a-Trifluorotoluene	104			90.4-116		05/19/2016 00:20	WG872872
(S) 4-Bromofluorobenzene	101			80.1-120		05/19/2016 00:20	WG872872

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
C10-C28 Diesel Range	0.0851	J	0.0222	0.100	1	05/17/2016 04:33	WG872740
C28-C40 Oil Range	0.0419	J	0.0118	0.100	1	05/17/2016 04:33	WG872740
(S) o-Terphenyl	95.3			50.0-150		05/17/2016 04:33	WG872740

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
4-Chloro-3-methylphenol	U		0.000263	0.0100	1	05/19/2016 15:12	WG872936
2-Chlorophenol	U		0.000283	0.0100	1	05/19/2016 15:12	WG872936
2,4-Dichlorophenol	U		0.000284	0.0100	1	05/19/2016 15:12	WG872936
2,4-Dimethylphenol	U		0.000624	0.0100	1	05/19/2016 15:12	WG872936
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100	1	05/19/2016 15:12	WG872936
2,4-Dinitrophenol	U	J3	0.00325	0.0100	1	05/19/2016 15:12	WG872936
2-Nitrophenol	U		0.000320	0.0100	1	05/19/2016 15:12	WG872936
4-Nitrophenol	U		0.00201	0.0100	1	05/19/2016 15:12	WG872936
Pentachlorophenol	U		0.000313	0.0100	1	05/19/2016 15:12	WG872936
Phenol	U		0.000334	0.0100	1	05/19/2016 15:12	WG872936
2,4,6-Trichlorophenol	U		0.000297	0.0100	1	05/19/2016 15:12	WG872936
(S) 2-Fluorophenol	43.8			10.0-77.9		05/19/2016 15:12	WG872936
(S) Phenol-d5	32.9			5.00-70.1		05/19/2016 15:12	WG872936
(S) Nitrobenzene-d5	76.8			21.8-123		05/19/2016 15:12	WG872936
(S) 2-Fluorobiphenyl	87.2			29.5-131		05/19/2016 15:12	WG872936



Collected date/time: 05/12/16 08:30

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Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	71.9			11.2-130		05/19/2016 15:12	WG872936
(S) p-Terphenyl-d14	98.2			29.3-137		05/19/2016 15:12	WG872936

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	7130		5.19	100	100	05/24/2016 13:45	WG874711
Fluoride	2.59		0.00990	0.100	1	05/24/2016 13:31	WG874711
Sulfate	14600		38.7	2500	500	05/26/2016 11:25	WG875355

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Iron	0.169	J	0.0705	0.500	5	05/17/2016 17:12	WG872666
Manganese	0.836		0.00600	0.0500	5	05/17/2016 17:12	WG872666

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
TPH (GC/FID) Low Fraction	U		0.0314	0.100	1	05/17/2016 00:53	WG872894
(S) a,a,a-Trifluorotoluene(FID) 99.5				62.0-128		05/17/2016 00:53	WG872894

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	1	05/19/2016 00:43	WG872872
Toluene	U		0.000780	0.00500	1	05/19/2016 00:43	WG872872
Ethylbenzene	U		0.000384	0.00100	1	05/19/2016 00:43	WG872872
Total Xylenes	U		0.00106	0.00300	1	05/19/2016 00:43	WG872872
(S) Toluene-d8	104			90.0-115		05/19/2016 00:43	WG872872
(S) Dibromofluoromethane	110			79.0-121		05/19/2016 00:43	WG872872
(S) a,a,a-Trifluorotoluene	103			90.4-116		05/19/2016 00:43	WG872872
(S) 4-Bromofluorobenzene	114			80.1-120		05/19/2016 00:43	WG872872

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
C10-C28 Diesel Range	0.182		0.0222	0.100	1	05/17/2016 04:50	WG872740
C28-C40 Oil Range	0.175		0.0118	0.100	1	05/17/2016 04:50	WG872740
(S) o-Terphenyl	104			50.0-150		05/17/2016 04:50	WG872740

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
4-Chloro-3-methylphenol	U		0.000263	0.0100	1	05/19/2016 19:26	WG872936
2-Chlorophenol	U		0.000283	0.0100	1	05/19/2016 19:26	WG872936
2,4-Dichlorophenol	U		0.000284	0.0100	1	05/19/2016 19:26	WG872936
2,4-Dimethylphenol	U		0.000624	0.0100	1	05/19/2016 19:26	WG872936
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100	1	05/19/2016 19:26	WG872936
2,4-Dinitrophenol	U	J3	0.00325	0.0100	1	05/19/2016 19:26	WG872936
2-Nitrophenol	U		0.000320	0.0100	1	05/19/2016 19:26	WG872936
4-Nitrophenol	U		0.00201	0.0100	1	05/19/2016 19:26	WG872936
Pentachlorophenol	U		0.000313	0.0100	1	05/19/2016 19:26	WG872936
Phenol	U		0.000334	0.0100	1	05/19/2016 19:26	WG872936
2,4,6-Trichlorophenol	U		0.000297	0.0100	1	05/19/2016 19:26	WG872936
(S) 2-Fluorophenol	52.9			10.0-77.9		05/19/2016 19:26	WG872936
(S) Phenol-d5	38.1			5.00-70.1		05/19/2016 19:26	WG872936
(S) Nitrobenzene-d5	84.9			21.8-123		05/19/2016 19:26	WG872936
(S) 2-Fluorobiphenyl	88.9			29.5-131		05/19/2016 19:26	WG872936



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	78.3			11.2-130		05/19/2016 19:26	WG872936
(S) p-Terphenyl-d14	99.5			29.3-137		05/19/2016 19:26	WG872936

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	7100		26.0	500	500	05/23/2016 12:55	WG874225
Fluoride	3.10		0.00990	0.100	1	05/23/2016 13:58	WG874225
Sulfate	16800		38.7	2500	500	05/23/2016 12:55	WG874225

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Iron	0.981		0.0705	0.500	5	05/17/2016 17:18	WG872666
Manganese	0.910		0.00600	0.0500	5	05/17/2016 17:18	WG872666

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
TPH (GC/FID) Low Fraction	U		0.0314	0.100	1	05/17/2016 01:15	WG872894
(S) a,a,a-Trifluorotoluene(FID) 98.8				62.0-128		05/17/2016 01:15	WG872894

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	1	05/19/2016 01:05	WG872872
Toluene	U		0.000780	0.00500	1	05/19/2016 01:05	WG872872
Ethylbenzene	U		0.000384	0.00100	1	05/19/2016 01:05	WG872872
Total Xylenes	U		0.00106	0.00300	1	05/19/2016 01:05	WG872872
(S) Toluene-d8	103			90.0-115		05/19/2016 01:05	WG872872
(S) Dibromofluoromethane	110			79.0-121		05/19/2016 01:05	WG872872
(S) a,a,a-Trifluorotoluene	103			90.4-116		05/19/2016 01:05	WG872872
(S) 4-Bromofluorobenzene	116			80.1-120		05/19/2016 01:05	WG872872

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
C10-C28 Diesel Range	0.0892	J	0.0222	0.100	1	05/17/2016 05:07	WG872740
C28-C40 Oil Range	0.0898	J	0.0118	0.100	1	05/17/2016 05:07	WG872740
(S) o-Terphenyl	97.7			50.0-150		05/17/2016 05:07	WG872740

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
4-Chloro-3-methylphenol	U		0.000263	0.0100	1	05/19/2016 19:49	WG872936
2-Chlorophenol	U		0.000283	0.0100	1	05/19/2016 19:49	WG872936
2,4-Dichlorophenol	U		0.000284	0.0100	1	05/19/2016 19:49	WG872936
2,4-Dimethylphenol	U		0.000624	0.0100	1	05/19/2016 19:49	WG872936
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100	1	05/19/2016 19:49	WG872936
2,4-Dinitrophenol	U	J3	0.00325	0.0100	1	05/19/2016 19:49	WG872936
2-Nitrophenol	U		0.000320	0.0100	1	05/19/2016 19:49	WG872936
4-Nitrophenol	U		0.00201	0.0100	1	05/19/2016 19:49	WG872936
Pentachlorophenol	U		0.000313	0.0100	1	05/19/2016 19:49	WG872936
Phenol	U		0.000334	0.0100	1	05/19/2016 19:49	WG872936
2,4,6-Trichlorophenol	U		0.000297	0.0100	1	05/19/2016 19:49	WG872936
(S) 2-Fluorophenol	40.0			10.0-77.9		05/19/2016 19:49	WG872936
(S) Phenol-d5	32.2			5.00-70.1		05/19/2016 19:49	WG872936
(S) Nitrobenzene-d5	70.2			21.8-123		05/19/2016 19:49	WG872936
(S) 2-Fluorobiphenyl	81.9			29.5-131		05/19/2016 19:49	WG872936



Collected date/time: 05/12/16 09:05

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Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	63.3			11.2-130		05/19/2016 19:49	WG872936
(S) p-Terphenyl-d14	94.9			29.3-137		05/19/2016 19:49	WG872936

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	U		0.000331	0.00100	1	05/18/2016 20:12	WG872872
Toluene	U		0.000780	0.00500	1	05/18/2016 20:12	WG872872
Ethylbenzene	U		0.000384	0.00100	1	05/18/2016 20:12	WG872872
Total Xylenes	U		0.00106	0.00300	1	05/18/2016 20:12	WG872872
(S) Toluene-d8	104			90.0-115		05/18/2016 20:12	WG872872
(S) Dibromofluoromethane	109			79.0-121		05/18/2016 20:12	WG872872
(S) a,a,a-Trifluorotoluene	104			90.4-116		05/18/2016 20:12	WG872872
(S) 4-Bromofluorobenzene	99.5			80.1-120		05/18/2016 20:12	WG872872

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	U		0.000331	0.00100	1	05/18/2016 20:34	WG872872
Toluene	U		0.000780	0.00500	1	05/18/2016 20:34	WG872872
Ethylbenzene	U		0.000384	0.00100	1	05/18/2016 20:34	WG872872
Total Xylenes	U		0.00106	0.00300	1	05/18/2016 20:34	WG872872
(S) Toluene-d8	108			90.0-115		05/18/2016 20:34	WG872872
(S) Dibromofluoromethane	99.3			79.0-121		05/18/2016 20:34	WG872872
(S) a,a,a-Trifluorotoluene	108			90.4-116		05/18/2016 20:34	WG872872
(S) 4-Bromofluorobenzene	105			80.1-120		05/18/2016 20:34	WG872872

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	1660		7.95	100	10	05/23/2016 18:01	WG874228
Fluoride	18.3		0.261	1.00	1	05/23/2016 17:37	WG874228
Sulfate	20000		28.5	2500	50	05/24/2016 09:03	WG874228

Mercury by Method 7471A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	U		0.00280	0.0200	1	05/19/2016 09:44	WG873476

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Arsenic	2.87		0.650	2.00	1	05/20/2016 13:52	WG873554
Barium	95.9		0.170	0.500	1	05/20/2016 13:52	WG873554
Cadmium	0.222	J	0.0700	0.500	1	05/20/2016 13:52	WG873554
Chromium	5.89		0.140	1.00	1	05/20/2016 13:52	WG873554
Iron	5120		1.41	10.0	1	05/20/2016 13:52	WG873554
Lead	7.90		0.190	0.500	1	05/20/2016 13:52	WG873554
Manganese	390		0.120	1.00	1	05/20/2016 13:52	WG873554
Selenium	U		0.740	2.00	1	05/20/2016 13:52	WG873554
Silver	U		0.280	1.00	1	05/20/2016 13:52	WG873554

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/20/2016 22:59	WG874253
(S) a,a,a-Trifluorotoluene(FID) 87.3				59.0-128		05/20/2016 22:59	WG874253

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/25/2016 02:00	WG874942
Toluene	U		0.00217	0.0250	5	05/25/2016 02:00	WG874942
Ethylbenzene	U		0.00148	0.00500	5	05/25/2016 02:00	WG874942
Total Xylenes	U		0.00349	0.0150	5	05/25/2016 02:00	WG874942
(S) Toluene-d8	106			88.7-115		05/25/2016 02:00	WG874942
(S) Dibromofluoromethane	102			76.3-123		05/25/2016 02:00	WG874942
(S) a,a,a-Trifluorotoluene	103			87.2-117		05/25/2016 02:00	WG874942
(S) 4-Bromofluorobenzene	103			69.7-129		05/25/2016 02:00	WG874942

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/20/2016 19:28	WG873587
C28-C40 Oil Range	4.12		0.274	4.00	1	05/20/2016 19:28	WG873587
(S) o-Terphenyl	87.5			50.0-150		05/20/2016 19:28	WG873587

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc



Collected date/time: 05/12/16 00:00

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Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/20/2016 14:58	WG873908
2-Chlorophenol	U	<u>J3</u>	0.00831	0.333	1	05/20/2016 14:58	WG873908
2,4-Dichlorophenol	U		0.00746	0.333	1	05/20/2016 14:58	WG873908
2,4-Dimethylphenol	U		0.0471	0.333	1	05/20/2016 14:58	WG873908
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/20/2016 14:58	WG873908
2,4-Dinitrophenol	U		0.0980	0.333	1	05/20/2016 14:58	WG873908
2-Nitrophenol	U		0.0130	0.333	1	05/20/2016 14:58	WG873908
4-Nitrophenol	U		0.0525	0.333	1	05/20/2016 14:58	WG873908
Pentachlorophenol	U		0.0480	0.333	1	05/20/2016 14:58	WG873908
Phenol	U		0.00695	0.333	1	05/20/2016 14:58	WG873908
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/20/2016 14:58	WG873908
(S) 2-Fluorophenol	61.1			21.1-116		05/20/2016 14:58	WG873908
(S) Phenol-d5	55.3			26.3-121		05/20/2016 14:58	WG873908
(S) Nitrobenzene-d5	67.6			21.9-129		05/20/2016 14:58	WG873908
(S) 2-Fluorobiphenyl	62.2			34.9-129		05/20/2016 14:58	WG873908
(S) 2,4,6-Tribromophenol	46.7			21.6-142		05/20/2016 14:58	WG873908
(S) p-Terphenyl-d14	52.9			21.5-128		05/20/2016 14:58	WG873908

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3139265-1 05/23/16 09:07

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.0099	0.100
Sulfate	U		0.0774	5.00

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3139265-2 05/23/16 09:23 • (LCSD) R3139265-3 05/23/16 09:38

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chloride	40.0	38.9	38.9	97	97	80-120			0	15
Fluoride	8.00	7.73	7.76	97	97	80-120			0	15
Sulfate	40.0	38.5	38.6	96	97	80-120			0	15

L835977-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835977-10 05/23/16 17:41 • (MS) R3139265-4 05/23/16 17:57 • (MSD) R3139265-5 05/23/16 18:13

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Fluoride	5.00	0.361	5.34	5.28	100	98	1	80-120			1	15
Sulfate	50.0	ND	50.8	51.0	99	99	1	80-120			0	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3139346-1 05/24/16 08:33

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.0099	0.100

L836606-01 Original Sample (OS) • Duplicate (DUP)

(OS) L836606-01 05/24/16 16:53 • (DUP) R3139346-5 05/24/16 17:07

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Chloride	ND	0.611	1	0		15
Fluoride	ND	0.0818	1	0		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3139346-2 05/24/16 08:47 • (LCSD) R3139346-3 05/24/16 10:27

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Chloride	40.0	39.0	39.2	97	98	90-110			0	20
Fluoride	8.00	7.82	7.84	98	98	90-110			0	20

L836505-07 Original Sample (OS) • Matrix Spike (MS)

(OS) L836505-07 05/24/16 14:28 • (MS) R3139346-4 05/24/16 14:43

	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Analyte	mg/l	mg/l	mg/l	%		%	
Chloride	50.0	17.2	67.6	101	1	80-120	
Fluoride	5.00	0.122	5.04	98	1	80-120	

L836606-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836606-06 05/24/16 18:36 • (MS) R3139346-6 05/24/16 18:50 • (MSD) R3139346-7 05/24/16 19:04

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Chloride	50.0	ND	50.1	51.6	100	103	1	80-120			3	15
Fluoride	5.00	ND	4.98	5.18	98	102	1	80-120			4	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3140117-1 05/26/16 09:06

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Chloride	U		0.0519	1.00
Sulfate	U		0.0774	5.00

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

L837803-06 Original Sample (OS) • Duplicate (DUP)

(OS) L837803-06 05/26/16 15:51 • (DUP) R3140117-4 05/26/16 16:06

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Sulfate	35.7	35.6	1	0		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3140117-2 05/26/16 09:21 • (LCSD) R3140117-3 05/26/16 09:36

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Chloride	40.0	39.4	39.3	99	98	80-120			0	15
Sulfate	40.0	39.8	39.8	100	100	80-120			0	15

⁷Gl

⁸Al

⁹Sc



Method Blank (MB)

(MB) R3139258-1 05/23/16 10:37

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Chloride	U		0.795	10.0
Fluoride	U		0.261	1.00
Sulfate	U		0.57	50.0

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

L836501-15 Original Sample (OS) • Duplicate (DUP)

(OS) L836501-15 05/23/16 20:25 • (DUP) R3139258-4 05/23/16 20:49

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	86.9	80.8	1	7		15
Fluoride	7.38	6.69	1	10		15
Sulfate	215	177	1	19	P1	15

L836501-21 Original Sample (OS) • Duplicate (DUP)

(OS) L836501-21 05/24/16 00:48 • (DUP) R3139258-7 05/24/16 01:12

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	75.8	83.5	1	10		15
Fluoride	16.2	13.3	1	20	J3	15
Sulfate	257	235	1	9		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3139258-2 05/23/16 11:01 • (LCSD) R3139258-3 05/23/16 11:25

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chloride	200	199	199	99	99	80-120			0	15
Fluoride	20.0	20.4	20.5	102	103	80-120			0	15
Sulfate	200	200	200	100	100	80-120			0	15



L836501-16 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836501-16 05/23/16 22:00 • (MS) R3139258-5 05/23/16 22:24 • (MSD) R3139258-6 05/23/16 22:48

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	538	78.6	643	629	105	102	1	80-120			2	15
Fluoride	53.8	5.67	49.6	49.1	82	81	1	80-120			1	15
Sulfate	538	269	822	816	103	102	1	80-120			1	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3138224-1 05/19/16 09:36

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Mercury	U		0.0028	0.0200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138224-2 05/19/16 09:39 • (LCSD) R3138224-3 05/19/16 09:41

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Mercury	0.300	0.260	0.274	87	91	80-120			5	20

L835353-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835353-06 05/19/16 09:44 • (MS) R3138224-4 05/19/16 09:47 • (MSD) R3138224-5 05/19/16 09:54

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Mercury	0.300	U	0.282	0.276	94	92	1	75-125			2	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3137501-1 05/17/16 12:02

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Iron	U		0.0141	0.100
Manganese	U		0.0012	0.0100

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137501-2 05/17/16 12:04 • (LCSD) R3137501-3 05/17/16 12:07

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Iron	10.0	9.70	9.78	97	98	80-120			1	20
Manganese	1.00	0.973	0.980	97	98	80-120			1	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3138672-1 05/20/16 13:30

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Arsenic	U		0.65	2.00
Barium	0.278	J	0.17	0.500
Cadmium	U		0.07	0.500
Chromium	U		0.14	1.00
Iron	U		1.41	10.0
Lead	U		0.19	0.500
Manganese	U		0.12	1.00
Selenium	U		0.74	2.00
Silver	U		0.28	1.00

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138672-2 05/20/16 13:33 • (LCSD) R3138672-3 05/20/16 13:35

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	100	99.2	97.4	99	97	80-120			2	20
Barium	100	104	102	104	102	80-120			1	20
Cadmium	100	103	101	103	101	80-120			2	20
Chromium	100	99.2	97.9	99	98	80-120			1	20
Iron	1000	974	963	97	96	80-120			1	20
Lead	100	104	102	104	102	80-120			2	20
Manganese	100	99.7	98.4	100	98	80-120			1	20
Selenium	100	103	102	103	102	80-120			1	20
Silver	100	98.4	97.0	98	97	80-120			1	20

L836003-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836003-08 05/20/16 13:38 • (MS) R3138672-6 05/20/16 13:46 • (MSD) R3138672-7 05/20/16 13:48

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	105	4.07	102	106	94	97	1	75-125			3	20
Barium	105	47.6	155	166	102	113	1	75-125			7	20
Cadmium	105	U	106	108	101	103	1	75-125			2	20
Chromium	105	7.15	105	111	93	99	1	75-125			6	20
Iron	1050	11300	10800	12600	0	118	1	75-125	V		16	20



[L835353-06](#)

L836003-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836003-08 05/20/16 13:38 • (MS) R3138672-6 05/20/16 13:46 • (MSD) R3138672-7 05/20/16 13:48

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Lead	105	6.62	114	116	102	105	1	75-125			2	20
Manganese	105	293	362	353	65	57	1	75-125	J6	J6	2	20
Selenium	105	U	92.7	98.3	88	94	1	75-125			6	20
Silver	105	U	100	104	95	99	1	75-125			4	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3137306-3 05/16/16 22:25

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
TPH (GC/FID) Low Fraction	U		0.0314	0.100
(S) a,a,a-Trifluorotoluene(FID) 100				62.0-128

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137306-1 05/16/16 21:22 • (LCSD) R3137306-2 05/16/16 21:43

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	6.14	6.04	112	110	67.0-132			1.66	20
(S) a,a,a-Trifluorotoluene(FID)				102	101	62.0-128				

L834446-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L834446-01 05/16/16 23:50 • (MS) R3137306-4 05/16/16 22:46 • (MSD) R3137306-5 05/16/16 23:07

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	ND	2.91	3.00	52.9	54.6	1	50.0-143			3.25	20
(S) a,a,a-Trifluorotoluene(FID)					100	100		62.0-128				

Method Blank (MB)

(MB) R3138993-3 05/20/16 19:11

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	88.2			59.0-128

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138993-1 05/20/16 18:01 • (LCSD) R3138993-2 05/20/16 18:24

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
TPH (GC/FID) Low Fraction	5.50	5.12	4.92	93.0	89.4	63.5-137			3.96	20
(S) a,a,a-Trifluorotoluene(FID)				89.1	89.0	59.0-128				

L835353-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835353-06 05/20/16 22:59 • (MS) R3138993-4 05/20/16 21:50 • (MSD) R3138993-5 05/20/16 22:13

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
TPH (GC/FID) Low Fraction	5.50	U	17.6	19.8	63.9	71.9	5	28.5-138			11.7	23.6
(S) a,a,a-Trifluorotoluene(FID)					86.7	87.5		59.0-128				

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3138238-3 05/18/16 18:41

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.000331	0.00100
Ethylbenzene	U		0.000384	0.00100
Toluene	U		0.000780	0.00500
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	102			90.0-115
(S) Dibromofluoromethane	109			79.0-121
(S) a,a,a-Trifluorotoluene	103			90.4-116
(S) 4-Bromofluorobenzene	101			80.1-120

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138238-1 05/18/16 16:49 • (LCSD) R3138238-2 05/18/16 17:11

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0256	0.0267	102	107	73.0-122			4.33	20
Ethylbenzene	0.0250	0.0251	0.0260	100	104	80.9-121			3.74	20
Toluene	0.0250	0.0235	0.0244	93.9	97.4	77.9-116			3.63	20
Xylenes, Total	0.0750	0.0736	0.0765	98.2	102	79.2-122			3.82	20
(S) Toluene-d8				105	106	90.0-115				
(S) Dibromofluoromethane				110	103	79.0-121				
(S) a,a,a-Trifluorotoluene				103	106	90.4-116				
(S) 4-Bromofluorobenzene				101	106	80.1-120				

L835321-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835321-02 05/18/16 21:19 • (MS) R3138238-4 05/18/16 19:04 • (MSD) R3138238-5 05/18/16 19:27

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	ND	0.0233	0.0247	93.2	98.8	1	58.6-133			5.89	20
Ethylbenzene	0.0250	ND	0.0234	0.0253	93.5	101	1	62.7-136			7.89	20
Toluene	0.0250	ND	0.0215	0.0228	85.9	91.4	1	67.8-124			6.16	20
Xylenes, Total	0.0750	ND	0.0695	0.0740	92.6	98.7	1	65.6-133			6.31	20
(S) Toluene-d8					106	105		90.0-115				
(S) Dibromofluoromethane					108	109		79.0-121				
(S) a,a,a-Trifluorotoluene					104	104		90.4-116				
(S) 4-Bromofluorobenzene					104	104		80.1-120				

Method Blank (MB)

(MB) R3139540-3 05/24/16 21:59

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000270	0.00100
Ethylbenzene	U		0.000297	0.00100
Toluene	U		0.000434	0.00500
Xylenes, Total	U		0.000698	0.00300
(S) Toluene-d8	106			88.7-115
(S) Dibromofluoromethane	99.4			76.3-123
(S) a,a,a-Trifluorotoluene	105			87.2-117
(S) 4-Bromofluorobenzene	103			69.7-129

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3139540-1 05/24/16 20:22 • (LCSD) R3139540-2 05/24/16 20:42

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0216	0.0216	86.5	86.4	72.6-120			0.0900	20
Ethylbenzene	0.0250	0.0236	0.0232	94.6	92.8	78.6-124			1.85	20
Toluene	0.0250	0.0224	0.0225	89.5	90.1	76.7-116			0.740	20
Xylenes, Total	0.0750	0.0711	0.0715	94.8	95.3	78.1-123			0.510	20
(S) Toluene-d8				108	108	88.7-115				
(S) Dibromofluoromethane				101	101	76.3-123				
(S) a,a,a-Trifluorotoluene				107	106	87.2-117				
(S) 4-Bromofluorobenzene				103	102	69.7-129				

L836637-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836637-05 05/26/16 11:45 • (MS) R3139988-1 05/26/16 12:04 • (MSD) R3139988-2 05/26/16 12:24

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0285	29.5	137	134	81.9	79.6	4600	47.8-131			2.25	22.8
Ethylbenzene	0.0285	108	229	232	91.7	94.6	4600	44.8-135			1.67	26.9
Toluene	0.0285	222	339	347	89.5	95.7	4600	47.8-127			2.37	24.3
Xylenes, Total	0.0855	527	895	913	93.6	98.1	4600	42.7-135			1.94	26.6
(S) Toluene-d8					108	107		88.7-115				
(S) Dibromofluoromethane					102	99.1		76.3-123				
(S) a,a,a-Trifluorotoluene					106	107		87.2-117				



L836637-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836637-05 05/26/16 11:45 • (MS) R3139988-1 05/26/16 12:04 • (MSD) R3139988-2 05/26/16 12:24

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
(S) 4-Bromofluorobenzene					104	105		69.7-129				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3137334-1 05/17/16 03:42

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
C10-C28 Diesel Range	U		0.0222	0.100
C28-C40 Oil Range	U		0.0118	0.100
(S) o-Terphenyl	105			50.0-150

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137334-2 05/17/16 03:59 • (LCSD) R3137334-3 05/17/16 04:16

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	1.50	1.48	1.44	98.5	96.1	70.0-130			2.44	20
(S) o-Terphenyl				104	97.9	50.0-150				

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Method Blank (MB)

(MB) R3138554-1 05/20/16 10:03

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	88.1			50.0-150

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138554-2 05/20/16 10:17 • (LCSD) R3138554-3 05/20/16 10:31

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	47.4	48.5	78.9	80.9	50.0-100			2.44	20
(S) o-Terphenyl				88.9	91.0	50.0-150				

L835353-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835353-06 05/20/16 19:28 • (MS) R3138554-4 05/20/16 19:42 • (MSD) R3138554-5 05/20/16 19:57

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	U	43.1	44.1	71.8	73.6	1	50.0-100			2.39	20
(S) o-Terphenyl					67.2	65.3		50.0-150				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3138702-3 05/19/16 14:49

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
4-Chloro-3-methylphenol	U		0.000263	0.0100
2-Chlorophenol	U		0.000283	0.0100
2,4-Dichlorophenol	U		0.000284	0.0100
2,4-Dimethylphenol	U		0.000624	0.0100
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100
2,4-Dinitrophenol	U		0.00325	0.0100
2-Nitrophenol	U		0.000320	0.0100
4-Nitrophenol	U		0.00201	0.0100
Pentachlorophenol	U		0.000313	0.0100
Phenol	U		0.000334	0.0100
2,4,6-Trichlorophenol	U		0.000297	0.0100
(S) Nitrobenzene-d5	77.9			21.8-123
(S) 2-Fluorobiphenyl	84.2			29.5-131
(S) p-Terphenyl-d14	93.8			29.3-137
(S) Phenol-d5	38.1			5.00-70.1
(S) 2-Fluorophenol	55.7			10.0-77.9
(S) 2,4,6-Tribromophenol	70.6			11.2-130

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138702-1 05/19/16 14:02 • (LCSD) R3138702-2 05/19/16 14:25

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.0500	0.0439	0.0424	87.8	84.8	35.7-100			3.47	22.9
2-Chlorophenol	0.0500	0.0377	0.0354	75.3	70.8	26.2-91.5			6.19	26.5
2,4-Dichlorophenol	0.0500	0.0441	0.0428	88.1	85.7	31.4-103			2.83	24.9
2,4-Dimethylphenol	0.0500	0.0430	0.0431	86.1	86.2	31.9-107			0.150	25.7
4,6-Dinitro-2-methylphenol	0.0500	0.0375	0.0383	75.0	76.7	18.4-148			2.20	24.4
2,4-Dinitrophenol	0.0500	0.0258	0.0157	51.5	31.3	24.2-128		J3	48.8	20.5
2-Nitrophenol	0.0500	0.0447	0.0434	89.3	86.7	25.9-106			2.97	26.9
4-Nitrophenol	0.0500	0.0190	0.0153	38.0	30.6	10.0-52.7			21.7	40
Pentachlorophenol	0.0500	0.0392	0.0347	78.3	69.4	10.0-97.4			12.0	35.1
Phenol	0.0500	0.0200	0.0177	40.0	35.5	10.0-57.9			12.1	35
2,4,6-Trichlorophenol	0.0500	0.0452	0.0456	90.5	91.2	29.8-107			0.790	24.1
(S) Nitrobenzene-d5				84.3	87.2	21.8-123				
(S) 2-Fluorobiphenyl				86.0	90.9	29.5-131				



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138702-1 05/19/16 14:02 • (LCSD) R3138702-2 05/19/16 14:25

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
(S) p-Terphenyl-d14				96.1	98.8	29.3-137				
(S) Phenol-d5				37.7	32.4	5.00-70.1				
(S) 2-Fluorophenol				52.3	43.9	10.0-77.9				
(S) 2,4,6-Tribromophenol				88.7	88.5	11.2-130				

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



Method Blank (MB)

(MB) R3138667-3 05/20/16 10:56

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
4-Chloro-3-methylphenol	U		0.00477	0.333
2-Chlorophenol	U		0.00831	0.333
2,4-Dichlorophenol	U		0.00746	0.333
2,4-Dimethylphenol	U		0.0471	0.333
4,6-Dinitro-2-methylphenol	U		0.124	0.333
2,4-Dinitrophenol	U		0.0980	0.333
2-Nitrophenol	U		0.0130	0.333
4-Nitrophenol	U		0.0525	0.333
Pentachlorophenol	U		0.0480	0.333
Phenol	U		0.00695	0.333
2,4,6-Trichlorophenol	U		0.00779	0.333
(S) Nitrobenzene-d5	61.8			21.9-129
(S) 2-Fluorobiphenyl	61.7			34.9-129
(S) p-Terphenyl-d14	68.7			21.5-128
(S) Phenol-d5	70.1			26.3-121
(S) 2-Fluorophenol	64.2			21.1-116
(S) 2,4,6-Tribromophenol	52.9			21.6-142

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138667-1 05/20/16 10:08 • (LCSD) R3138667-2 05/20/16 10:32

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.667	0.451	0.496	67.7	74.4	51.1-113			9.51	20
2-Chlorophenol	0.667	0.345	0.432	51.7	64.8	40.8-103		J3	22.6	20
2,4-Dichlorophenol	0.667	0.452	0.451	67.8	67.5	46.2-109			0.350	20
2,4-Dimethylphenol	0.667	0.420	0.451	62.9	67.6	42.2-110			7.12	20
4,6-Dinitro-2-methylphenol	0.667	0.457	0.470	68.5	70.5	23.1-119			2.97	23.7
2,4-Dinitrophenol	0.667	0.430	0.404	64.5	60.6	10.0-105			6.29	36.5
2-Nitrophenol	0.667	0.421	0.463	63.1	69.4	44.2-113			9.50	20.9
4-Nitrophenol	0.667	0.393	0.365	58.9	54.7	34.8-109			7.41	20
Pentachlorophenol	0.667	0.517	0.487	77.5	73.0	16.2-102			5.87	22.9
Phenol	0.667	0.367	0.442	55.0	66.3	41.5-106			18.6	20
2,4,6-Trichlorophenol	0.667	0.512	0.479	76.8	71.8	44.4-108			6.68	20
(S) Nitrobenzene-d5				59.1	63.6	21.9-129				
(S) 2-Fluorobiphenyl				69.2	60.8	34.9-129				



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138667-1 05/20/16 10:08 • (LCSD) R3138667-2 05/20/16 10:32

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
(S) p-Terphenyl-d14				65.8	64.2	21.5-128				
(S) Phenol-d5				56.0	67.8	26.3-121				
(S) 2-Fluorophenol				59.1	73.1	21.1-116				
(S) 2,4,6-Tribromophenol				57.7	55.4	21.6-142				

L835349-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835349-02 05/20/16 13:46 • (MS) R3138667-4 05/20/16 14:10 • (MSD) R3138667-5 05/20/16 14:34

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.767	U	0.592	0.713	77.2	93.1	1	27.0-154			18.6	26.6
2-Chlorophenol	0.767	U	0.450	0.513	58.8	67.0	1	33.2-121			13.1	29.3
2,4-Dichlorophenol	0.767	U	0.536	0.619	70.0	80.7	1	34.8-134			14.3	27.3
2,4-Dimethylphenol	0.767	U	0.502	0.634	65.4	82.8	1	12.3-149			23.4	32.3
4,6-Dinitro-2-methylphenol	0.767	U	0.558	0.641	72.8	83.6	1	10.0-144			13.8	32.7
2,4-Dinitrophenol	0.767	U	0.495	0.577	64.6	75.2	1	10.0-121			15.2	39.4
2-Nitrophenol	0.767	U	0.523	0.563	68.3	73.4	1	29.5-144			7.26	29.9
4-Nitrophenol	0.767	U	0.493	0.569	64.3	74.2	1	20.0-133			14.3	30.2
Pentachlorophenol	0.767	U	0.648	0.726	84.5	94.7	1	10.0-139			11.4	28.3
Phenol	0.767	U	0.581	0.646	75.8	84.3	1	25.1-130			10.6	29.6
2,4,6-Trichlorophenol	0.767	U	0.602	0.649	78.5	84.6	1	33.8-133			7.56	28.1
(S) Nitrobenzene-d5					67.5	80.4		21.9-129				
(S) 2-Fluorobiphenyl					59.8	65.2		34.9-129				
(S) p-Terphenyl-d14					47.5	54.0		21.5-128				
(S) Phenol-d5					63.4	68.3		26.3-121				
(S) 2-Fluorophenol					66.7	73.0		21.1-116				
(S) 2,4,6-Tribromophenol					68.4	64.6		21.6-142				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.

Qualifier	Description
-----------	-------------

J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
V	The sample concentration is too high to evaluate accurate spike recoveries.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina ¹	DW21704
Florida	E87487	North Carolina ²	41
Georgia	NELAP	North Dakota	R-140
Georgia ¹	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky ¹	90010	South Dakota	n/a
Kentucky ²	16	Tennessee ¹⁴	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

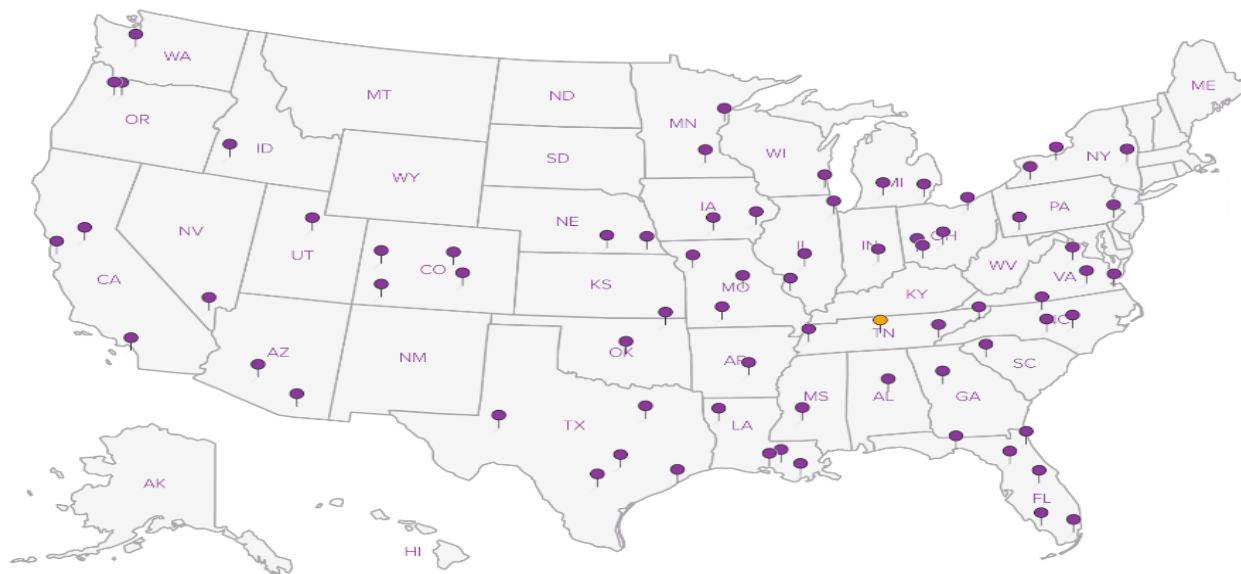
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ^{n/a} Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



AMEC Foster Wheeler - Houston, TX

585 N. Dairy Ashford
Houston, TX 77079

Billing Information:

Accounts Payable
585 N. Dairy Ashford
Houston, TX 77079

Email To: pamela.krueger@amecfw.com

Report to:
Pamela Krueger

Project: *WASTE WATER LINE*
Description: *Slurry Slinger Sump Investigation*

Phone: 713-929-5674
Fax:

Client Project #
6703160012.00

City/State
Collected:

Lab Project #
AMECFWHTX-SLURRY

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Rush? (Lab MUST Be Notified)
☐ Same Day200%
☐ Next Day100%
☐ Two Day50%
☐ Three Day25%

Date Results Needed

Email? ☐ No ☒ Yes
FAX? ☐ No ☐ Yes

Immediately
Packed on Ice N ☐ Y ☐

No.
of
Cntrs

8270 100ml Amb NoPres

DROOROLVI 40mlAmb-HCl-BT

DRORLA,SV8270 40zClr-NoPres

GRO 40mlAmb HCl

GRO,V8260 20zClr-NoPres

Skinner's List Mtls. 250mlHDPE-HNO3

Skinner's List Mtls. 20zClr-NoPres

V8260 40mlAmb-HCl

V8260- Trip Blank 40mlAmb-HCl-Bik

Chain of Custody Page of



YOUR LAB OF CHOICE

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859



L# *1835353*

1198

Acctnum: AMECFWHTX

Template: T112081

Prelogin: P552543

TSR: 526 - Chris McCord

PB: *5-4-10 KM*

Shipped Via: FedEx Ground

Rem./Contaminant Sample # (lab only)

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8270 100ml Amb NoPres	DROOROLVI 40mlAmb-HCl-BT	DRORLA,SV8270 40zClr-NoPres	GRO 40mlAmb HCl	GRO,V8260 20zClr-NoPres	Skinner's List Mtls. 250mlHDPE-HNO3	Skinner's List Mtls. 20zClr-NoPres	V8260 40mlAmb-HCl	V8260- Trip Blank 40mlAmb-HCl-Bik	Rem./Contaminant	Sample # (lab only)
		SS				3			X		X		X				
		SS				3			X		X		X				
		SS				3			X		X		X				
<i>TMW-WWL1</i>		GW		<i>5/12/16</i>	<i>8:30</i>	10	X	X		X		X		X			<i>-01</i>
<i>TMW-WWL2</i>		GW		<i>5/12/16</i>	<i>9:00</i>	10	X	X		X		X		X			<i>02</i>
<i>TMW-WWL2D</i>		GW		<i>5/12/16</i>	<i>9:05</i>	10	X	X		X		X		X			<i>03</i>
<i>TRIP Blank</i>		GW				1									X		<i>04</i>
<i>TRIP Blank</i>		GW				1									X		<i>05</i>
<i>TRIP Blank</i>		GW				1									X		

*WWL-SPC**

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other

Remarks:

** Pamela Krueger will call in analysis for WWL1 Soil Pit Composite Sample*

Relinquished by: (Signature)

Date: *5/12/16*

Time: *11:00*

Received by: (Signature)

Samples returned via: ☐ UPS

☐ FedEx ☐ Courier ☐

Relinquished by: (Signature)

Date:

Time:

Received by: (Signature)

Temp: *2.6* °C Bottles Received: *35*

Relinquished by: (Signature)

Date:

Time:

Received for lab by: (Signature)

Date: *5-12-16* Time: *9:00*

Condition: (lab use only)

5-054

COC Seal Intact: ☒ Y ☐ N ☐ NA

pH Checked: NCF:

6711 0132 9017

JW7
OK

ESC Lab Sciences Non-Conformance Form

Login #: L835353	Client: AMECFWHTX	Date: 5/13/16	Evaluated by: Jeremy
------------------	-------------------	---------------	----------------------

Non-Conformance (check applicable items)

Sample Integrity		Chain of Custody Clarification	
Parameter(s) past holding time	x	Login Clarification Needed	If Broken Container:
Improper temperature		Chain of custody is incomplete	Insufficient packing material around container
Improper container type		Please specify Metals requested.	Insufficient packing material inside cooler
Improper preservation		Please specify TCLP requested.	Improper handling by carrier (FedEx / UPS / Courier)
Insufficient sample volume.		Received additional samples not listed on coc.	Sample was frozen
Sample is biphasic.		Sample ids on containers do not match ids on coc	Container lid not intact
Vials received with headspace.		Trip Blank not received.	If no Chain of Custody:
Broken container		Client did not "X" analysis.	Received by:
Broken container:		Chain of Custody is missing	Date/Time:
Sufficient sample remains			Temp./Cont. Rec./pH:
			Carrier:
			Tracking#

Login Comments: Received a 125ml-NP for Anions for all TMW ID's not listed on COC.

Client informed by:	Call	Email	Voice Mail	Date:	Time:
TSR Initials: CM	Client Contact:				

Login Instructions:

Log 125mL-NP for CHLORIDE, FLUORIDE and SULFATE.

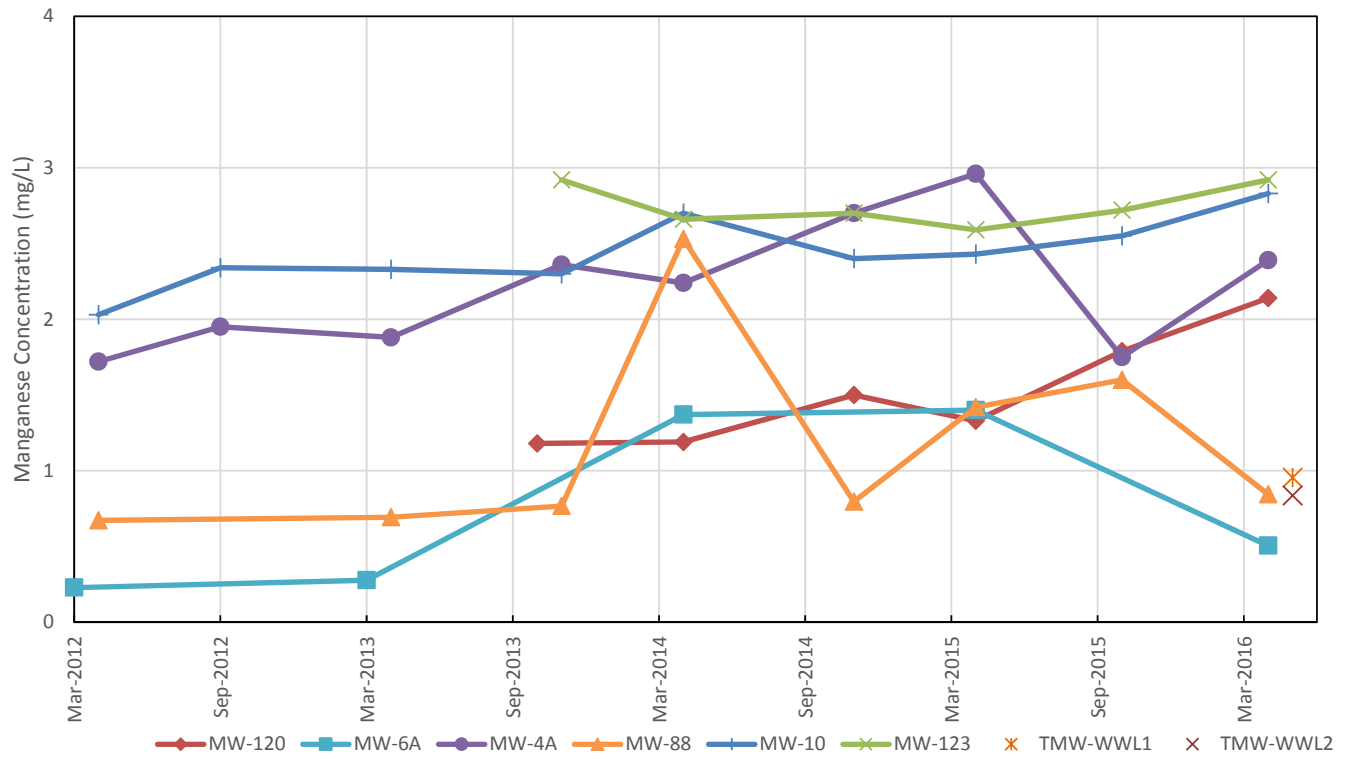
Also, change on all IDs: 8270 to 8270ACID; V8260 to V8260BTEX and only log metals FEICP and MNICP.

This E-mail and any attached files are confidential, and may be copyright protected. If you are not the addressee, any dissemination of this communication is strictly prohibited. If you have received this message in error, please contact the sender immediately and delete/destroy all information received.

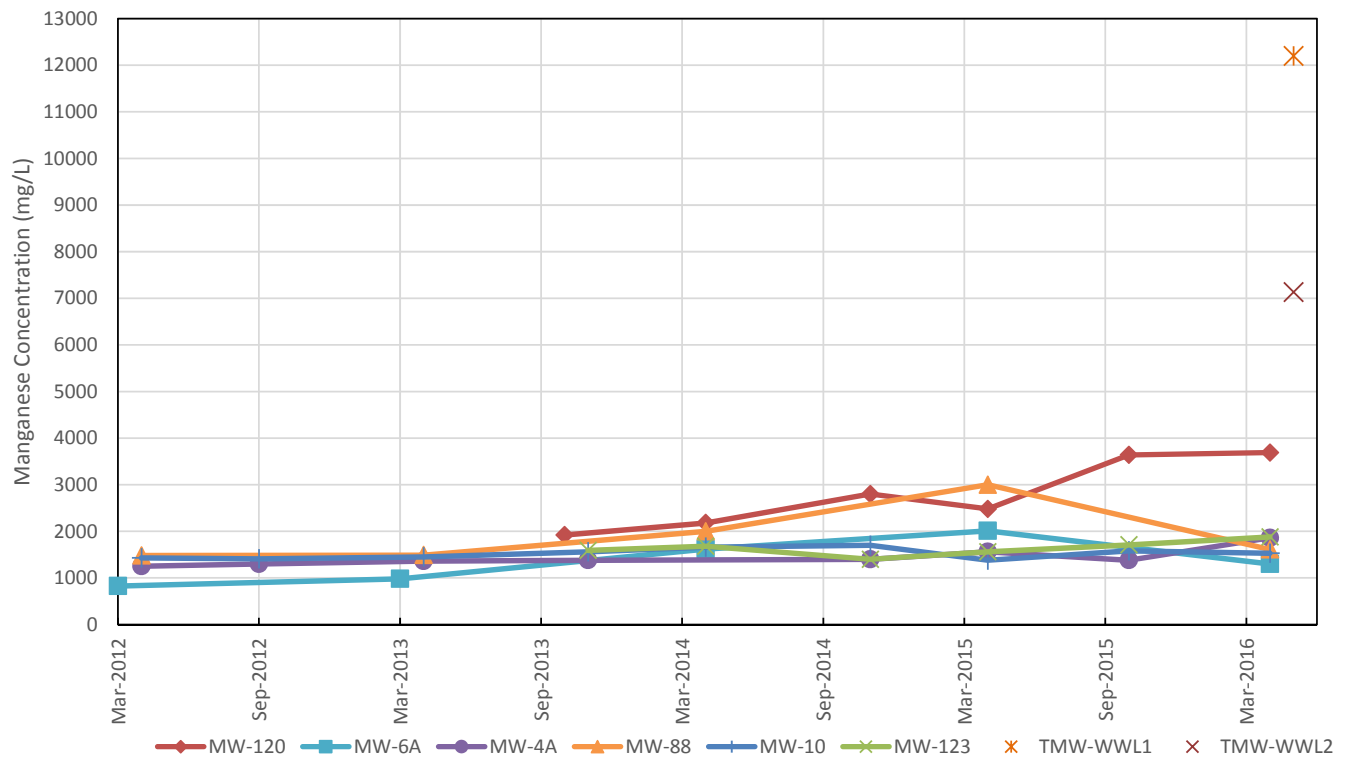


ATTACHMENT D

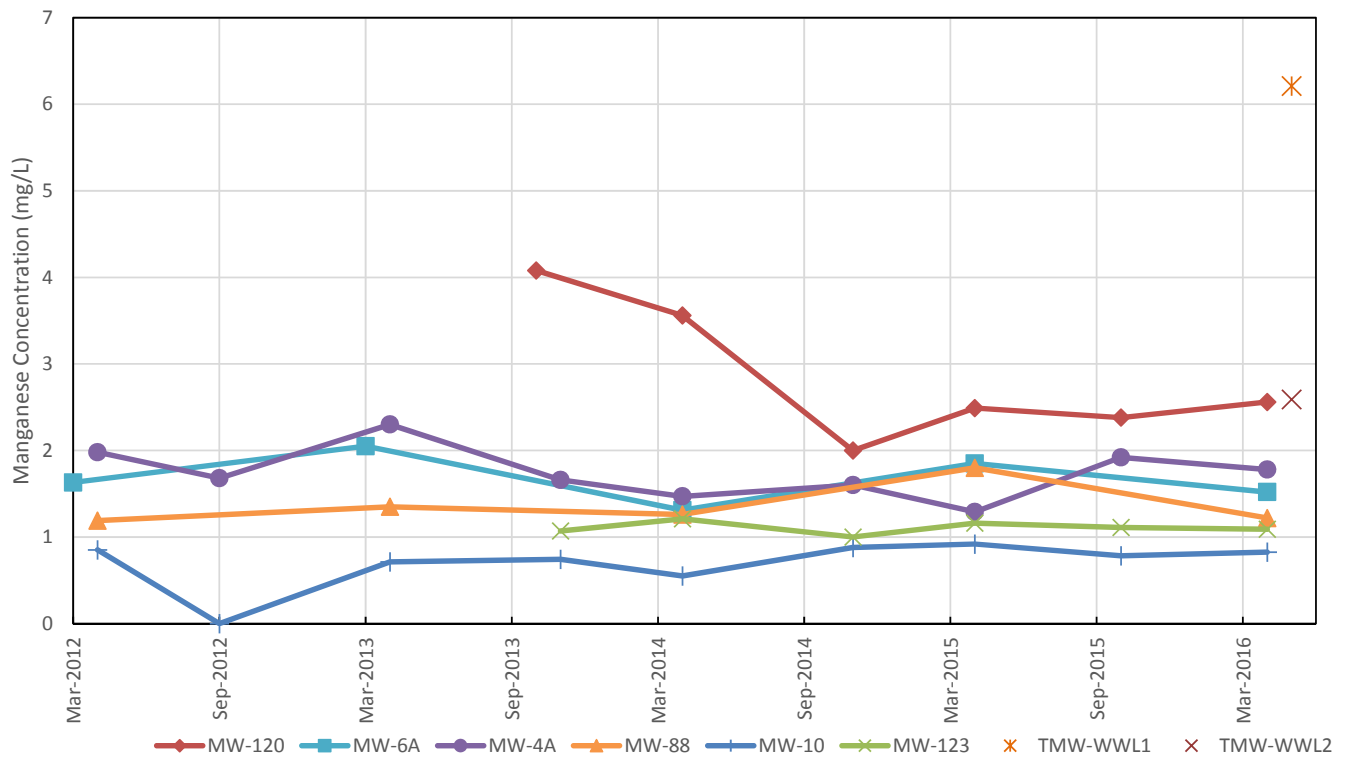
Manganese



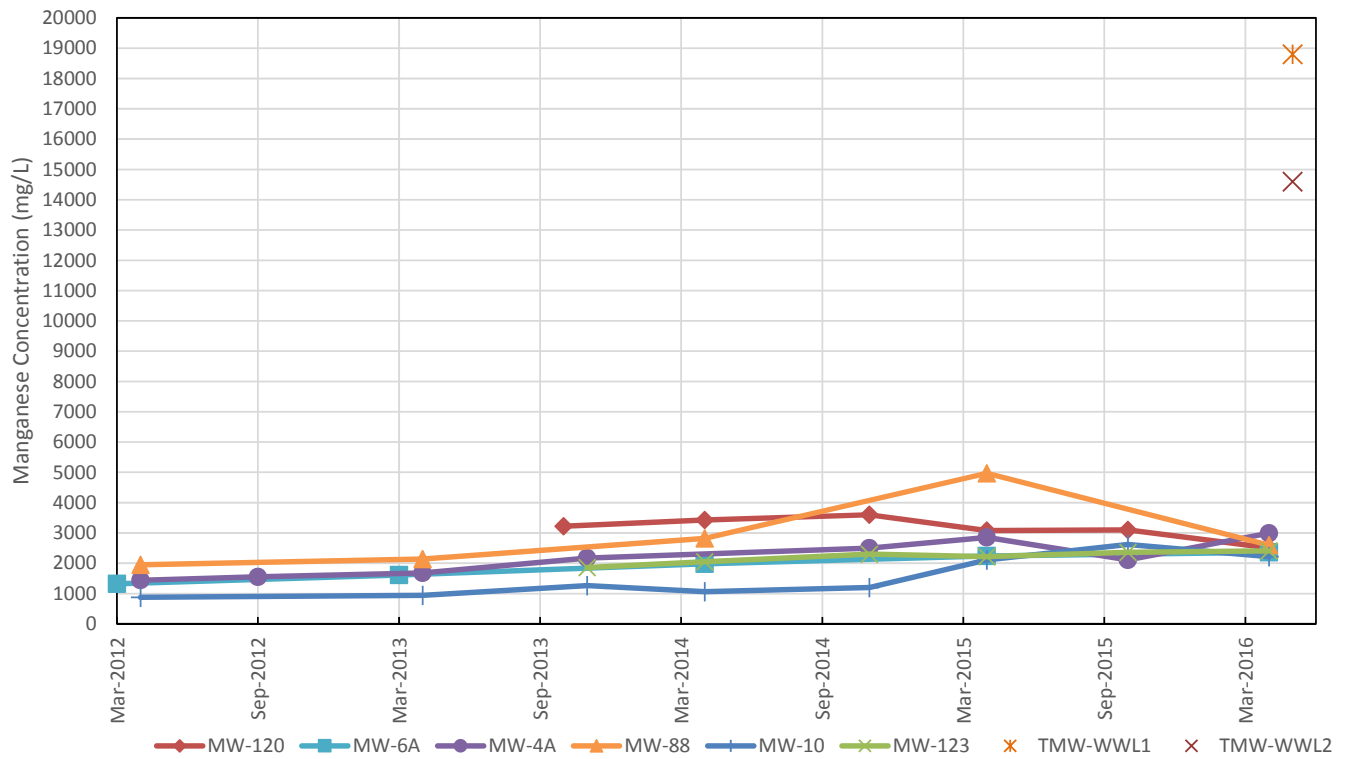
Chloride



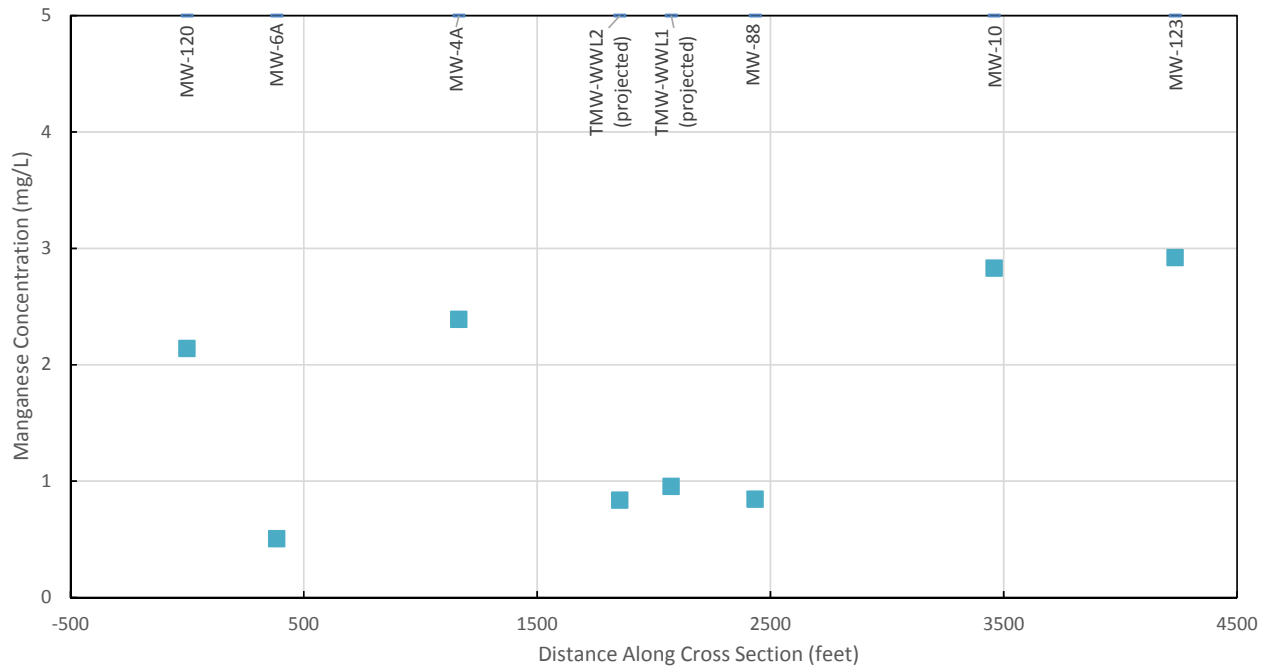
Fluoride



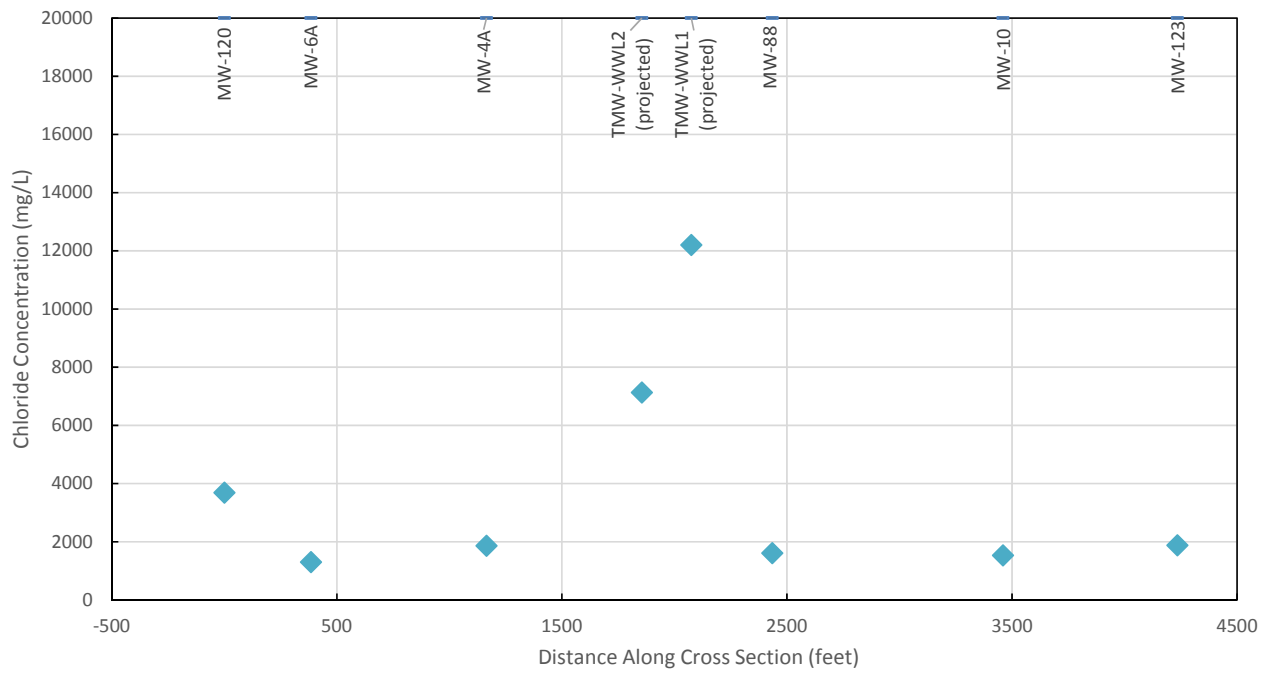
Sulfate



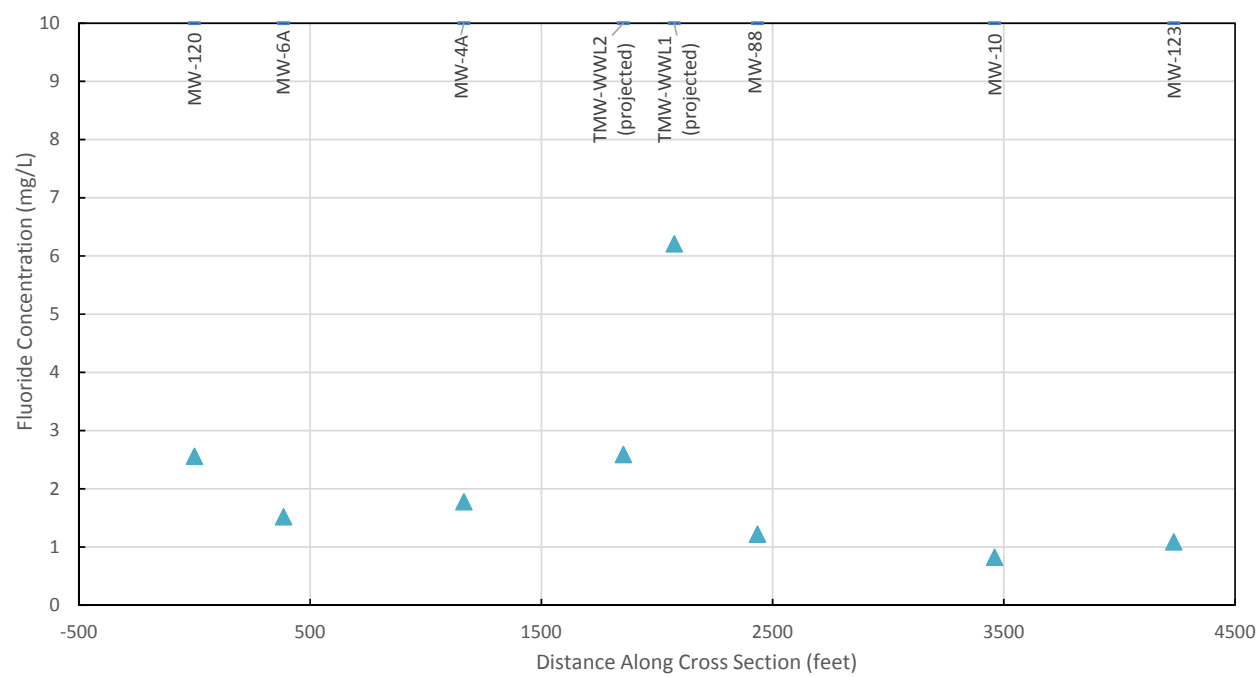
Manganese



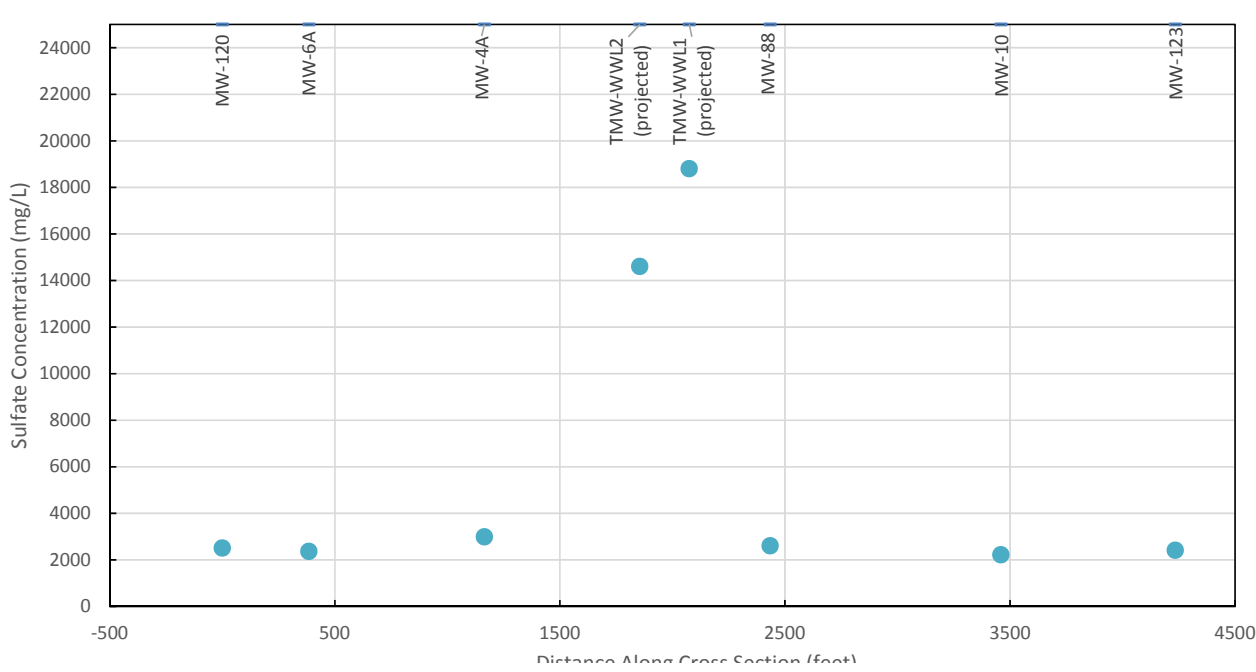
Chloride



Fluoride



Sulfate



Tom Blaine, P.E.
State Engineer



Roswell Office
1900 WEST SECOND STREET
ROSWELL, NM 88201

**STATE OF NEW MEXICO
OFFICE OF THE STATE ENGINEER**

Trn Nbr: 586987
File Nbr: RA 12403

May. 10, 2016

SCOTT DENTON
HOLLYFRONTIER NAVAJO REFINING
501 EAST MAIN STREET
ARTESIA, NM 88210


Greetings:

Enclosed is your copy of the above numbered permit that has been approved subject to the conditions set forth on the approval page. In accordance with the conditions of approval, the well can only be tested for 10 cumulative days, and the well is to be plugged on or before 05/31/2017, unless a permit to use the water is acquired from this office.

A Well Record & Log (OSE Form wr-20) shall be filed in this office within twenty (20) days after completion of drilling, but no later than 05/31/2017.

Appropriate forms can be downloaded from the OSE website www.ose.state.nm.us or will be mailed upon request.

Sincerely,


Juan Hernandez
(575) 622-6521

Enclosure

explore

File No.

RA-12403



NEW MEXICO OFFICE OF THE STATE ENGINEER

APPLICATION FOR PERMIT TO DRILL A WELL
WITH NO CONSUMPTIVE USE OF WATER

(check applicable box):

For fees, see State Engineer website: <http://www.ose.state.nm.us/>

- Purpose:
- ☐ Pollution Control And / Or Recovery ☐ Geo-Thermal
- ☐ Exploratory ☐ Construction Site De-Watering ☐ Other (Describe):
- ☒ Monitoring ☐ Mineral De-Watering

A separate permit will be required to apply water to beneficial use.

☒ Temporary Request - Requested Start Date: 5/1/2016

Requested End Date: 6/1/2016

Plugging Plan of Operations Submitted? ☒ Yes ☐ No

1. APPLICANT(S)

Name: HollyFrontier Navajo Refining LLC	Name:
Contact or Agent: check here if Agent <input type="checkbox"/> Scott Denton	Contact or Agent: check here if Agent <input type="checkbox"/>
Mailing Address: 501 East Main Street	Mailing Address:
City: Artesia	City:
State: NM Zip Code: 88210	State: Zip Code:
Phone: <input checked="" type="checkbox"/> Home <input type="checkbox"/> Cell Phone (Work): 575-746-5487	Phone: <input type="checkbox"/> Home <input type="checkbox"/> Cell Phone (Work): 575-746-5487
E-mail (optional): Scott.Denton@HollyFrontier.com	E-mail (optional):

FOR OSE INTERNAL USE

Application for Permit, Form wr-07, Rev 6/14/12

File No.: RA-12403	Trn. No.: 586987	Receipt No.:
Trans Description (optional): POD 1,2		
Sub-Basin:	PCW/LOG Due Date: 5-31-17	

2. WELL(S) Describe the well(s) applicable to this application.

Location Required: Coordinate location must be reported in NM State Plane (NAD 83), UTM (NAD 83), or Latitude/Longitude (Lat/Long - WGS84).
District II (Roswell) and District VII (Cimarron) customers, provide a PLSS location in addition to above.

☐ NM State Plane (NAD83) (Feet)
 ☐ UTM (NAD83) (Meters)
 ☒ Lat/Long (WGS84) (to the nearest 1/10th of second)

☐ NM West Zone
 ☐ Zone 12N

☐ NM East Zone
 ☐ Zone 13N

☐ NM Central Zone

Well Number (if known):	X or Easting or Longitude:	Y or Northing or Latitude:	Provide if known: -Public Land Survey System (PLSS) (Quarters or Halves, Section, Township, Range) OR - Hydrographic Survey Map & Tract; OR - Lot, Block & Subdivision; OR - Land Grant Name
TMW-WWLine1	104 20' 20.1" W	32 51' 0.1" N	T17S, R26E, S12, Q4 1, Q16 3
TMW-WWLine2	104 20' 20.3" W	32 51' 0.7" N	T17S, R26E, S12, Q4 1, Q16 3

NOTE: If more well locations need to be described, complete form WR-08 (Attachment 1 – POD Descriptions)

Additional well descriptions are attached: ☐ Yes ☒ No If yes, how many _____

Other description relating well to common landmarks, streets, or other:
 Temporary wells to be installed on either side of underground wastewater line south of former evaporation ponds, north of US Highway 82.

Well is on land owned by: HollyFrontier Navajo Refining, LLC

Well Information: **NOTE: If more than one (1) well needs to be described, provide attachment.** Attached? ☐ Yes ☒ No
 If yes, how many _____

Approximate depth of well (feet): 10 to 12 feet Outside diameter of well casing (inches): 2

Driller Name: Envirotech Drilling Services LLC Driller License Number: WD-1757

3. ADDITIONAL STATEMENTS OR EXPLANATIONS

Temporary monitoring wells will be installed and developed, allowed to rest for 24 hours, sampled (once only), then plugged and abandoned. The purpose of the temporary monitoring wells is to determine whether wastewater released from an identified line break may have impacted the shallow groundwater beneath the pipeline.

2016 MAY -2 PM 4:20

FOR USE INTERNAL USE

Application for Permit, Form wr-07

File No.: RA-12403

Trn No.: 586987

4. SPECIFIC REQUIREMENTS: The applicant must include the following, as applicable to each well type. Please check the appropriate boxes, to indicate the information has been included and/or attached to this application:

Exploratory: <input type="checkbox"/> Include a description of any proposed pump test, if applicable.	Pollution Control and/or Recovery: <input type="checkbox"/> Include a plan for pollution control/recovery, that includes the following: <input type="checkbox"/> A description of the need for the pollution control or recovery operation. <input type="checkbox"/> The estimated maximum period of time for completion of the operation. <input type="checkbox"/> The annual diversion amount. <input type="checkbox"/> The annual consumptive use amount. <input type="checkbox"/> The maximum amount of water to be diverted and injected for the duration of the operation. <input type="checkbox"/> The method and place of discharge. <input type="checkbox"/> The method of measurement of water produced and discharged.	Construction De-Watering: <input type="checkbox"/> Include a description of the proposed dewatering operation, <input type="checkbox"/> The estimated duration of the operation, <input type="checkbox"/> The maximum amount of water to be diverted, <input type="checkbox"/> A description of the need for the dewatering operation, and, <input type="checkbox"/> A description of how the diverted water will be disposed of.	Mine De-Watering: <input type="checkbox"/> Include a plan for pollution control/recovery, that includes the following: <input type="checkbox"/> A description of the need for mine dewatering. <input type="checkbox"/> The estimated maximum period of time for completion of the operation. <input type="checkbox"/> The source(s) of the water to be diverted. <input type="checkbox"/> The geohydrologic characteristics of the aquifer(s). <input type="checkbox"/> The maximum amount of water to be diverted per annum. <input type="checkbox"/> The maximum amount of water to be diverted for the duration of the operation. <input type="checkbox"/> The quality of the water. <input type="checkbox"/> The method of measurement of water diverted.
Monitoring: <input checked="" type="checkbox"/> Include the reason for the monitoring well, and, <input checked="" type="checkbox"/> The duration of the planned monitoring.	<input type="checkbox"/> The method of measurement of water injected. <input type="checkbox"/> The characteristics of the aquifer. <input type="checkbox"/> The method of determining the resulting annual consumptive use of water and depletion from any related stream system. <input type="checkbox"/> Proof of any permit required from the New Mexico Environment Department. <input type="checkbox"/> An access agreement if the applicant is not the owner of the land on which the pollution plume control or recovery well is to be located.	Geo-Thermal: <input type="checkbox"/> Include a description of the geothermal heat exchange project, <input type="checkbox"/> The amount of water to be diverted and re-injected for the project, <input type="checkbox"/> The time frame for constructing the geothermal heat exchange project, and, <input type="checkbox"/> The duration of the project. <input type="checkbox"/> Preliminary surveys, design data, and additional information shall be included to provide all essential facts relating to the request.	<input type="checkbox"/> The recharge of water to the aquifer. <input type="checkbox"/> Description of the estimated area of hydrologic effect of the project. <input type="checkbox"/> The method and place of discharge. <input type="checkbox"/> An estimation of the effects on surface water rights and underground water rights from the mine dewatering project. <input type="checkbox"/> A description of the methods employed to estimate effects on surface water rights and underground water rights. <input type="checkbox"/> Information on existing wells, rivers, springs, and wetlands within the area of hydrologic effect.

ACKNOWLEDGEMENT

I, We (name of applicant(s)), Scott Denton on behalf of HollyFrontier Navajo Refining LLC

Print Name(s)

affirm that the foregoing statements are true to the best of (my, our) knowledge and belief.

Robert Combs for Scott M. Denton

Applicant Signature

Applicant Signature

ACTION OF THE STATE ENGINEER

This application is:

☒ approved

☐ partially approved

☐ denied

provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare and further subject to the attached conditions of approval.

Witness my hand and seal this 10th day of May 20 16, for the State Engineer,

Tom Blaine, P.E.

State Engineer

By:

Signature

Print

Title: Juan Hernandez, Engr Specialist Supervisor

Print

FOR USE INTERNAL USE

Application for Permit, Form wr-07

File No.:

RA-12403

Trn No.:

586987

**NEW MEXICO STATE ENGINEER OFFICE
PERMIT TO EXPLORE**

SPECIFIC CONDITIONS OF APPROVAL

- 1A Depth of the well shall not exceed the thickness of the valley fill.
- 4 No water shall be appropriated and beneficially used under this permit.
- 6 The well shall be plugged upon completion of the permitted use, and a plugging report shall be filed with the State Engineer within 10 days.
- 7 The Permittee shall utilize the highest and best technology available to ensure conservation of water to the maximum extent practical.
- B The well shall be drilled by a driller licensed in the State of New Mexico in accordance with Section 72-12-12 New Mexico Statutes Annotated.
- C Driller's well record must be filed with the State Engineer within 20 days after the well is drilled or driven. Well record forms will be provided by the State Engineer upon request.
- C2 No water shall be diverted from this well except for testing purposes which shall not exceed ten (10) cumulative days, and well shall be plugged or capped on or before , unless a permit to use water from this well is acquired from the Office of the State Engineer.
- P The well shall be constructed, maintained, and operated to prevent inter-aquifer exchange of water and to prevent loss of hydraulic head between geologic zones.

**NEW MEXICO STATE ENGINEER OFFICE
PERMIT TO EXPLORE**

SPECIFIC CONDITIONS OF APPROVAL (Continued)

Q The State Engineer retains jurisdiction over this permit.

LOG The Point of Diversion RA 12403 POD1 must be completed and the Well Log filed on or before 05/31/2017.

LOG The Point of Diversion RA 12403 POD2 must be completed and the Well Log filed on or before 05/31/2017.

IT IS THE PERMITTEES RESPONSIBILITY TO OBTAIN ALL AUTHORIZATIONS AND PERMISSIONS TO DRILL ON PROPERTY OF OTHER OWNERSHIP BEFORE COMMENCING ACTIVITIES UNDER THIS PERMIT.

SHOULD THE PERMITTEE CHANGE THE PURPOSE OF USE TO OTHER THAN MONITORING PURPOSES, AN APPLICATION SHALL BE ACQUIRED FROM THE OFFICE OF THE STATE ENGINEER.

ACTION OF STATE ENGINEER

Notice of Intention Rcvd:	Date Rcvd. Corrected:
Formal Application Rcvd: 05/02/2016	Pub. of Notice Ordered:
Date Returned - Correction:	Affidavit of Pub. Filed:

This application is approved provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare of the state; and further subject to the specific conditions listed previously.

Witness my hand and seal this 10 day of May A.D., 2016

Tom Blaine, P.E., State Engineer

By: 

Juan Hernandez

Trn Desc: RA 12403 POD1,2

File Number: RA 12403

Trn Number: 586987

Locator Tool Report

General Information:

Application ID: 29 Date: 05-10-2016 Time: 08:42:10

WR File Number: RA
Purpose: POINT OF DIVERSION

Applicant First Name: HOLLY FRONTIER NAVAJO REFINING LC
Applicant Last Name: TMW-WWLINE2

GW Basin: ROSWELL ARTESIAN
County: EDDY

Critical Management Area Name(s): NONE
Special Condition Area Name(s): NONE
Land Grant Name: NON GRANT

PLSS Description (New Mexico Principal Meridian):

SW 1/4 of SW 1/4 of SE 1/4 of NW 1/4 of Section 12, Township 17S, Range 26E.

Coordinate System Details:

Geographic Coordinates:

Latitude: 32 Degrees 51 Minutes 0.7 Seconds N
Longitude: 104 Degrees 20 Minutes 20.3 Seconds W

Universal Transverse Mercator Zone: 13N

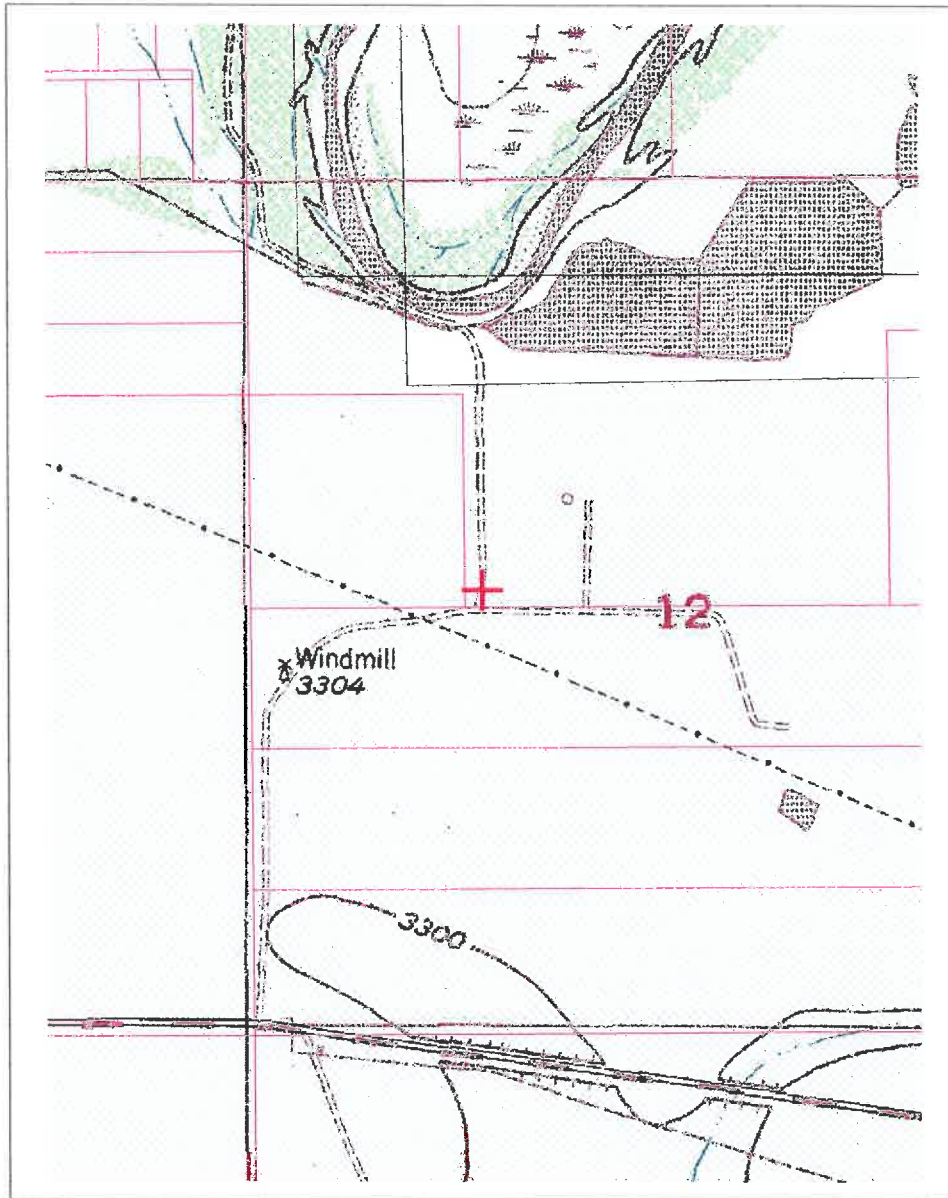
NAD 1983(92) (Meters)	N: 3,634,873	E: 561,855
NAD 1983(92) (Survey Feet)	N: 11,925,413	E: 1,843,353
NAD 1927 (Meters)	N: 3,634,670	E: 561,905
NAD 1927 (Survey Feet)	N: 11,924,748	E: 1,843,516

State Plane Coordinate System Zone: New Mexico East

NAD 1983(92) (Meters)	N: 205,141	E: 164,472
NAD 1983(92) (Survey Feet)	N: 673,034	E: 539,606
NAD 1927 (Meters)	N: 205,122	E: 151,921
NAD 1927 (Survey Feet)	N: 672,971	E: 498,427

NEW MEXICO OFFICE OF STATE ENGINEER

Locator Tool Report



WR File Number: RA

Scale: 1:14,368

Northing/Easting: UTM83(92) (Meter): N: 3,634,873

E: 561,855

Northing/Easting: SPCS83(92) (Feet): N: 673,034

E: 539,606

GW Basin: Roswell Artesian

Locator Tool Report

General Information:

Application ID:29 Date: 05-10-2016 Time: 08:40:32

WR File Number: RA
Purpose: POINT OF DIVERSION

Applicant First Name: HOLLY FRONTIER NAVAJO REFINING LC
Applicant Last Name: TMW-WWLINE1

GW Basin: ROSWELL ARTESIAN
County: EDDY

Critical Management Area Name(s): NONE
Special Condition Area Name(s): NONE
Land Grant Name: NON GRANT

PLSS Description (New Mexico Principal Meridian):

SW 1/4 of SW 1/4 of SE 1/4 of NW 1/4 of Section 12, Township 17S, Range 26E.

Coordinate System Details:

Geographic Coordinates:

Latitude: 32 Degrees 51 Minutes 0.1 Seconds N
Longitude: 104 Degrees 20 Minutes 20.1 Seconds W

Universal Transverse Mercator Zone: 13N

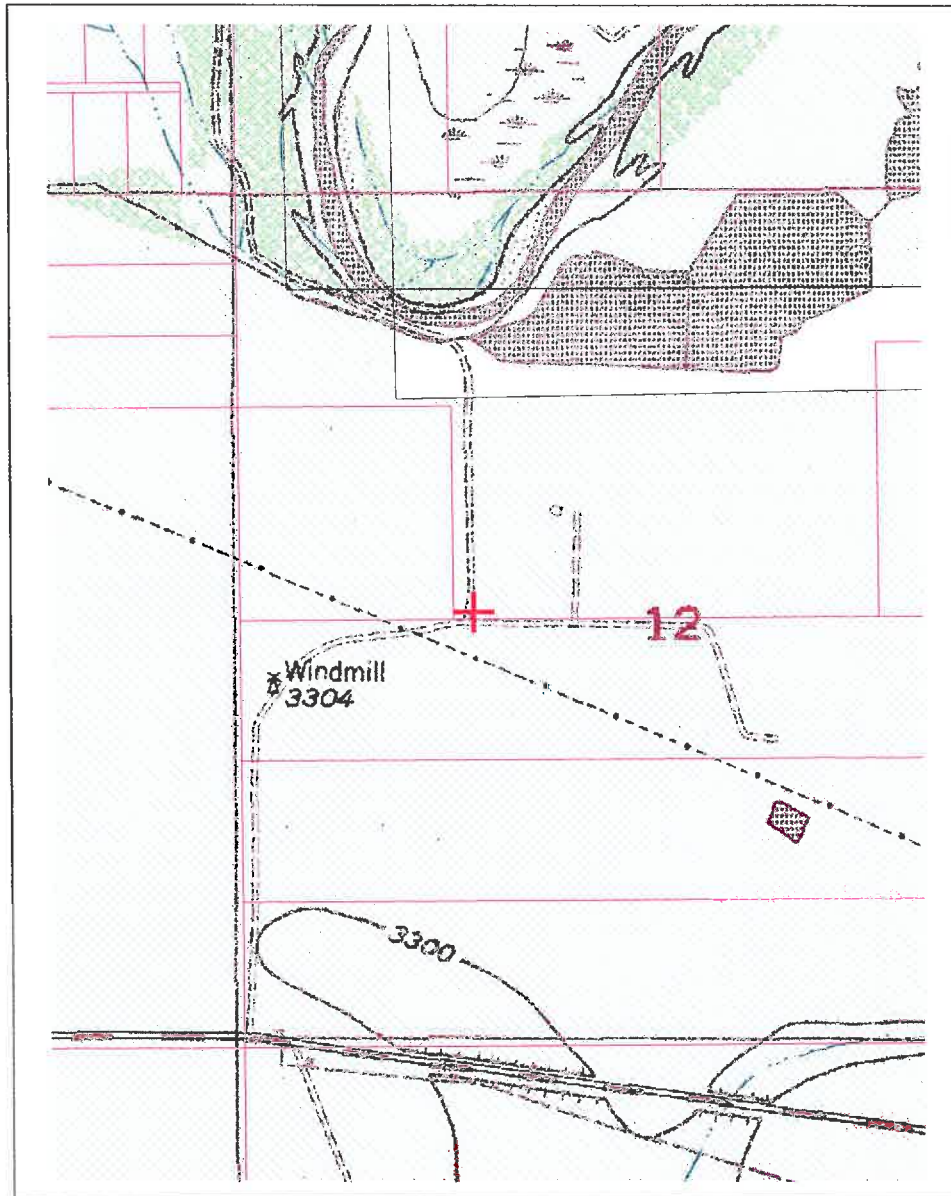
NAD 1983(92) (Meters)	N: 3,634,855	E: 561,860
NAD 1983(92) (Survey Feet)	N: 11,925,353	E: 1,843,371
NAD 1927 (Meters)	N: 3,634,652	E: 561,910
NAD 1927 (Survey Feet)	N: 11,924,687	E: 1,843,534

State Plane Coordinate System Zone: New Mexico East

NAD 1983(92) (Meters)	N: 205,123	E: 164,477
NAD 1983(92) (Survey Feet)	N: 672,973	E: 539,623
NAD 1927 (Meters)	N: 205,103	E: 151,926
NAD 1927 (Survey Feet)	N: 672,910	E: 498,444

NEW MEXICO OFFICE OF STATE ENGINEER

Locator Tool Report



WR File Number: RA

Scale: 1:14,368

Northing/Easting: UTM83(92) (Meter): N: 3,634,855

E: 561,860

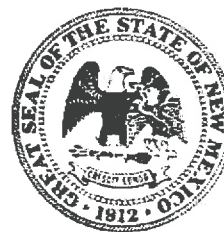
Northing/Easting: SPCS83(92) (Feet): N: 672,973

E: 539,623

GW Basin: Roswell Artesian



WELL PLUGGING PLAN OF OPERATIONS



NOTE: A Well Plugging Plan of Operations shall be filed with and accepted by the Office of the State Engineer prior to plugging.

I. FILING FEE: There is no filing fee for this form.

II. GENERAL / WELL OWNERSHIP:

Existing Office of the State Engineer POD Number (Well Number) for well to be plugged: RA-12403
Name of well owner: HollyFrontier Navajo Refining, LLC
Mailing address: 501 East Main Street
City: Artesia State: NM Zip code: 88210
Phone number: 575-746-5487 E-mail: Scott.Denton@HollyFrontier.com

III. WELL DRILLER INFORMATION:

Well Driller contracted to provide plugging services: Envirotech Drilling Services LLC
New Mexico Well Driller License No.: WD-1757 Expiration Date: 1/31/2018

IV. WELL INFORMATION:

Note: A copy of the existing Well Record for the well to be plugged should be attached to this plan.

- 1) GPS Well Location: Latitude: 32 deg, 51 min, 0.1 sec
Longitude: 104 deg, 20 min, 20.1 sec, NAD 83
- 2) Reason(s) for plugging well:

This plan is for two temporary monitoring wells that will only be sampled one time, and will be plugged and abandoned once the sample collection has been completed.
- 3) Was well used for any type of monitoring program? Yes If yes, please use section VII of this form to detail what hydrogeologic parameters were monitored. If the well was used to monitor contaminated or poor quality water, authorization from the New Mexico Environment Department may be required prior to plugging.
- 4) Does the well tap brackish, saline, or otherwise poor quality water? Yes If yes, provide additional detail, including analytical results and/or laboratory report(s):

Temporary wells are located south of former Evaporation Ponds, near monitoring wells that are included in a semiannual monitoring program. Data from those wells are reported to NMED and OCD annually, and have TDS values ranging from 5,000 to 11,000 mg/L.
- 5) Static water level: 5 - 7 feet below land surface feet above land surface (circle one)
- 6) Depth of the well: 10 - 12 feet

- 7) Inside diameter of innermost casing: 2 inches.
- 8) Casing material: PVC
- 9) The well was constructed with:
☐ an open-hole production interval, state the open interval: _____
☒ a well screen or perforated pipe, state the screened interval(s): 2 to 10 (or 2 to 12)
- 10) What annular interval surrounding the artesian casing of this well is cement-grouted? N/A
- 11) Was the well built with surface casing? No No If yes, is the annulus surrounding the surface casing grouted or otherwise sealed? _____ If yes, please describe:
- 12) Has all pumping equipment and associated piping been removed from the well? N/A If not, describe remaining equipment and intentions to remove prior to plugging in Section VII of this form.

V. DESCRIPTION OF PLANNED WELL PLUGGING:

Note: If this plan proposes to plug an artesian well in a way other than with cement grout, placed bottom to top with a tremie pipe, a detailed diagram of the well showing proposed final plugged configuration shall be attached, as well as any additional technical information, such as geophysical logs, that are necessary to adequately describe the proposal.

- 1) Describe the method by which cement grout shall be placed in the well, or describe requested plugging methodology proposed for the well:

Lean cement grout will be placed in the boring from the bottom up using a tremie pipe.
- 2) Will well head be cut-off below land surface after plugging? PVC casing will be removed

VI. PLUGGING AND SEALING MATERIALS:

Note: The plugging of a well that taps poor quality water may require the use of a specialty cement or specialty sealant

- 1) For plugging intervals that employ cement grout, complete and attach Table A.
- 2) For plugging intervals that will employ approved non-cement based sealant(s), complete and attach Table B.
- 3) Theoretical volume of grout required to plug the well to land surface: 1.6 - 2 gallons
- 4) Type of Cement proposed: Portland cement
- 5) Proposed cement grout mix: 5 gallons of water per 94 pound sack of Portland cement.
- 6) Will the grout be: _____ batch-mixed and delivered to the site
X mixed on site

02:41:20 PM 4/20

WELL PLUGGING PLAN
 VERSION: AUGUST 11, 2015

- 7) Grout additives requested, and percent by dry weight relative to cement:

- 8) Additional notes and calculations:

VII. ADDITIONAL INFORMATION: List additional information below, or on separate sheet(s):

VIII. SIGNATURE:

I, Scott Denton, say that I have carefully read the foregoing Well Plugging Plan of Operations and any attachments, which are a part hereof; that I am familiar with the rules and regulations of the State Engineer pertaining to the plugging of wells and will comply with them, and that each and all of the statements in the Well Plugging Plan of Operations and attachments are true to the best of my knowledge and belief.

Robert Conks for Scott M. Denton 5/2/16

Signature of Applicant

Date

IX. ACTION OF THE STATE ENGINEER:

This Well Plugging Plan of Operations is:

X Approved subject to the attached conditions.
 Not approved for the reasons provided on the attached letter.

Witness my hand and official seal this 16th day of May, 2016

Tom Blaine P.E., New Mexico State Engineer

By: Andy Morley C. Goetz

Fox Andy Morley
District II Manager

2016 MAY -2 PM 4:20
NEW MEXICO STATE ENGINEER
OFFICE OF THE STATE ENGINEER

TABLE A - For plugging intervals that employ cement grout. Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of grout placement (ft bgl)			0
Bottom of proposed interval of grout placement (ft bgl)			10-12
Theoretical volume of grout required per interval (gallons)			1.6 to 2
Proposed cement grout mix gallons of water per 94-lb. sack of Portland cement			5
Mixed on-site or batch-mixed and delivered?			mixed on-site
Grout additive 1 requested			
Additive 1 percent by dry weight relative to cement			
Grout additive 2 requested			
Additive 2 percent by dry weight relative to cement			

2016 MAY -2 PM 4:20

WELL PLUGGING PLAN
VERSION: AUGUST 11, 2015

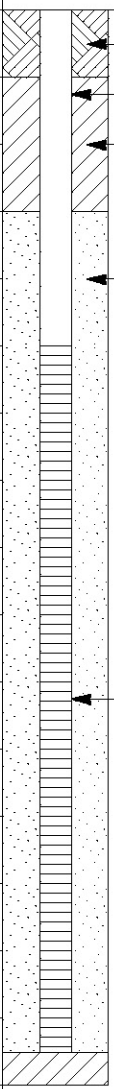
TABLE B - For plugging intervals that will employ approved non-cement based sealant(s). Start with deepest interval.

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow
			Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of sealant placement (ft bgl)			
Bottom of proposed sealant or grout placement (ft bgl)			
Theoretical volume of sealant required per interval (gallons)			
Proposed abandonment sealant (manufacturer and trade name)			

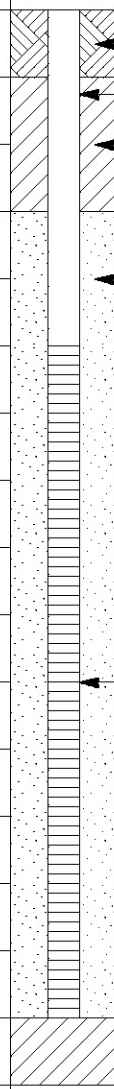
2016 MAY -2 PM 4: 20

STATE OF TEXAS
DEPARTMENT OF AGRICULTURE

PROJECT: HollyFrontier Navajo Wastewater Line Release Investigation					Log of Well No. TMW-WWL-1	
BORING LOCATION:					GROUND SURFACE ELEVATION AND DATUM:	
DRILLING CONTRACTOR: Envirotech Services					DATE STARTED: 5/10/16	DATE FINISHED: 5/10/16
DRILLING METHOD: Hollow Stem Auger					TOTAL DEPTH (ft.): 16.0	SCREEN INTERVAL (ft.): 10'
DRILLING EQUIPMENT: Geoprobe 9520					DEPTH TO WATER ATD: 12'	CASING: 2'
SAMPLING METHOD: Auger					LOGGED BY: William Smith	
HAMMER WEIGHT: NA		DROP: NA			RESPONSIBLE PROFESSIONAL: William Smith	REG. NO.

DEPTH (feet)	SAMPLES		OVM Reading	DESCRIPTION	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample Blows/ Foot		NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	
0 - .01 -			0	SANDY CLAY (CL): reddish-brown, dry, low carbonate induration, low-medium plasticity, no odor, no staining	 <div style="position: absolute; left: 770px; top: 290px;">Open</div> <div style="position: absolute; left: 770px; top: 310px;">2" Diameter Casing</div> <div style="position: absolute; left: 770px; top: 335px;">Bentonite</div> <div style="position: absolute; left: 770px; top: 400px;">20/40 Grade Silica Sand</div> <div style="position: absolute; left: 770px; top: 600px;">Sch 40 0.010 Slot PVC Screen</div>
5 - .05 -			0	SANDY CLAY (CL): reddish-brown, low carbonate induration, medium-high plasticity, no odor, no staining	
10 - .12 -			0	SANDY CLAY (CL): light brown, low plasticity, no odor, no staining	
15 -			0	SANDY CLAY (CL): brown, low plasticity, gypsum crystals, no odor, no staining	
20 -			0	SANDY CLAY (CL): light reddish-brown, low carbonate induration, low-medium plasticity, damp, contains some gypsum crystals, no odor, no staining	
				Gypsiferous SANDY CLAY (CL): whitish-green, low plasticity, moist, no odor, no staining	
				Total Depth = 15.5'	
				Sampler Stopped at 16'	
				Auger Stopped at 15'	
				TMW-WWL-1 Set to 15.5'	

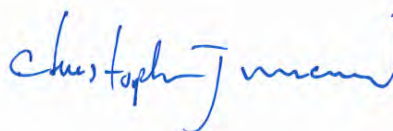
PROJECT: HollyFrontier Navajo Wastewater Line Release Investigation					Log of Well No. TMW-WWL-2	
BORING LOCATION:					GROUND SURFACE ELEVATION AND DATUM:	
DRILLING CONTRACTOR: Envirotech Services					DATE STARTED: 5/10/16	DATE FINISHED: 5/10/16
DRILLING METHOD: Hollow Stem Auger					TOTAL DEPTH (ft.): 16.0	SCREEN INTERVAL (ft.): 10'
DRILLING EQUIPMENT: Geoprobe 9520					DEPTH TO WATER ATD: 12'	CASING: 2'
SAMPLING METHOD: Auger					LOGGED BY: William Smith	
HAMMER WEIGHT: NA		DROP: NA			RESPONSIBLE PROFESSIONAL: William Smith	REG. NO.

DEPTH (feet)	SAMPLES		OVM Reading	DESCRIPTION	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample Blows/ Foot		NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	
0			0	SILTY SAND (SM): light brown, damp, non-plastic, no odor, no stain	 <p>Open</p> <p>2" Diameter Casing</p> <p>Bentonite</p> <p>20/40 Grade Silica Sand</p> <p>Sch 40 0.010 Slot PVC Screen</p>
5			0	SANDY CLAY (CL): brown, damp, medium plasticity, contains some gypsum crystals, no odor, no stain, SANDY CLAY (CL): light reddish-brown, damp, medium to high plasticity, contains some gypsum crystals, no odor, no stain,	
10			0		
15			0	SANDY CLAY (CL): reddish-brown, moist, low plasticity, low-moderate carbonate induration becomes more gymsiferous with depth, no odor, organic, no stain	
20				TOTAL DEPTH = 16' Sampler Stopped at 16' Auger Stopped at 15' TMW-WWL-1 Set to 15'	

AMEC Foster Wheeler - Houston, TX

Sample Delivery Group: L835078
Samples Received: 05/12/2016
Project Number: 6703160012.001
Description: Wastewater Line Investigation
Site: HOLLEY FRONTIER NAVAJO
Report To: Pamela Krueger
585 N. Dairy Ashford
Houston, TX 77079

Entire Report Reviewed By:



Chris McCord
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



TMW-WWL1-01 L835078-01 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 15:00

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:06	BRJ
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 16:05	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 12:02	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873092	5	05/17/16 17:13	05/18/16 07:06	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872230	5	05/19/16 00:02	05/19/16 08:15	DWR
Wet Chemistry by Method 9056A	WG872631	20	05/16/16 17:26	05/17/16 11:40	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 01:04	CM

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

TMW-WWL1-05 L835078-02 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 15:10

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:08	CCE
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 16:29	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 10:49	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873092	5	05/17/16 17:13	05/18/16 09:12	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872230	5	05/19/16 00:02	05/19/16 08:37	DWR
Wet Chemistry by Method 9056A	WG872631	50	05/16/16 17:26	05/17/16 12:04	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 01:52	CM

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

TMW-WWL1-12 L835078-03 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 15:20

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:17	CCE
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 16:52	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 11:02	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873092	5	05/17/16 17:13	05/18/16 09:35	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872230	5	05/19/16 00:02	05/19/16 09:00	DWR
Wet Chemistry by Method 9056A	WG872631	50	05/16/16 17:26	05/17/16 12:28	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 02:16	CM

TMW-WWL2-01 L835078-04 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 16:20

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:20	BRJ
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 17:15	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 11:50	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873092	5	05/17/16 17:13	05/18/16 09:58	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872230	5	05/19/16 00:02	05/19/16 09:22	DWR
Wet Chemistry by Method 9056A	WG872631	1	05/16/16 17:26	05/17/16 06:29	CM
Wet Chemistry by Method 9056A	WG872631	10	05/16/16 17:26	05/17/16 12:52	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 02:40	CM

TMW-WWL2-05 L835078-05 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 16:30

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:23	BRJ
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 17:39	JF

ACCOUNT:

AMEC Foster Wheeler - Houston, TX

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



TMW-WWL2-05 L835078-05 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 16:30

Received date/time
05/12/16 09:00

¹Cp

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 11:14	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873092	5	05/17/16 17:13	05/18/16 10:21	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG873800	5	05/19/16 11:42	05/19/16 15:29	BMB
Wet Chemistry by Method 9056A	WG872631	1	05/16/16 17:26	05/17/16 06:53	CM
Wet Chemistry by Method 9056A	WG872631	50	05/16/16 17:26	05/17/16 13:16	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 03:04	CM

²Tc

³Ss

⁴Cn

⁵Sr

TMW-WWL2-12 L835078-06 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 16:50

Received date/time
05/12/16 09:00

⁶Qc

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:26	CCE
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872189	1	05/17/16 19:33	05/18/16 18:02	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 11:26	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873220	5	05/18/16 18:29	05/18/16 20:23	JAH
Volatile Organic Compounds (GC/MS) by Method 8260B	WG873800	5	05/19/16 11:42	05/19/16 15:53	BMB
Wet Chemistry by Method 9056A	WG872631	1	05/16/16 17:26	05/17/16 07:17	CM
Wet Chemistry by Method 9056A	WG872631	50	05/16/16 17:26	05/17/16 13:40	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 04:16	CM

⁷Gl

⁸Al

⁹Sc

TMW-WWL2-12D L835078-07 Solid

Collected by
William R. Smith

Collected date/time
05/10/16 16:55

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872357	1	05/14/16 08:15	05/14/16 14:29	CCE
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG873908	1	05/19/16 22:56	05/20/16 12:33	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872902	1	05/16/16 23:00	05/17/16 11:38	DMG
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG873220	5	05/18/16 18:29	05/18/16 20:46	JAH
Volatile Organic Compounds (GC/MS) by Method 8260B	WG873800	5	05/19/16 11:42	05/19/16 16:17	BMB
Wet Chemistry by Method 9056A	WG872631	1	05/16/16 17:26	05/17/16 09:36	CM
Wet Chemistry by Method 9056A	WG872631	50	05/16/16 17:26	05/17/16 14:04	CM
Wet Chemistry by Method 9056A	WG873240	1	05/18/16 15:50	05/19/16 04:40	CM

TMW-WW6-EQ L835078-08 GW

Collected by
William R. Smith

Collected date/time
05/10/16 18:00

Received date/time
05/12/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872401	1	05/16/16 10:43	05/16/16 15:27	ST
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872427	1	05/12/16 21:03	05/15/16 18:23	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872369	1	05/12/16 20:58	05/15/16 10:41	JNS
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG872916	1	05/17/16 19:24	05/17/16 19:24	LRL
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872248	1	05/13/16 18:16	05/13/16 18:16	LRL
Wet Chemistry by Method 9056A	WG873772	1	05/20/16 04:02	05/20/16 04:02	SAM

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All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Chris McCord
Technical Service Representative

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	1730		15.9	200	20	05/17/2016 11:40	WG872631
Fluoride	5.61		0.261	1.00	1	05/19/2016 01:04	WG873240
Sulfate	7580		11.4	1000	20	05/17/2016 11:40	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	12200		1.41	10.0	1	05/14/2016 14:06	WG872357
Manganese	388		0.120	1.00	1	05/14/2016 14:06	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/18/2016 07:06	WG873092
(S) a,a,a-Trifluorotoluene(FID) 99.2				59.0-128		05/18/2016 07:06	WG873092

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 08:15	WG872230
Toluene	U		0.00217	0.0250	5	05/19/2016 08:15	WG872230
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 08:15	WG872230
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 08:15	WG872230
(S) Toluene-d8	105			88.7-115		05/19/2016 08:15	WG872230
(S) Dibromofluoromethane	103			76.3-123		05/19/2016 08:15	WG872230
(S) a,a,a-Trifluorotoluene	95.8			87.2-117		05/19/2016 08:15	WG872230
(S) 4-Bromofluorobenzene	96.7			69.7-129		05/19/2016 08:15	WG872230

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	7.31		1.61	4.00	1	05/17/2016 12:02	WG872902
C28-C40 Oil Range	3.15	J	0.274	4.00	1	05/17/2016 12:02	WG872902
(S) o-Terphenyl	91.8			50.0-150		05/17/2016 12:02	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 16:05	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 16:05	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 16:05	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 16:05	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 16:05	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 16:05	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 16:05	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 16:05	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 16:05	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 16:05	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 16:05	WG872189
(S) 2-Fluorophenol	67.0			21.1-116		05/18/2016 16:05	WG872189
(S) Phenol-d5	68.0			26.3-121		05/18/2016 16:05	WG872189
(S) Nitrobenzene-d5	83.5			21.9-129		05/18/2016 16:05	WG872189
(S) 2-Fluorobiphenyl	74.9			34.9-129		05/18/2016 16:05	WG872189



Collected date/time: 05/10/16 15:00

L835078

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	62.6			21.6-142		05/18/2016 16:05	WG872189
(S) p-Terphenyl-d14	63.6			21.5-128		05/18/2016 16:05	WG872189

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	1070		39.8	500	50	05/17/2016 12:04	WG872631
Fluoride	16.1		0.261	1.00	1	05/19/2016 01:52	WG873240
Sulfate	18300		28.5	2500	50	05/17/2016 12:04	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	7850		1.41	10.0	1	05/14/2016 14:08	WG872357
Manganese	162		0.120	1.00	1	05/14/2016 14:08	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/18/2016 09:12	WG873092
(S) a,a,a-Trifluorotoluene(FID) 98.8				59.0-128		05/18/2016 09:12	WG873092

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 08:37	WG872230
Toluene	U		0.00217	0.0250	5	05/19/2016 08:37	WG872230
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 08:37	WG872230
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 08:37	WG872230
(S) Toluene-d8	105			88.7-115		05/19/2016 08:37	WG872230
(S) Dibromofluoromethane	104			76.3-123		05/19/2016 08:37	WG872230
(S) a,a,a-Trifluorotoluene	95.5			87.2-117		05/19/2016 08:37	WG872230
(S) 4-Bromofluorobenzene	99.6			69.7-129		05/19/2016 08:37	WG872230

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 10:49	WG872902
C28-C40 Oil Range	U		0.274	4.00	1	05/17/2016 10:49	WG872902
(S) o-Terphenyl	98.1			50.0-150		05/17/2016 10:49	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 16:29	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 16:29	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 16:29	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 16:29	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 16:29	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 16:29	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 16:29	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 16:29	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 16:29	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 16:29	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 16:29	WG872189
(S) 2-Fluorophenol	57.1			21.1-116		05/18/2016 16:29	WG872189
(S) Phenol-d5	46.4			26.3-121		05/18/2016 16:29	WG872189
(S) Nitrobenzene-d5	64.5			21.9-129		05/18/2016 16:29	WG872189
(S) 2-Fluorobiphenyl	66.2			34.9-129		05/18/2016 16:29	WG872189



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	39.8			21.6-142		05/18/2016 16:29	WG872189
(S) p-Terphenyl-d14	39.6			21.5-128		05/18/2016 16:29	WG872189

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	1690		39.8	500	50	05/17/2016 12:28	WG872631
Fluoride	11.8		0.261	1.00	1	05/19/2016 02:16	WG873240
Sulfate	18300		28.5	2500	50	05/17/2016 12:28	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	2710		1.41	10.0	1	05/14/2016 14:17	WG872357
Manganese	64.7		0.120	1.00	1	05/14/2016 14:17	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/18/2016 09:35	WG873092
(S) a,a,a-Trifluorotoluene(FID)	99.0			59.0-128		05/18/2016 09:35	WG873092

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 09:00	WG872230
Toluene	U		0.00217	0.0250	5	05/19/2016 09:00	WG872230
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 09:00	WG872230
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 09:00	WG872230
(S) Toluene-d8	106			88.7-115		05/19/2016 09:00	WG872230
(S) Dibromofluoromethane	104			76.3-123		05/19/2016 09:00	WG872230
(S) a,a,a-Trifluorotoluene	96.3			87.2-117		05/19/2016 09:00	WG872230
(S) 4-Bromofluorobenzene	98.8			69.7-129		05/19/2016 09:00	WG872230

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 11:02	WG872902
C28-C40 Oil Range	U		0.274	4.00	1	05/17/2016 11:02	WG872902
(S) o-Terphenyl	95.4			50.0-150		05/17/2016 11:02	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 16:52	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 16:52	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 16:52	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 16:52	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 16:52	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 16:52	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 16:52	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 16:52	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 16:52	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 16:52	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 16:52	WG872189
(S) 2-Fluorophenol	64.9			21.1-116		05/18/2016 16:52	WG872189
(S) Phenol-d5	58.7			26.3-121		05/18/2016 16:52	WG872189
(S) Nitrobenzene-d5	64.9			21.9-129		05/18/2016 16:52	WG872189
(S) 2-Fluorobiphenyl	56.2			34.9-129		05/18/2016 16:52	WG872189



Collected date/time: 05/10/16 15:20

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Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	51.6			21.6-142		05/18/2016 16:52	WG872189
(S) p-Terphenyl-d14	46.8			21.5-128		05/18/2016 16:52	WG872189

- 1Cp
- 2Tc
- 3Ss
- 4Cn
- 5Sr
- 6Qc
- 7Gl
- 8Al
- 9Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	113		0.795	10.0	1	05/17/2016 06:29	WG872631
Fluoride	4.56		0.261	1.00	1	05/19/2016 02:40	WG873240
Sulfate	2590		5.70	500	10	05/17/2016 12:52	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	10500		1.41	10.0	1	05/14/2016 14:20	WG872357
Manganese	344		0.120	1.00	1	05/14/2016 14:20	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	0.255	J	0.108	0.500	5	05/18/2016 09:58	WG873092
(S) a,a,a-Trifluorotoluene(FID) 99.7				59.0-128		05/18/2016 09:58	WG873092

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 09:22	WG872230
Toluene	U		0.00217	0.0250	5	05/19/2016 09:22	WG872230
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 09:22	WG872230
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 09:22	WG872230
(S) Toluene-d8	106			88.7-115		05/19/2016 09:22	WG872230
(S) Dibromofluoromethane	103			76.3-123		05/19/2016 09:22	WG872230
(S) a,a,a-Trifluorotoluene	97.8			87.2-117		05/19/2016 09:22	WG872230
(S) 4-Bromofluorobenzene	100			69.7-129		05/19/2016 09:22	WG872230

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 11:50	WG872902
C28-C40 Oil Range	0.687	J	0.274	4.00	1	05/17/2016 11:50	WG872902
(S) o-Terphenyl	84.3			50.0-150		05/17/2016 11:50	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 17:15	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 17:15	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 17:15	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 17:15	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 17:15	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 17:15	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 17:15	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 17:15	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 17:15	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 17:15	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 17:15	WG872189
(S) 2-Fluorophenol	63.6			21.1-116		05/18/2016 17:15	WG872189
(S) Phenol-d5	67.5			26.3-121		05/18/2016 17:15	WG872189
(S) Nitrobenzene-d5	72.4			21.9-129		05/18/2016 17:15	WG872189
(S) 2-Fluorobiphenyl	77.4			34.9-129		05/18/2016 17:15	WG872189



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	71.5			21.6-142		05/18/2016 17:15	WG872189
(S) p-Terphenyl-d14	67.0			21.5-128		05/18/2016 17:15	WG872189

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	712		0.795	10.0	1	05/17/2016 06:53	WG872631
Fluoride	15.8		0.261	1.00	1	05/19/2016 03:04	WG873240
Sulfate	18300		28.5	2500	50	05/17/2016 13:16	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	5580		1.41	10.0	1	05/14/2016 14:23	WG872357
Manganese	70.6		0.120	1.00	1	05/14/2016 14:23	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/18/2016 10:21	WG873092
(S) a,a,a-Trifluorotoluene(FID) 99.0				59.0-128		05/18/2016 10:21	WG873092

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 15:29	WG873800
Toluene	U		0.00217	0.0250	5	05/19/2016 15:29	WG873800
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 15:29	WG873800
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 15:29	WG873800
(S) Toluene-d8	101			88.7-115		05/19/2016 15:29	WG873800
(S) Dibromofluoromethane	102			76.3-123		05/19/2016 15:29	WG873800
(S) a,a,a-Trifluorotoluene	101			87.2-117		05/19/2016 15:29	WG873800
(S) 4-Bromofluorobenzene	101			69.7-129		05/19/2016 15:29	WG873800

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 11:14	WG872902
C28-C40 Oil Range	U		0.274	4.00	1	05/17/2016 11:14	WG872902
(S) o-Terphenyl	96.4			50.0-150		05/17/2016 11:14	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 17:39	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 17:39	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 17:39	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 17:39	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 17:39	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 17:39	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 17:39	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 17:39	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 17:39	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 17:39	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 17:39	WG872189
(S) 2-Fluorophenol	59.4			21.1-116		05/18/2016 17:39	WG872189
(S) Phenol-d5	58.8			26.3-121		05/18/2016 17:39	WG872189
(S) Nitrobenzene-d5	64.1			21.9-129		05/18/2016 17:39	WG872189
(S) 2-Fluorobiphenyl	56.5			34.9-129		05/18/2016 17:39	WG872189



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	58.0			21.6-142		05/18/2016 17:39	WG872189
(S) p-Terphenyl-d14	66.9			21.5-128		05/18/2016 17:39	WG872189

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	712		0.795	10.0	1	05/17/2016 07:17	WG872631
Fluoride	8.01		0.261	1.00	1	05/19/2016 04:16	WG873240
Sulfate	17200		28.5	2500	50	05/17/2016 13:40	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	2880		1.41	10.0	1	05/14/2016 14:26	WG872357
Manganese	80.3		0.120	1.00	1	05/14/2016 14:26	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U	J3 J6	0.108	0.500	5	05/18/2016 20:23	WG873220
(S) a,a,a-Trifluorotoluene(FID) 99.8				59.0-128		05/18/2016 20:23	WG873220

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 15:53	WG873800
Toluene	U		0.00217	0.0250	5	05/19/2016 15:53	WG873800
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 15:53	WG873800
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 15:53	WG873800
(S) Toluene-d8	103			88.7-115		05/19/2016 15:53	WG873800
(S) Dibromofluoromethane	103			76.3-123		05/19/2016 15:53	WG873800
(S) a,a,a-Trifluorotoluene	100			87.2-117		05/19/2016 15:53	WG873800
(S) 4-Bromofluorobenzene	101			69.7-129		05/19/2016 15:53	WG873800

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 11:26	WG872902
C28-C40 Oil Range	U		0.274	4.00	1	05/17/2016 11:26	WG872902
(S) o-Terphenyl	102			50.0-150		05/17/2016 11:26	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 18:02	WG872189
2-Chlorophenol	U		0.00831	0.333	1	05/18/2016 18:02	WG872189
2,4-Dichlorophenol	U		0.00746	0.333	1	05/18/2016 18:02	WG872189
2,4-Dimethylphenol	U		0.0471	0.333	1	05/18/2016 18:02	WG872189
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/18/2016 18:02	WG872189
2,4-Dinitrophenol	U		0.0980	0.333	1	05/18/2016 18:02	WG872189
2-Nitrophenol	U		0.0130	0.333	1	05/18/2016 18:02	WG872189
4-Nitrophenol	U		0.0525	0.333	1	05/18/2016 18:02	WG872189
Pentachlorophenol	U		0.0480	0.333	1	05/18/2016 18:02	WG872189
Phenol	U		0.00695	0.333	1	05/18/2016 18:02	WG872189
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/18/2016 18:02	WG872189
(S) 2-Fluorophenol	45.8			21.1-116		05/18/2016 18:02	WG872189
(S) Phenol-d5	45.5			26.3-121		05/18/2016 18:02	WG872189
(S) Nitrobenzene-d5	52.8			21.9-129		05/18/2016 18:02	WG872189
(S) 2-Fluorobiphenyl	48.0			34.9-129		05/18/2016 18:02	WG872189



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	44.1			21.6-142		05/18/2016 18:02	WG872189
(S) p-Terphenyl-d14	42.5			21.5-128		05/18/2016 18:02	WG872189

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	899		0.795	10.0	1	05/17/2016 09:36	WG872631
Fluoride	11.2		0.261	1.00	1	05/19/2016 04:40	WG873240
Sulfate	18200		28.5	2500	50	05/17/2016 14:04	WG872631

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Iron	3950		1.41	10.0	1	05/14/2016 14:29	WG872357
Manganese	95.4		0.120	1.00	1	05/14/2016 14:29	WG872357

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/18/2016 20:46	WG873220
(S) a,a,a-Trifluorotoluene(FID) 99.5				59.0-128		05/18/2016 20:46	WG873220

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/19/2016 16:17	WG873800
Toluene	U		0.00217	0.0250	5	05/19/2016 16:17	WG873800
Ethylbenzene	U		0.00148	0.00500	5	05/19/2016 16:17	WG873800
Total Xylenes	U		0.00349	0.0150	5	05/19/2016 16:17	WG873800
(S) Toluene-d8	106			88.7-115		05/19/2016 16:17	WG873800
(S) Dibromofluoromethane	98.9			76.3-123		05/19/2016 16:17	WG873800
(S) a,a,a-Trifluorotoluene	105			87.2-117		05/19/2016 16:17	WG873800
(S) 4-Bromofluorobenzene	99.8			69.7-129		05/19/2016 16:17	WG873800

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/17/2016 11:38	WG872902
C28-C40 Oil Range	U		0.274	4.00	1	05/17/2016 11:38	WG872902
(S) o-Terphenyl	94.5			50.0-150		05/17/2016 11:38	WG872902

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/20/2016 12:33	WG873908
2-Chlorophenol	U	J3	0.00831	0.333	1	05/20/2016 12:33	WG873908
2,4-Dichlorophenol	U		0.00746	0.333	1	05/20/2016 12:33	WG873908
2,4-Dimethylphenol	U		0.0471	0.333	1	05/20/2016 12:33	WG873908
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/20/2016 12:33	WG873908
2,4-Dinitrophenol	U		0.0980	0.333	1	05/20/2016 12:33	WG873908
2-Nitrophenol	U		0.0130	0.333	1	05/20/2016 12:33	WG873908
4-Nitrophenol	U		0.0525	0.333	1	05/20/2016 12:33	WG873908
Pentachlorophenol	U		0.0480	0.333	1	05/20/2016 12:33	WG873908
Phenol	U		0.00695	0.333	1	05/20/2016 12:33	WG873908
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/20/2016 12:33	WG873908
(S) 2-Fluorophenol	77.5			21.1-116		05/20/2016 12:33	WG873908
(S) Phenol-d5	72.1			26.3-121		05/20/2016 12:33	WG873908
(S) Nitrobenzene-d5	67.2			21.9-129		05/20/2016 12:33	WG873908
(S) 2-Fluorobiphenyl	75.7			34.9-129		05/20/2016 12:33	WG873908



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	<u>Qualifier</u>	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	<u>Batch</u>
(S) 2,4,6-Tribromophenol	64.1			21.6-142		05/20/2016 12:33	WG873908
(S) p-Terphenyl-d14	64.6			21.5-128		05/20/2016 12:33	WG873908

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	0.244	J	0.0519	1.00	1	05/20/2016 04:02	WG873772
Fluoride	U		0.00990	0.100	1	05/20/2016 04:02	WG873772
Sulfate	0.269	J	0.0774	5.00	1	05/20/2016 04:02	WG873772

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Iron	0.0241	B J	0.0141	0.100	1	05/16/2016 15:27	WG872401
Manganese	U		0.00120	0.0100	1	05/16/2016 15:27	WG872401

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
TPH (GC/FID) Low Fraction	U		0.0314	0.100	1	05/17/2016 19:24	WG872916
(S) a,a,a-Trifluorotoluene(FID) 94.6				62.0-128		05/17/2016 19:24	WG872916

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Benzene	0.000509	J	0.000331	0.00100	1	05/13/2016 18:16	WG872248
Toluene	U		0.000780	0.00500	1	05/13/2016 18:16	WG872248
Ethylbenzene	U		0.000384	0.00100	1	05/13/2016 18:16	WG872248
Total Xylenes	U		0.00106	0.00300	1	05/13/2016 18:16	WG872248
(S) Toluene-d8	105			90.0-115		05/13/2016 18:16	WG872248
(S) Dibromofluoromethane	106			79.0-121		05/13/2016 18:16	WG872248
(S) a,a,a-Trifluorotoluene	98.5			90.4-116		05/13/2016 18:16	WG872248
(S) 4-Bromofluorobenzene	102			80.1-120		05/13/2016 18:16	WG872248

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
C10-C28 Diesel Range	0.0358	J	0.0222	0.100	1	05/15/2016 10:41	WG872369
C28-C40 Oil Range	U		0.0118	0.100	1	05/15/2016 10:41	WG872369
(S) o-Terphenyl	109			50.0-150		05/15/2016 10:41	WG872369

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
4-Chloro-3-methylphenol	U	J4	0.000263	0.0100	1	05/15/2016 18:23	WG872427
2-Chlorophenol	U		0.000283	0.0100	1	05/15/2016 18:23	WG872427
2,4-Dichlorophenol	U		0.000284	0.0100	1	05/15/2016 18:23	WG872427
2,4-Dimethylphenol	U		0.000624	0.0100	1	05/15/2016 18:23	WG872427
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100	1	05/15/2016 18:23	WG872427
2,4-Dinitrophenol	U		0.00325	0.0100	1	05/15/2016 18:23	WG872427
2-Nitrophenol	U		0.000320	0.0100	1	05/15/2016 18:23	WG872427
4-Nitrophenol	U		0.00201	0.0100	1	05/15/2016 18:23	WG872427
Pentachlorophenol	U		0.000313	0.0100	1	05/15/2016 18:23	WG872427
Phenol	U	J4	0.000334	0.0100	1	05/15/2016 18:23	WG872427
2,4,6-Trichlorophenol	U		0.000297	0.0100	1	05/15/2016 18:23	WG872427
(S) 2-Fluorophenol	71.8			10.0-77.9		05/15/2016 18:23	WG872427
(S) Phenol-d5	58.8			5.00-70.1		05/15/2016 18:23	WG872427
(S) Nitrobenzene-d5	82.5			21.8-123		05/15/2016 18:23	WG872427
(S) 2-Fluorobiphenyl	79.0			29.5-131		05/15/2016 18:23	WG872427



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	51.3			11.2-130		05/15/2016 18:23	WG872427
(S) p-Terphenyl-d14	91.0			29.3-137		05/15/2016 18:23	WG872427

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3137464-1 05/16/16 20:07

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Chloride	U		0.795	10.0
Sulfate	U		0.57	50.0

L835458-01 Original Sample (OS) • Duplicate (DUP)

(OS) L835458-01 05/16/16 22:07 • (DUP) R3137464-4 05/16/16 22:30

	Original Result (dry)	DUP Result (dry)	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Chloride	15.8	17.1	1	8		15
Sulfate	ND	2.85	1	0		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137464-2 05/16/16 20:31 • (LCSD) R3137464-3 05/16/16 20:55

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Chloride	200	192	192	96	96	80-120			0	15
Sulfate	200	194	195	97	97	80-120			0	15

L834994-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L834994-01 05/17/16 03:18 • (MS) R3137464-5 05/17/16 03:42 • (MSD) R3137464-6 05/17/16 04:06

	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Chloride	559	13.1	595	564	104	99	1	80-120			5	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3138282-1 05/18/16 23:05

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Fluoride	U		0.261	1.00

L835078-01 Original Sample (OS) • Duplicate (DUP)

(OS) L835078-01 05/19/16 01:04 • (DUP) R3138282-4 05/19/16 01:28

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Fluoride	5.61	5.53	1	1		15

L835938-02 Original Sample (OS) • Duplicate (DUP)

(OS) L835938-02 05/19/16 09:16 • (DUP) R3138282-5 05/19/16 09:50

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/kg	mg/kg		%		%
Fluoride	6.25	7.86	1	23	J3	15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138282-2 05/18/16 23:28 • (LCSD) R3138282-3 05/18/16 23:52

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Fluoride	20.0	19.9	20.0	100	100	80-120			0	15

L835938-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835938-03 05/19/16 10:14 • (MS) R3138282-6 05/19/16 11:26 • (MSD) R3138282-7 05/19/16 11:50

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Fluoride	50.0	5.27	36.6	33.9	63	57	1	80-120	J6	J6	7	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3138709-1 05/19/16 20:49

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.0099	0.100
Sulfate	U		0.0774	5.00

L834614-04 Original Sample (OS) • Duplicate (DUP)

(OS) L834614-04 05/20/16 02:49 • (DUP) R3138709-5 05/20/16 03:04

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	1.51	1.52	1	0		15
Fluoride	ND	0.0592	1	0		15
Sulfate	18.1	18.1	1	0		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138709-2 05/19/16 21:03 • (LCSD) R3138709-3 05/19/16 21:18

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chloride	40.0	39.2	39.2	98	98	80-120			0	15
Fluoride	8.00	7.89	7.89	99	99	80-120			0	15
Sulfate	40.0	39.6	39.6	99	99	80-120			0	15

L834185-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L834185-02 05/20/16 00:54 • (MS) R3138709-4 05/20/16 01:09

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	40.1	92.4	104	1	80-120	
Fluoride	5.00	0.558	5.88	106	1	80-120	
Sulfate	50.0	6.65	60.4	107	1	80-120	

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



L834409-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L834409-03 05/20/16 04:45 • (MS) R3138709-6 05/20/16 04:59 • (MSD) R3138709-7 05/20/16 05:14

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Chloride	50.0	31.0	80.0	81.0	98	100	1	80-120			1	15
Fluoride	5.00	ND	5.21	5.34	102	105	1	80-120			2	15
Sulfate	50.0	ND	53.0	53.9	101	103	1	80-120			2	15

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R3136806-1 05/14/16 13:43

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
Iron	1.56	⌵	1.41	10.0
Manganese	U		0.12	1.00

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3136806-2 05/14/16 13:46 • (LCSD) R3136806-3 05/14/16 13:48

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Iron	1000	937	924	94	92	80-120			1	20
Manganese	100	93.2	92.0	93	92	80-120			1	20

L835281-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835281-01 05/14/16 13:51 • (MS) R3136806-6 05/14/16 14:00 • (MSD) R3136806-7 05/14/16 14:03

Analyte	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Iron	1090	20800	20900	23500	15	254	1	75-125	⌵	⌵	12	20
Manganese	109	608	701	714	85	97	1	75-125			2	20



Method Blank (MB)

(MB) R3137224-7 05/16/16 19:15

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Iron	0.0473	J	0.0141	0.100
Manganese	U		0.0012	0.0100

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137224-8 05/16/16 19:17 • (LCSD) R3137224-9 05/16/16 19:20

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Iron	10.0	10.2	10.3	102	103	80-120			1	20
Manganese	1.00	0.997	1.00	100	100	80-120			1	20

L835100-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835100-04 05/16/16 19:23 • (MS) R3137224-11 05/16/16 19:28 • (MSD) R3137224-12 05/16/16 19:31

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Iron	10.0	0.0740	10.3	10.3	102	102	1	75-125			0	20
Manganese	1.00	0.00612	1.02	1.02	102	101	1	75-125			1	20



Method Blank (MB)

(MB) R3137716-5 05/17/16 12:58

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
TPH (GC/FID) Low Fraction	0.0333	J	0.0314	0.100
(S) a,a,a-Trifluorotoluene(FID) 94.7				62.0-128

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137716-3 05/17/16 11:43 • (LCSD) R3137716-4 05/17/16 12:06

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	5.24	5.58	95.3	101	67.0-132			6.28	20
(S) a,a,a-Trifluorotoluene(FID)				104	104	62.0-128				

L835661-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835661-01 05/17/16 17:33 • (MS) R3137716-8 05/17/16 16:27 • (MSD) R3137716-9 05/17/16 16:49

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	ND	5.49	5.50	99.1	99.3	1	50.0-143			0.200	20
(S) a,a,a-Trifluorotoluene(FID)					103	104		62.0-128				



Method Blank (MB)

(MB) R3137718-3 05/18/16 01:00

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	99.8			59.0-128

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137718-1 05/17/16 23:52 • (LCSD) R3137718-2 05/18/16 00:14

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
TPH (GC/FID) Low Fraction	5.50	6.45	6.44	117	117	63.5-137			0.140	20
(S) a,a,a-Trifluorotoluene(FID)				99.0	99.6	59.0-128				

L835078-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835078-04 05/18/16 09:58 • (MS) R3137718-4 05/18/16 01:46 • (MSD) R3137718-5 05/18/16 02:09

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
TPH (GC/FID) Low Fraction	5.50	0.255	18.3	14.9	65.7	53.1	5	28.5-138			20.9	23.6
(S) a,a,a-Trifluorotoluene(FID)					96.5	97.4		59.0-128				



Method Blank (MB)

(MB) R3138234-3 05/18/16 17:50

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID) 100				59.0-128

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138234-1 05/18/16 16:42 • (LCSD) R3138234-2 05/18/16 17:04

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	5.59	6.61	102	120	63.5-137			16.8	20
(S) a,a,a-Trifluorotoluene(FID)				99.3	99.1	59.0-128				

L835078-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835078-06 05/18/16 20:23 • (MS) R3138234-4 05/18/16 19:15 • (MSD) R3138234-5 05/18/16 19:38

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	U	4.61	9.33	16.8	33.9	5	28.5-138	J6	J3	67.8	23.6
(S) a,a,a-Trifluorotoluene(FID)					98.4	98.4		59.0-128				

Method Blank (MB)

(MB) R3138213-3 05/19/16 01:28

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000270	0.00100
Ethylbenzene	U		0.000297	0.00100
Toluene	U		0.000434	0.00500
Xylenes, Total	U		0.000698	0.00300
(S) Toluene-d8	105			88.7-115
(S) Dibromofluoromethane	101			76.3-123
(S) a,a,a-Trifluorotoluene	94.8			87.2-117
(S) 4-Bromofluorobenzene	100			69.7-129

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138213-1 05/18/16 23:58 • (LCSD) R3138213-2 05/19/16 00:21

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0232	0.0234	92.7	93.6	72.6-120			1.03	20
Ethylbenzene	0.0250	0.0248	0.0244	99.2	97.6	78.6-124			1.62	20
Toluene	0.0250	0.0243	0.0247	97.2	98.7	76.7-116			1.52	20
Xylenes, Total	0.0750	0.0724	0.0729	96.5	97.1	78.1-123			0.620	20
(S) Toluene-d8				105	106	88.7-115				
(S) Dibromofluoromethane				103	103	76.3-123				
(S) a,a,a-Trifluorotoluene				95.8	96.3	87.2-117				
(S) 4-Bromofluorobenzene				102	101	69.7-129				

L835057-12 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835057-12 05/19/16 03:21 • (MS) R3138213-4 05/19/16 02:13 • (MSD) R3138213-5 05/19/16 02:36

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	ND	0.0727	0.122	58.2	97.3	5	47.8-131		J3	50.4	22.8
Ethylbenzene	0.0250	ND	0.0847	0.121	67.8	97.1	5	44.8-135		J3	35.6	26.9
Toluene	0.0250	ND	0.0832	0.122	66.5	97.9	5	47.8-127		J3	38.1	24.3
Xylenes, Total	0.0750	ND	0.253	0.362	67.6	96.6	5	42.7-135		J3	35.4	26.6
(S) Toluene-d8					104	103		88.7-115				
(S) Dibromofluoromethane					102	104		76.3-123				
(S) a,a,a-Trifluorotoluene					95.0	94.8		87.2-117				
(S) 4-Bromofluorobenzene					98.2	99.3		69.7-129				

Method Blank (MB)

(MB) R3138352-3 05/19/16 10:31

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000270	0.00100
Ethylbenzene	U		0.000297	0.00100
Toluene	U		0.000434	0.00500
Xylenes, Total	U		0.000698	0.00300
(S) Toluene-d8	105			88.7-115
(S) Dibromofluoromethane	95.5			76.3-123
(S) a,a,a-Trifluorotoluene	106			87.2-117
(S) 4-Bromofluorobenzene	103			69.7-129

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138352-1 05/19/16 08:30 • (LCSD) R3138352-2 05/19/16 08:54

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0228	0.0223	91.1	89.3	72.6-120			2.05	20
Ethylbenzene	0.0250	0.0259	0.0253	103	101	78.6-124			2.09	20
Toluene	0.0250	0.0229	0.0232	91.6	92.9	76.7-116			1.39	20
Xylenes, Total	0.0750	0.0751	0.0738	100	98.4	78.1-123			1.75	20
(S) Toluene-d8				105	106	88.7-115				
(S) Dibromofluoromethane				99.3	96.4	76.3-123				
(S) a,a,a-Trifluorotoluene				105	107	87.2-117				
(S) 4-Bromofluorobenzene				102	103	69.7-129				

L835074-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835074-10 05/19/16 14:41 • (MS) R3138352-6 05/19/16 12:16 • (MSD) R3138352-7 05/19/16 12:40

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0336	ND	1.40	1.36	90.6	87.5	45	47.8-131			3.33	22.8
Ethylbenzene	0.0336	ND	1.38	1.33	87.5	84.4	45	44.8-135			3.38	26.9
Toluene	0.0336	ND	1.40	1.37	90.6	88.7	45	47.8-127			2.13	24.3
Xylenes, Total	0.101	1.60	5.48	5.40	85.5	83.9	45	42.7-135			1.35	26.6
(S) Toluene-d8					104	104		88.7-115				
(S) Dibromofluoromethane					101	98.8		76.3-123				
(S) a,a,a-Trifluorotoluene					102	104		87.2-117				



[L835078-05,06,07](#)

L835074-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835074-10 05/19/16 14:41 • (MS) R3138352-6 05/19/16 12:16 • (MSD) R3138352-7 05/19/16 12:40

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
(S) 4-Bromofluorobenzene					95.1	99.8		69.7-129				

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



Method Blank (MB)

(MB) R3136703-3 05/13/16 13:23

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.000331	0.00100
Ethylbenzene	U		0.000384	0.00100
Toluene	U		0.000780	0.00500
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	105			90.0-115
(S) Dibromofluoromethane	105			79.0-121
(S) a,a,a-Trifluorotoluene	98.8			90.4-116
(S) 4-Bromofluorobenzene	101			80.1-120

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3136703-1 05/13/16 12:14 • (LCSD) R3136703-2 05/13/16 12:31

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0259	0.0255	103	102	73.0-122			1.27	20
Ethylbenzene	0.0250	0.0260	0.0246	104	98.2	80.9-121			5.57	20
Toluene	0.0250	0.0264	0.0251	105	100	77.9-116			5.02	20
Xylenes, Total	0.0750	0.0786	0.0747	105	99.6	79.2-122			5.11	20
(S) Toluene-d8				105	104	90.0-115				
(S) Dibromofluoromethane				102	106	79.0-121				
(S) a,a,a-Trifluorotoluene				99.7	99.5	90.4-116				
(S) 4-Bromofluorobenzene				97.8	98.1	80.1-120				

L835078-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835078-08 05/13/16 18:16 • (MS) R3136703-4 05/13/16 18:33 • (MSD) R3136703-5 05/13/16 18:50

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.000509	0.0233	0.0247	91.1	96.9	1	58.6-133			6.06	20
Ethylbenzene	0.0250	U	0.0217	0.0232	86.9	92.7	1	62.7-136			6.45	20
Toluene	0.0250	U	0.0224	0.0240	89.4	95.8	1	67.8-124			6.96	20
Xylenes, Total	0.0750	U	0.0658	0.0704	87.8	93.9	1	65.6-133			6.70	20
(S) Toluene-d8					104	106		90.0-115				
(S) Dibromofluoromethane					106	108		79.0-121				
(S) a,a,a-Trifluorotoluene					97.8	102		90.4-116				
(S) 4-Bromofluorobenzene					98.4	98.0		80.1-120				



Method Blank (MB)

(MB) R3139237-1 05/15/16 09:51

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
C10-C28 Diesel Range	U		0.0222	0.100
C28-C40 Oil Range	U		0.0118	0.100
(S) o-Terphenyl	112			50.0-150

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3139237-2 05/15/16 10:07 • (LCSD) R3139237-3 05/15/16 10:24

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	1.50	1.53	1.54	102	102	70.0-130			0.680	20
(S) o-Terphenyl				110	117	50.0-150				

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc



Method Blank (MB)

(MB) R3137450-1 05/17/16 10:13

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	103			50.0-150

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137450-2 05/17/16 10:25 • (LCSD) R3137450-3 05/17/16 10:37

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	48.2	52.7	80.3	87.9	50.0-100			9.05	20
(S) o-Terphenyl				93.1	93.4	50.0-150				

L835078-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835078-01 05/17/16 12:02 • (MS) R3137450-4 05/17/16 12:15 • (MSD) R3137450-5 05/17/16 12:27

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	7.31	57.8	64.7	84.1	95.7	1	50.0-100			11.4	20
(S) o-Terphenyl					72.6	68.2		50.0-150				

Method Blank (MB)

(MB) R3138162-3 05/18/16 13:22

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
4-Chloro-3-methylphenol	U		0.00477	0.333
2-Chlorophenol	U		0.00831	0.333
2,4-Dichlorophenol	U		0.00746	0.333
2,4-Dimethylphenol	U		0.0471	0.333
4,6-Dinitro-2-methylphenol	U		0.124	0.333
2,4-Dinitrophenol	U		0.0980	0.333
2-Nitrophenol	U		0.0130	0.333
4-Nitrophenol	U		0.0525	0.333
Pentachlorophenol	U		0.0480	0.333
Phenol	U		0.00695	0.333
2,4,6-Trichlorophenol	U		0.00779	0.333
(S) Nitrobenzene-d5	80.9			21.9-129
(S) 2-Fluorobiphenyl	83.1			34.9-129
(S) p-Terphenyl-d14	85.7			21.5-128
(S) Phenol-d5	80.4			26.3-121
(S) 2-Fluorophenol	74.3			21.1-116
(S) 2,4,6-Tribromophenol	74.1			21.6-142

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138162-1 05/18/16 12:35 • (LCSD) R3138162-2 05/18/16 12:58

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.667	0.587	0.686	88.0	103	51.1-113			15.6	20
2-Chlorophenol	0.667	0.469	0.525	70.3	78.7	40.8-103			11.3	20
2,4-Dichlorophenol	0.667	0.551	0.617	82.6	92.5	46.2-109			11.3	20
2,4-Dimethylphenol	0.667	0.557	0.647	83.6	97.1	42.2-110			15.0	20
4,6-Dinitro-2-methylphenol	0.667	0.536	0.586	80.3	87.8	23.1-119			8.86	23.7
2,4-Dinitrophenol	0.667	0.332	0.345	49.8	51.7	10.0-105			3.82	36.5
2-Nitrophenol	0.667	0.532	0.620	79.7	93.0	44.2-113			15.3	20.9
4-Nitrophenol	0.667	0.538	0.600	80.7	90.0	34.8-109			10.9	20
Pentachlorophenol	0.667	0.550	0.574	82.5	86.1	16.2-102			4.25	22.9
Phenol	0.667	0.497	0.599	74.6	89.8	41.5-106			18.5	20
2,4,6-Trichlorophenol	0.667	0.565	0.620	84.7	93.0	44.4-108			9.39	20
(S) Nitrobenzene-d5				86.7	99.9	21.9-129				
(S) 2-Fluorobiphenyl				83.6	94.3	34.9-129				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138162-1 05/18/16 12:35 • (LCSD) R3138162-2 05/18/16 12:58

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
(S) p-Terphenyl-d14				81.3	84.5	21.5-128				
(S) Phenol-d5				74.6	82.2	26.3-121				
(S) 2-Fluorophenol				71.3	82.1	21.1-116				
(S) 2,4,6-Tribromophenol				83.7	84.4	21.6-142				

L835035-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835035-10 05/19/16 12:00 • (MS) R3138313-1 05/19/16 12:24 • (MSD) R3138313-2 05/19/16 12:47

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.142	U	0.632	0.663	89.0	93.4	5	27.0-154			4.76	26.6
2-Chlorophenol	0.142	U	0.524	0.563	73.8	79.2	5	33.2-121			7.06	29.3
2,4-Dichlorophenol	0.142	U	0.634	0.639	89.2	90.0	5	34.8-134			0.890	27.3
2,4-Dimethylphenol	0.142	U	0.638	0.651	89.9	91.7	5	12.3-149			2.00	32.3
4,6-Dinitro-2-methylphenol	0.142	U	ND	ND	0.000	0.000	5	10.0-144	J6	J6	0.000	32.7
2,4-Dinitrophenol	0.142	U	ND	ND	0.000	0.000	5	10.0-121	J6	J6	0.000	39.4
2-Nitrophenol	0.142	U	0.636	0.652	89.5	91.8	5	29.5-144			2.53	29.9
4-Nitrophenol	0.142	U	0.586	0.569	82.6	80.1	5	20.0-133			3.03	30.2
Pentachlorophenol	0.142	U	0.655	0.671	92.3	94.5	5	10.0-139			2.43	28.3
Phenol	0.142	U	0.565	0.644	79.5	90.7	5	25.1-130			13.1	29.6
2,4,6-Trichlorophenol	0.142	U	0.633	0.675	89.1	95.1	5	33.8-133			6.52	28.1
(S) Nitrobenzene-d5					86.3	94.0		21.9-129				
(S) 2-Fluorobiphenyl					83.0	81.1		34.9-129				
(S) p-Terphenyl-d14					82.2	60.4		21.5-128				
(S) Phenol-d5					80.2	86.0		26.3-121				
(S) 2-Fluorophenol					78.2	82.9		21.1-116				
(S) 2,4,6-Tribromophenol					80.1	84.2		21.6-142				



Method Blank (MB)

(MB) R3138667-3 05/20/16 10:56

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
4-Chloro-3-methylphenol	U		0.00477	0.333
2-Chlorophenol	U		0.00831	0.333
2,4-Dichlorophenol	U		0.00746	0.333
2,4-Dimethylphenol	U		0.0471	0.333
4,6-Dinitro-2-methylphenol	U		0.124	0.333
2,4-Dinitrophenol	U		0.0980	0.333
2-Nitrophenol	U		0.0130	0.333
4-Nitrophenol	U		0.0525	0.333
Pentachlorophenol	U		0.0480	0.333
Phenol	U		0.00695	0.333
2,4,6-Trichlorophenol	U		0.00779	0.333
(S) Nitrobenzene-d5	61.8			21.9-129
(S) 2-Fluorobiphenyl	61.7			34.9-129
(S) p-Terphenyl-d14	68.7			21.5-128
(S) Phenol-d5	70.1			26.3-121
(S) 2-Fluorophenol	64.2			21.1-116
(S) 2,4,6-Tribromophenol	52.9			21.6-142

Cp

Tc

Ss

Cn

Sr

Qc

Gl

Al

Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138667-1 05/20/16 10:08 • (LCSD) R3138667-2 05/20/16 10:32

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.667	0.451	0.496	67.7	74.4	51.1-113			9.51	20
2-Chlorophenol	0.667	0.345	0.432	51.7	64.8	40.8-103		J3	22.6	20
2,4-Dichlorophenol	0.667	0.452	0.451	67.8	67.5	46.2-109			0.350	20
2,4-Dimethylphenol	0.667	0.420	0.451	62.9	67.6	42.2-110			7.12	20
4,6-Dinitro-2-methylphenol	0.667	0.457	0.470	68.5	70.5	23.1-119			2.97	23.7
2,4-Dinitrophenol	0.667	0.430	0.404	64.5	60.6	10.0-105			6.29	36.5
2-Nitrophenol	0.667	0.421	0.463	63.1	69.4	44.2-113			9.50	20.9
4-Nitrophenol	0.667	0.393	0.365	58.9	54.7	34.8-109			7.41	20
Pentachlorophenol	0.667	0.517	0.487	77.5	73.0	16.2-102			5.87	22.9
Phenol	0.667	0.367	0.442	55.0	66.3	41.5-106			18.6	20
2,4,6-Trichlorophenol	0.667	0.512	0.479	76.8	71.8	44.4-108			6.68	20
(S) Nitrobenzene-d5				59.1	63.6	21.9-129				
(S) 2-Fluorobiphenyl				69.2	60.8	34.9-129				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138667-1 05/20/16 10:08 • (LCSD) R3138667-2 05/20/16 10:32

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
(S) p-Terphenyl-d14				65.8	64.2	21.5-128				
(S) Phenol-d5				56.0	67.8	26.3-121				
(S) 2-Fluorophenol				59.1	73.1	21.1-116				
(S) 2,4,6-Tribromophenol				57.7	55.4	21.6-142				

L835349-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835349-02 05/20/16 13:46 • (MS) R3138667-4 05/20/16 14:10 • (MSD) R3138667-5 05/20/16 14:34

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.767	U	0.592	0.713	77.2	93.1	1	27.0-154			18.6	26.6
2-Chlorophenol	0.767	U	0.450	0.513	58.8	67.0	1	33.2-121			13.1	29.3
2,4-Dichlorophenol	0.767	U	0.536	0.619	70.0	80.7	1	34.8-134			14.3	27.3
2,4-Dimethylphenol	0.767	U	0.502	0.634	65.4	82.8	1	12.3-149			23.4	32.3
4,6-Dinitro-2-methylphenol	0.767	U	0.558	0.641	72.8	83.6	1	10.0-144			13.8	32.7
2,4-Dinitrophenol	0.767	U	0.495	0.577	64.6	75.2	1	10.0-121			15.2	39.4
2-Nitrophenol	0.767	U	0.523	0.563	68.3	73.4	1	29.5-144			7.26	29.9
4-Nitrophenol	0.767	U	0.493	0.569	64.3	74.2	1	20.0-133			14.3	30.2
Pentachlorophenol	0.767	U	0.648	0.726	84.5	94.7	1	10.0-139			11.4	28.3
Phenol	0.767	U	0.581	0.646	75.8	84.3	1	25.1-130			10.6	29.6
2,4,6-Trichlorophenol	0.767	U	0.602	0.649	78.5	84.6	1	33.8-133			7.56	28.1
(S) Nitrobenzene-d5					67.5	80.4		21.9-129				
(S) 2-Fluorobiphenyl					59.8	65.2		34.9-129				
(S) p-Terphenyl-d14					47.5	54.0		21.5-128				
(S) Phenol-d5					63.4	68.3		26.3-121				
(S) 2-Fluorophenol					66.7	73.0		21.1-116				
(S) 2,4,6-Tribromophenol					68.4	64.6		21.6-142				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3136946-3 05/15/16 16:02

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
4-Chloro-3-methylphenol	U		0.000263	0.0100
2-Chlorophenol	U		0.000283	0.0100
2,4-Dichlorophenol	U		0.000284	0.0100
2,4-Dimethylphenol	U		0.000624	0.0100
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100
2,4-Dinitrophenol	U		0.00325	0.0100
2-Nitrophenol	U		0.000320	0.0100
4-Nitrophenol	U		0.00201	0.0100
Pentachlorophenol	U		0.000313	0.0100
Phenol	U		0.000334	0.0100
2,4,6-Trichlorophenol	U		0.000297	0.0100
(S) Nitrobenzene-d5	85.3			21.8-123
(S) 2-Fluorobiphenyl	75.7			29.5-131
(S) p-Terphenyl-d14	88.4			29.3-137
(S) Phenol-d5	53.1			5.00-70.1
(S) 2-Fluorophenol	72.7			10.0-77.9
(S) 2,4,6-Tribromophenol	44.8			11.2-130

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3136946-1 05/15/16 15:16 • (LCSD) R3136946-2 05/15/16 15:39

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.0500	0.0516	0.0536	103	107	35.7-100	J4	J4	3.90	22.9
2-Chlorophenol	0.0500	0.0350	0.0353	70.1	70.6	26.2-91.5			0.760	26.5
2,4-Dichlorophenol	0.0500	0.0414	0.0421	82.8	84.1	31.4-103			1.56	24.9
2,4-Dimethylphenol	0.0500	0.0402	0.0453	80.3	90.6	31.9-107			12.0	25.7
4,6-Dinitro-2-methylphenol	0.0500	0.0450	0.0490	89.9	98.1	18.4-148			8.69	24.4
2,4-Dinitrophenol	0.0500	0.0286	0.0321	57.1	64.3	24.2-128			11.8	20.5
2-Nitrophenol	0.0500	0.0429	0.0419	85.7	83.9	25.9-106			2.18	26.9
4-Nitrophenol	0.0500	0.0259	0.0255	51.9	50.9	10.0-52.7			1.86	40
Pentachlorophenol	0.0500	0.0325	0.0346	65.0	69.1	10.0-97.4			6.22	35.1
Phenol	0.0500	0.0280	0.0295	55.9	59.1	10.0-57.9		J4	5.49	35
2,4,6-Trichlorophenol	0.0500	0.0418	0.0443	83.7	88.6	29.8-107			5.71	24.1
(S) Nitrobenzene-d5				93.0	96.0	21.8-123				
(S) 2-Fluorobiphenyl				80.1	80.5	29.5-131				



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3136946-1 05/15/16 15:16 • (LCSD) R3136946-2 05/15/16 15:39

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
(S) p-Terphenyl-d14				88.1	101	29.3-137				
(S) Phenol-d5				55.5	52.7	5.00-70.1				
(S) 2-Fluorophenol				66.2	67.0	10.0-77.9				
(S) 2,4,6-Tribromophenol				62.1	62.8	11.2-130				

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND,U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.
SDL	Sample Detection Limit.
MQL	Method Quantitation Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
V	The sample concentration is too high to evaluate accurate spike recoveries.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina ¹	DW21704
Florida	E87487	North Carolina ²	41
Georgia	NELAP	North Dakota	R-140
Georgia ¹	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky ¹	90010	South Dakota	n/a
Kentucky ²	16	Tennessee ¹⁴	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

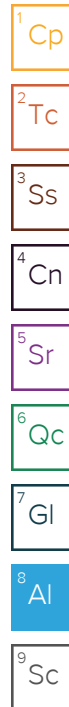
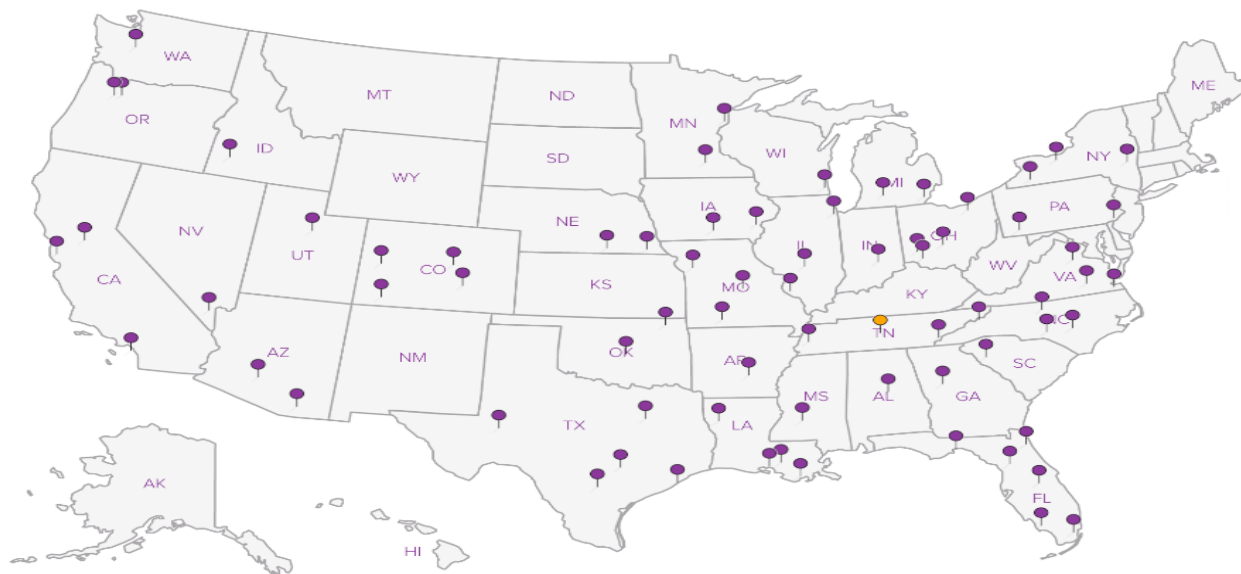
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ^{n/a} Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



AMEC Foster Wheeler - Houston, TX

585 N. Dairy Ashford
Houston, TX 77079

Billing Information:

Accounts Payable
585 N. Dairy Ashford
Houston, TX 77079

Report to:
Pamela Krueger

Email To: pamela.krueger@amecfw.com

Project
Description: Wastewater Line Investigation

City/State
Collected: ARTESIA, NM

Phone: 713-929-5674
Fax:

Client Project #
6703160012.001

Lab Project #
AMECFWHTX-WW LINE

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Rush? (Lab MUST Be Notified)
Same Day200%
Next Day100%
Two Day50%
Three Day25%

Date Results Needed

Email? No ☒ Yes
FAX? No ☐ Yes

No.
of
Cntrs

Immediately
Packed on Ice N ☐ Y ☒

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Cntrs	8270ACID 100ml Amb NoPres	CI, FI, SO4 125mlHDPE-NoPres	CI, FI, SO4 4ozClr-NoPres	DROOROLVI 40mlAmb-HCl-BT	DRORLA,SV8270ACID 4ozClr-NoPres	FEICP,MN1CP 250mlHDPE-HNO3	FEICP,MN1CP 2ozClr-NoPres	GRO 40mlAmb HCl	GRO,V8260BTEX 2ozClr-NoPres	V8260BTEX 40mlAmb-HCl	Rem./Contaminant	Sample # (lab only)
TMW-WWL1-01		SS	1	5/10/16	15:00	4			X		X		X		X			-01
TMW-WWL1-05		SS	5	5/10/16	15:10	4			X		X		X		X			-02
TMW-WWL1-12		SS	12	5/10/16	15:20	4			X		X		X		X			-03
TMW-WWL2-01		SS	1	5/10/16	16:20	4			X		X		X		X			-04
TMW-WWL2-05		SS	5	5/10/16	16:30	4			X		X		X		X			-05
TMW-WWL2-12		SS	12	5/10/16	16:50	4			X		X		X		X			-06
TMW-WWL2-12D		SS	12	5/10/16	16:55	4			X		X		X		X			-07
		SS				4			X		X		X		X			
TMW-WWL6-EG		GW		5/10/16	18:00	11	X	X		X		X		X		X		-08
		GW				11	X	X		X		X		X		X		

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other

Remarks:

pH _____ Temp _____

Flow _____ Other _____

6711 0132 8168
Hold #

Relinquished by: (Signature)

Date:

Time:

Received by: (Signature)

Samples returned via: ☐ UPS

Condition: (lab use only)

Relinquished by: (Signature)

Date:

Time:

Received by: (Signature)

Temp: °C Bottles Received:

COC Seal Intact: ☒ Y ☐ N ☐ NA

Relinquished by: (Signature)

Date:

Time:

Received for lab by: (Signature)

Date: 5/12/16 Time: 900

pH Checked: 7.2 NCF:

May 27, 2016

AMEC Foster Wheeler - Houston, TX

Sample Delivery Group: L835353
Samples Received: 05/13/2016
Project Number: 6703160012.001
Description: Wastewater Line Investigation

Report To: Pamela Krueger
585 N. Dairy Ashford
Houston, TX 77079

Entire Report Reviewed By:



Chris McCord
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.



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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



TMW-WWL1 L835353-01 GW

			Collected by	Collected date/time	Received date/time
				05/12/16 08:30	05/13/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872666	5	05/17/16 09:52	05/17/16 17:15	ST
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872936	1	05/18/16 11:41	05/19/16 15:12	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872740	1	05/15/16 18:28	05/17/16 04:33	JNS
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG872894	1	05/17/16 00:32	05/17/16 00:32	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872872	1	05/19/16 00:20	05/19/16 00:20	DAH
Wet Chemistry by Method 9056A	WG874711	1	05/24/16 13:02	05/24/16 13:02	CM
Wet Chemistry by Method 9056A	WG875355	500	05/26/16 11:11	05/26/16 11:11	CM

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

TMW-WWL2 L835353-02 GW

			Collected by	Collected date/time	Received date/time
				05/12/16 09:00	05/13/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872666	5	05/17/16 09:52	05/17/16 17:12	ST
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872936	1	05/18/16 11:41	05/19/16 19:26	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872740	1	05/15/16 18:28	05/17/16 04:50	JNS
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG872894	1	05/17/16 00:53	05/17/16 00:53	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872872	1	05/19/16 00:43	05/19/16 00:43	DAH
Wet Chemistry by Method 9056A	WG874711	1	05/24/16 13:31	05/24/16 13:31	CM
Wet Chemistry by Method 9056A	WG874711	100	05/24/16 13:45	05/24/16 13:45	CM
Wet Chemistry by Method 9056A	WG875355	500	05/26/16 11:25	05/26/16 11:25	CM

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

TMW-WWL2D L835353-03 GW

			Collected by	Collected date/time	Received date/time
				05/12/16 09:05	05/13/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG872666	5	05/17/16 09:52	05/17/16 17:18	ST
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG872936	1	05/18/16 11:41	05/19/16 19:49	JF
Semi-Volatile Organic Compounds (GC) by Method 8015	WG872740	1	05/15/16 18:28	05/17/16 05:07	JNS
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG872894	1	05/17/16 01:15	05/17/16 01:15	ACG
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872872	1	05/19/16 01:05	05/19/16 01:05	DAH
Wet Chemistry by Method 9056A	WG874225	1	05/23/16 13:58	05/23/16 13:58	SAM
Wet Chemistry by Method 9056A	WG874225	500	05/23/16 12:55	05/23/16 12:55	SAM

TRIP BLANK L835353-04 GW

			Collected by	Collected date/time	Received date/time
				05/12/16 00:00	05/13/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872872	1	05/18/16 20:12	05/18/16 20:12	DAH

TRIP BLANK L835353-05 GW

			Collected by	Collected date/time	Received date/time
				05/12/16 00:00	05/13/16 09:00
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG872872	1	05/18/16 20:34	05/18/16 20:34	DAH

ACCOUNT:

AMEC Foster Wheeler - Houston, TX

PROJECT:

6703160012.001

SDG:

L835353

DATE/TIME:

05/27/16 16:17

PAGE:

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



WWL-SPC L835353-06 Solid

Collected by

Collected date/time

Received date/time

05/12/16 00:00

05/13/16 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	¹ Cp
Mercury by Method 7471A	WG873476	1	05/18/16 17:22	05/19/16 09:44	NJB	² Tc
Metals (ICP) by Method 6010B	WG873554	1	05/20/16 11:08	05/20/16 13:52	BRJ	³ Ss
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG873908	1	05/19/16 22:56	05/20/16 14:58	SNR	⁴ Cn
Semi-Volatile Organic Compounds (GC) by Method 8015	WG873587	1	05/19/16 21:44	05/20/16 19:28	DMG	⁵ Sr
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG874253	5	05/20/16 17:57	05/20/16 22:59	JAH	⁶ Qc
Volatile Organic Compounds (GC/MS) by Method 8260B	WG874942	5	05/24/16 16:07	05/25/16 02:00	DWR	⁷ Gl
Wet Chemistry by Method 9056A	WG874228	1	05/23/16 09:00	05/23/16 17:37	CM	⁸ Al
Wet Chemistry by Method 9056A	WG874228	10	05/23/16 09:00	05/23/16 18:01	CM	⁹ Sc
Wet Chemistry by Method 9056A	WG874228	50	05/23/16 09:00	05/24/16 09:03	CM	

ACCOUNT:

AMEC Foster Wheeler - Houston, TX

PROJECT:

6703160012.001

SDG:

L835353

DATE/TIME:

05/27/16 16:17

PAGE:

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All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Chris McCord
Technical Service Representative

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	12200		26.0	500	500	05/26/2016 11:11	WG875355
Fluoride	6.21		0.00990	0.100	1	05/24/2016 13:02	WG874711
Sulfate	18800		38.7	2500	500	05/26/2016 11:11	WG875355

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Iron	0.234	J	0.0705	0.500	5	05/17/2016 17:15	WG872666
Manganese	0.954		0.00600	0.0500	5	05/17/2016 17:15	WG872666

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
TPH (GC/FID) Low Fraction	U		0.0314	0.100	1	05/17/2016 00:32	WG872894
(S) a,a,a-Trifluorotoluene(FID) 99.2				62.0-128		05/17/2016 00:32	WG872894

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	1	05/19/2016 00:20	WG872872
Toluene	U		0.000780	0.00500	1	05/19/2016 00:20	WG872872
Ethylbenzene	U		0.000384	0.00100	1	05/19/2016 00:20	WG872872
Total Xylenes	U		0.00106	0.00300	1	05/19/2016 00:20	WG872872
(S) Toluene-d8	104			90.0-115		05/19/2016 00:20	WG872872
(S) Dibromofluoromethane	109			79.0-121		05/19/2016 00:20	WG872872
(S) a,a,a-Trifluorotoluene	104			90.4-116		05/19/2016 00:20	WG872872
(S) 4-Bromofluorobenzene	101			80.1-120		05/19/2016 00:20	WG872872

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
C10-C28 Diesel Range	0.0851	J	0.0222	0.100	1	05/17/2016 04:33	WG872740
C28-C40 Oil Range	0.0419	J	0.0118	0.100	1	05/17/2016 04:33	WG872740
(S) o-Terphenyl	95.3			50.0-150		05/17/2016 04:33	WG872740

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
4-Chloro-3-methylphenol	U		0.000263	0.0100	1	05/19/2016 15:12	WG872936
2-Chlorophenol	U		0.000283	0.0100	1	05/19/2016 15:12	WG872936
2,4-Dichlorophenol	U		0.000284	0.0100	1	05/19/2016 15:12	WG872936
2,4-Dimethylphenol	U		0.000624	0.0100	1	05/19/2016 15:12	WG872936
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100	1	05/19/2016 15:12	WG872936
2,4-Dinitrophenol	U	J3	0.00325	0.0100	1	05/19/2016 15:12	WG872936
2-Nitrophenol	U		0.000320	0.0100	1	05/19/2016 15:12	WG872936
4-Nitrophenol	U		0.00201	0.0100	1	05/19/2016 15:12	WG872936
Pentachlorophenol	U		0.000313	0.0100	1	05/19/2016 15:12	WG872936
Phenol	U		0.000334	0.0100	1	05/19/2016 15:12	WG872936
2,4,6-Trichlorophenol	U		0.000297	0.0100	1	05/19/2016 15:12	WG872936
(S) 2-Fluorophenol	43.8			10.0-77.9		05/19/2016 15:12	WG872936
(S) Phenol-d5	32.9			5.00-70.1		05/19/2016 15:12	WG872936
(S) Nitrobenzene-d5	76.8			21.8-123		05/19/2016 15:12	WG872936
(S) 2-Fluorobiphenyl	87.2			29.5-131		05/19/2016 15:12	WG872936



Collected date/time: 05/12/16 08:30

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Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	71.9			11.2-130		05/19/2016 15:12	WG872936
(S) p-Terphenyl-d14	98.2			29.3-137		05/19/2016 15:12	WG872936

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	7130		5.19	100	100	05/24/2016 13:45	WG874711
Fluoride	2.59		0.00990	0.100	1	05/24/2016 13:31	WG874711
Sulfate	14600		38.7	2500	500	05/26/2016 11:25	WG875355

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Iron	0.169	J	0.0705	0.500	5	05/17/2016 17:12	WG872666
Manganese	0.836		0.00600	0.0500	5	05/17/2016 17:12	WG872666

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
TPH (GC/FID) Low Fraction	U		0.0314	0.100	1	05/17/2016 00:53	WG872894
(S) a,a,a-Trifluorotoluene(FID) 99.5				62.0-128		05/17/2016 00:53	WG872894

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	1	05/19/2016 00:43	WG872872
Toluene	U		0.000780	0.00500	1	05/19/2016 00:43	WG872872
Ethylbenzene	U		0.000384	0.00100	1	05/19/2016 00:43	WG872872
Total Xylenes	U		0.00106	0.00300	1	05/19/2016 00:43	WG872872
(S) Toluene-d8	104			90.0-115		05/19/2016 00:43	WG872872
(S) Dibromofluoromethane	110			79.0-121		05/19/2016 00:43	WG872872
(S) a,a,a-Trifluorotoluene	103			90.4-116		05/19/2016 00:43	WG872872
(S) 4-Bromofluorobenzene	114			80.1-120		05/19/2016 00:43	WG872872

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
C10-C28 Diesel Range	0.182		0.0222	0.100	1	05/17/2016 04:50	WG872740
C28-C40 Oil Range	0.175		0.0118	0.100	1	05/17/2016 04:50	WG872740
(S) o-Terphenyl	104			50.0-150		05/17/2016 04:50	WG872740

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
4-Chloro-3-methylphenol	U		0.000263	0.0100	1	05/19/2016 19:26	WG872936
2-Chlorophenol	U		0.000283	0.0100	1	05/19/2016 19:26	WG872936
2,4-Dichlorophenol	U		0.000284	0.0100	1	05/19/2016 19:26	WG872936
2,4-Dimethylphenol	U		0.000624	0.0100	1	05/19/2016 19:26	WG872936
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100	1	05/19/2016 19:26	WG872936
2,4-Dinitrophenol	U	J3	0.00325	0.0100	1	05/19/2016 19:26	WG872936
2-Nitrophenol	U		0.000320	0.0100	1	05/19/2016 19:26	WG872936
4-Nitrophenol	U		0.00201	0.0100	1	05/19/2016 19:26	WG872936
Pentachlorophenol	U		0.000313	0.0100	1	05/19/2016 19:26	WG872936
Phenol	U		0.000334	0.0100	1	05/19/2016 19:26	WG872936
2,4,6-Trichlorophenol	U		0.000297	0.0100	1	05/19/2016 19:26	WG872936
(S) 2-Fluorophenol	52.9			10.0-77.9		05/19/2016 19:26	WG872936
(S) Phenol-d5	38.1			5.00-70.1		05/19/2016 19:26	WG872936
(S) Nitrobenzene-d5	84.9			21.8-123		05/19/2016 19:26	WG872936
(S) 2-Fluorobiphenyl	88.9			29.5-131		05/19/2016 19:26	WG872936



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	78.3			11.2-130		05/19/2016 19:26	WG872936
(S) p-Terphenyl-d14	99.5			29.3-137		05/19/2016 19:26	WG872936

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	7100		26.0	500	500	05/23/2016 12:55	WG874225
Fluoride	3.10		0.00990	0.100	1	05/23/2016 13:58	WG874225
Sulfate	16800		38.7	2500	500	05/23/2016 12:55	WG874225

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Iron	0.981		0.0705	0.500	5	05/17/2016 17:18	WG872666
Manganese	0.910		0.00600	0.0500	5	05/17/2016 17:18	WG872666

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
TPH (GC/FID) Low Fraction	U		0.0314	0.100	1	05/17/2016 01:15	WG872894
(S) a,a,a-Trifluorotoluene(FID) 98.8				62.0-128		05/17/2016 01:15	WG872894

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	1	05/19/2016 01:05	WG872872
Toluene	U		0.000780	0.00500	1	05/19/2016 01:05	WG872872
Ethylbenzene	U		0.000384	0.00100	1	05/19/2016 01:05	WG872872
Total Xylenes	U		0.00106	0.00300	1	05/19/2016 01:05	WG872872
(S) Toluene-d8	103			90.0-115		05/19/2016 01:05	WG872872
(S) Dibromofluoromethane	110			79.0-121		05/19/2016 01:05	WG872872
(S) a,a,a-Trifluorotoluene	103			90.4-116		05/19/2016 01:05	WG872872
(S) 4-Bromofluorobenzene	116			80.1-120		05/19/2016 01:05	WG872872

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
C10-C28 Diesel Range	0.0892	J	0.0222	0.100	1	05/17/2016 05:07	WG872740
C28-C40 Oil Range	0.0898	J	0.0118	0.100	1	05/17/2016 05:07	WG872740
(S) o-Terphenyl	97.7			50.0-150		05/17/2016 05:07	WG872740

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
4-Chloro-3-methylphenol	U		0.000263	0.0100	1	05/19/2016 19:49	WG872936
2-Chlorophenol	U		0.000283	0.0100	1	05/19/2016 19:49	WG872936
2,4-Dichlorophenol	U		0.000284	0.0100	1	05/19/2016 19:49	WG872936
2,4-Dimethylphenol	U		0.000624	0.0100	1	05/19/2016 19:49	WG872936
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100	1	05/19/2016 19:49	WG872936
2,4-Dinitrophenol	U	J3	0.00325	0.0100	1	05/19/2016 19:49	WG872936
2-Nitrophenol	U		0.000320	0.0100	1	05/19/2016 19:49	WG872936
4-Nitrophenol	U		0.00201	0.0100	1	05/19/2016 19:49	WG872936
Pentachlorophenol	U		0.000313	0.0100	1	05/19/2016 19:49	WG872936
Phenol	U		0.000334	0.0100	1	05/19/2016 19:49	WG872936
2,4,6-Trichlorophenol	U		0.000297	0.0100	1	05/19/2016 19:49	WG872936
(S) 2-Fluorophenol	40.0			10.0-77.9		05/19/2016 19:49	WG872936
(S) Phenol-d5	32.2			5.00-70.1		05/19/2016 19:49	WG872936
(S) Nitrobenzene-d5	70.2			21.8-123		05/19/2016 19:49	WG872936
(S) 2-Fluorobiphenyl	81.9			29.5-131		05/19/2016 19:49	WG872936



Collected date/time: 05/12/16 09:05

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Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
(S) 2,4,6-Tribromophenol	63.3			11.2-130		05/19/2016 19:49	WG872936
(S) p-Terphenyl-d14	94.9			29.3-137		05/19/2016 19:49	WG872936

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	U		0.000331	0.00100	1	05/18/2016 20:12	WG872872
Toluene	U		0.000780	0.00500	1	05/18/2016 20:12	WG872872
Ethylbenzene	U		0.000384	0.00100	1	05/18/2016 20:12	WG872872
Total Xylenes	U		0.00106	0.00300	1	05/18/2016 20:12	WG872872
(S) Toluene-d8	104			90.0-115		05/18/2016 20:12	WG872872
(S) Dibromofluoromethane	109			79.0-121		05/18/2016 20:12	WG872872
(S) a,a,a-Trifluorotoluene	104			90.4-116		05/18/2016 20:12	WG872872
(S) 4-Bromofluorobenzene	99.5			80.1-120		05/18/2016 20:12	WG872872

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc



Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	U		0.000331	0.00100	1	05/18/2016 20:34	WG872872
Toluene	U		0.000780	0.00500	1	05/18/2016 20:34	WG872872
Ethylbenzene	U		0.000384	0.00100	1	05/18/2016 20:34	WG872872
Total Xylenes	U		0.00106	0.00300	1	05/18/2016 20:34	WG872872
(S) Toluene-d8	108			90.0-115		05/18/2016 20:34	WG872872
(S) Dibromofluoromethane	99.3			79.0-121		05/18/2016 20:34	WG872872
(S) a,a,a-Trifluorotoluene	108			90.4-116		05/18/2016 20:34	WG872872
(S) 4-Bromofluorobenzene	105			80.1-120		05/18/2016 20:34	WG872872

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Chloride	1660		7.95	100	10	05/23/2016 18:01	WG874228
Fluoride	18.3		0.261	1.00	1	05/23/2016 17:37	WG874228
Sulfate	20000		28.5	2500	50	05/24/2016 09:03	WG874228

Mercury by Method 7471A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	U		0.00280	0.0200	1	05/19/2016 09:44	WG873476

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Arsenic	2.87		0.650	2.00	1	05/20/2016 13:52	WG873554
Barium	95.9		0.170	0.500	1	05/20/2016 13:52	WG873554
Cadmium	0.222	J	0.0700	0.500	1	05/20/2016 13:52	WG873554
Chromium	5.89		0.140	1.00	1	05/20/2016 13:52	WG873554
Iron	5120		1.41	10.0	1	05/20/2016 13:52	WG873554
Lead	7.90		0.190	0.500	1	05/20/2016 13:52	WG873554
Manganese	390		0.120	1.00	1	05/20/2016 13:52	WG873554
Selenium	U		0.740	2.00	1	05/20/2016 13:52	WG873554
Silver	U		0.280	1.00	1	05/20/2016 13:52	WG873554

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) Low Fraction	U		0.108	0.500	5	05/20/2016 22:59	WG874253
(S) a,a,a-Trifluorotoluene(FID) 87.3				59.0-128		05/20/2016 22:59	WG874253

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzene	U		0.00135	0.00500	5	05/25/2016 02:00	WG874942
Toluene	U		0.00217	0.0250	5	05/25/2016 02:00	WG874942
Ethylbenzene	U		0.00148	0.00500	5	05/25/2016 02:00	WG874942
Total Xylenes	U		0.00349	0.0150	5	05/25/2016 02:00	WG874942
(S) Toluene-d8	106			88.7-115		05/25/2016 02:00	WG874942
(S) Dibromofluoromethane	102			76.3-123		05/25/2016 02:00	WG874942
(S) a,a,a-Trifluorotoluene	103			87.2-117		05/25/2016 02:00	WG874942
(S) 4-Bromofluorobenzene	103			69.7-129		05/25/2016 02:00	WG874942

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
C10-C28 Diesel Range	U		1.61	4.00	1	05/20/2016 19:28	WG873587
C28-C40 Oil Range	4.12		0.274	4.00	1	05/20/2016 19:28	WG873587
(S) o-Terphenyl	87.5			50.0-150		05/20/2016 19:28	WG873587

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/20/2016 14:58	WG873908
2-Chlorophenol	U	<u>J3</u>	0.00831	0.333	1	05/20/2016 14:58	WG873908
2,4-Dichlorophenol	U		0.00746	0.333	1	05/20/2016 14:58	WG873908
2,4-Dimethylphenol	U		0.0471	0.333	1	05/20/2016 14:58	WG873908
4,6-Dinitro-2-methylphenol	U		0.124	0.333	1	05/20/2016 14:58	WG873908
2,4-Dinitrophenol	U		0.0980	0.333	1	05/20/2016 14:58	WG873908
2-Nitrophenol	U		0.0130	0.333	1	05/20/2016 14:58	WG873908
4-Nitrophenol	U		0.0525	0.333	1	05/20/2016 14:58	WG873908
Pentachlorophenol	U		0.0480	0.333	1	05/20/2016 14:58	WG873908
Phenol	U		0.00695	0.333	1	05/20/2016 14:58	WG873908
2,4,6-Trichlorophenol	U		0.00779	0.333	1	05/20/2016 14:58	WG873908
(S) 2-Fluorophenol	61.1			21.1-116		05/20/2016 14:58	WG873908
(S) Phenol-d5	55.3			26.3-121		05/20/2016 14:58	WG873908
(S) Nitrobenzene-d5	67.6			21.9-129		05/20/2016 14:58	WG873908
(S) 2-Fluorobiphenyl	62.2			34.9-129		05/20/2016 14:58	WG873908
(S) 2,4,6-Tribromophenol	46.7			21.6-142		05/20/2016 14:58	WG873908
(S) p-Terphenyl-d14	52.9			21.5-128		05/20/2016 14:58	WG873908

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3139265-1 05/23/16 09:07

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.0099	0.100
Sulfate	U		0.0774	5.00

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3139265-2 05/23/16 09:23 • (LCSD) R3139265-3 05/23/16 09:38

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chloride	40.0	38.9	38.9	97	97	80-120			0	15
Fluoride	8.00	7.73	7.76	97	97	80-120			0	15
Sulfate	40.0	38.5	38.6	96	97	80-120			0	15

L835977-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835977-10 05/23/16 17:41 • (MS) R3139265-4 05/23/16 17:57 • (MSD) R3139265-5 05/23/16 18:13

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Fluoride	5.00	0.361	5.34	5.28	100	98	1	80-120			1	15
Sulfate	50.0	ND	50.8	51.0	99	99	1	80-120			0	15

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



Method Blank (MB)

(MB) R3139346-1 05/24/16 08:33

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Chloride	U		0.0519	1.00
Fluoride	U		0.0099	0.100

L836606-01 Original Sample (OS) • Duplicate (DUP)

(OS) L836606-01 05/24/16 16:53 • (DUP) R3139346-5 05/24/16 17:07

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Chloride	ND	0.611	1	0		15
Fluoride	ND	0.0818	1	0		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3139346-2 05/24/16 08:47 • (LCSD) R3139346-3 05/24/16 10:27

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Chloride	40.0	39.0	39.2	97	98	90-110			0	20
Fluoride	8.00	7.82	7.84	98	98	90-110			0	20

L836505-07 Original Sample (OS) • Matrix Spike (MS)

(OS) L836505-07 05/24/16 14:28 • (MS) R3139346-4 05/24/16 14:43

	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Analyte	mg/l	mg/l	mg/l	%		%	
Chloride	50.0	17.2	67.6	101	1	80-120	
Fluoride	5.00	0.122	5.04	98	1	80-120	

L836606-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836606-06 05/24/16 18:36 • (MS) R3139346-6 05/24/16 18:50 • (MSD) R3139346-7 05/24/16 19:04

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Chloride	50.0	ND	50.1	51.6	100	103	1	80-120			3	15
Fluoride	5.00	ND	4.98	5.18	98	102	1	80-120			4	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3140117-1 05/26/16 09:06

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Chloride	U		0.0519	1.00
Sulfate	U		0.0774	5.00

L837803-06 Original Sample (OS) • Duplicate (DUP)

(OS) L837803-06 05/26/16 15:51 • (DUP) R3140117-4 05/26/16 16:06

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Sulfate	35.7	35.6	1	0		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3140117-2 05/26/16 09:21 • (LCSD) R3140117-3 05/26/16 09:36

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Chloride	40.0	39.4	39.3	99	98	80-120			0	15
Sulfate	40.0	39.8	39.8	100	100	80-120			0	15

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc

Method Blank (MB)

(MB) R3139258-1 05/23/16 10:37

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Chloride	U		0.795	10.0
Fluoride	U		0.261	1.00
Sulfate	U		0.57	50.0

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

L836501-15 Original Sample (OS) • Duplicate (DUP)

(OS) L836501-15 05/23/16 20:25 • (DUP) R3139258-4 05/23/16 20:49

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	86.9	80.8	1	7		15
Fluoride	7.38	6.69	1	10		15
Sulfate	215	177	1	19	P1	15

L836501-21 Original Sample (OS) • Duplicate (DUP)

(OS) L836501-21 05/24/16 00:48 • (DUP) R3139258-7 05/24/16 01:12

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	75.8	83.5	1	10		15
Fluoride	16.2	13.3	1	20	J3	15
Sulfate	257	235	1	9		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3139258-2 05/23/16 11:01 • (LCSD) R3139258-3 05/23/16 11:25

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chloride	200	199	199	99	99	80-120			0	15
Fluoride	20.0	20.4	20.5	102	103	80-120			0	15
Sulfate	200	200	200	100	100	80-120			0	15



L836501-16 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836501-16 05/23/16 22:00 • (MS) R3139258-5 05/23/16 22:24 • (MSD) R3139258-6 05/23/16 22:48

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	538	78.6	643	629	105	102	1	80-120			2	15
Fluoride	53.8	5.67	49.6	49.1	82	81	1	80-120			1	15
Sulfate	538	269	822	816	103	102	1	80-120			1	15

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3138224-1 05/19/16 09:36

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Mercury	U		0.0028	0.0200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138224-2 05/19/16 09:39 • (LCSD) R3138224-3 05/19/16 09:41

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	%	%	%			%	%
Mercury	0.300	0.260	0.274	87	91	80-120			5	20

L835353-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835353-06 05/19/16 09:44 • (MS) R3138224-4 05/19/16 09:47 • (MSD) R3138224-5 05/19/16 09:54

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Mercury	0.300	U	0.282	0.276	94	92	1	75-125			2	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3137501-1 05/17/16 12:02

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Iron	U		0.0141	0.100
Manganese	U		0.0012	0.0100

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137501-2 05/17/16 12:04 • (LCSD) R3137501-3 05/17/16 12:07

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Iron	10.0	9.70	9.78	97	98	80-120			1	20
Manganese	1.00	0.973	0.980	97	98	80-120			1	20

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R3138672-1 05/20/16 13:30

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Arsenic	U		0.65	2.00
Barium	0.278	J	0.17	0.500
Cadmium	U		0.07	0.500
Chromium	U		0.14	1.00
Iron	U		1.41	10.0
Lead	U		0.19	0.500
Manganese	U		0.12	1.00
Selenium	U		0.74	2.00
Silver	U		0.28	1.00

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138672-2 05/20/16 13:33 • (LCSD) R3138672-3 05/20/16 13:35

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	100	99.2	97.4	99	97	80-120			2	20
Barium	100	104	102	104	102	80-120			1	20
Cadmium	100	103	101	103	101	80-120			2	20
Chromium	100	99.2	97.9	99	98	80-120			1	20
Iron	1000	974	963	97	96	80-120			1	20
Lead	100	104	102	104	102	80-120			2	20
Manganese	100	99.7	98.4	100	98	80-120			1	20
Selenium	100	103	102	103	102	80-120			1	20
Silver	100	98.4	97.0	98	97	80-120			1	20

L836003-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836003-08 05/20/16 13:38 • (MS) R3138672-6 05/20/16 13:46 • (MSD) R3138672-7 05/20/16 13:48

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	105	4.07	102	106	94	97	1	75-125			3	20
Barium	105	47.6	155	166	102	113	1	75-125			7	20
Cadmium	105	U	106	108	101	103	1	75-125			2	20
Chromium	105	7.15	105	111	93	99	1	75-125			6	20
Iron	1050	11300	10800	12600	0	118	1	75-125	V		16	20

L836003-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836003-08 05/20/16 13:38 • (MS) R3138672-6 05/20/16 13:46 • (MSD) R3138672-7 05/20/16 13:48

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Lead	105	6.62	114	116	102	105	1	75-125			2	20
Manganese	105	293	362	353	65	57	1	75-125	J6	J6	2	20
Selenium	105	U	92.7	98.3	88	94	1	75-125			6	20
Silver	105	U	100	104	95	99	1	75-125			4	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3137306-3 05/16/16 22:25

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
TPH (GC/FID) Low Fraction	U		0.0314	0.100
(S) a,a,a-Trifluorotoluene(FID) 100				62.0-128

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137306-1 05/16/16 21:22 • (LCSD) R3137306-2 05/16/16 21:43

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	6.14	6.04	112	110	67.0-132			1.66	20
(S) a,a,a-Trifluorotoluene(FID)				102	101	62.0-128				

L834446-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L834446-01 05/16/16 23:50 • (MS) R3137306-4 05/16/16 22:46 • (MSD) R3137306-5 05/16/16 23:07

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPH (GC/FID) Low Fraction	5.50	ND	2.91	3.00	52.9	54.6	1	50.0-143			3.25	20
(S) a,a,a-Trifluorotoluene(FID)					100	100		62.0-128				

Method Blank (MB)

(MB) R3138993-3 05/20/16 19:11

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
TPH (GC/FID) Low Fraction	U		0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	88.2			59.0-128

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138993-1 05/20/16 18:01 • (LCSD) R3138993-2 05/20/16 18:24

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
TPH (GC/FID) Low Fraction	5.50	5.12	4.92	93.0	89.4	63.5-137			3.96	20
(S) a,a,a-Trifluorotoluene(FID)				89.1	89.0	59.0-128				

L835353-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835353-06 05/20/16 22:59 • (MS) R3138993-4 05/20/16 21:50 • (MSD) R3138993-5 05/20/16 22:13

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
TPH (GC/FID) Low Fraction	5.50	U	17.6	19.8	63.9	71.9	5	28.5-138			11.7	23.6
(S) a,a,a-Trifluorotoluene(FID)					86.7	87.5		59.0-128				

Method Blank (MB)

(MB) R3138238-3 05/18/16 18:41

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.000331	0.00100
Ethylbenzene	U		0.000384	0.00100
Toluene	U		0.000780	0.00500
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	102			90.0-115
(S) Dibromofluoromethane	109			79.0-121
(S) a,a,a-Trifluorotoluene	103			90.4-116
(S) 4-Bromofluorobenzene	101			80.1-120

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138238-1 05/18/16 16:49 • (LCSD) R3138238-2 05/18/16 17:11

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0256	0.0267	102	107	73.0-122			4.33	20
Ethylbenzene	0.0250	0.0251	0.0260	100	104	80.9-121			3.74	20
Toluene	0.0250	0.0235	0.0244	93.9	97.4	77.9-116			3.63	20
Xylenes, Total	0.0750	0.0736	0.0765	98.2	102	79.2-122			3.82	20
(S) Toluene-d8				105	106	90.0-115				
(S) Dibromofluoromethane				110	103	79.0-121				
(S) a,a,a-Trifluorotoluene				103	106	90.4-116				
(S) 4-Bromofluorobenzene				101	106	80.1-120				

L835321-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835321-02 05/18/16 21:19 • (MS) R3138238-4 05/18/16 19:04 • (MSD) R3138238-5 05/18/16 19:27

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	ND	0.0233	0.0247	93.2	98.8	1	58.6-133			5.89	20
Ethylbenzene	0.0250	ND	0.0234	0.0253	93.5	101	1	62.7-136			7.89	20
Toluene	0.0250	ND	0.0215	0.0228	85.9	91.4	1	67.8-124			6.16	20
Xylenes, Total	0.0750	ND	0.0695	0.0740	92.6	98.7	1	65.6-133			6.31	20
(S) Toluene-d8					106	105		90.0-115				
(S) Dibromofluoromethane					108	109		79.0-121				
(S) a,a,a-Trifluorotoluene					104	104		90.4-116				
(S) 4-Bromofluorobenzene					104	104		80.1-120				



Method Blank (MB)

(MB) R3139540-3 05/24/16 21:59

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000270	0.00100
Ethylbenzene	U		0.000297	0.00100
Toluene	U		0.000434	0.00500
Xylenes, Total	U		0.000698	0.00300
(S) Toluene-d8	106			88.7-115
(S) Dibromofluoromethane	99.4			76.3-123
(S) a,a,a-Trifluorotoluene	105			87.2-117
(S) 4-Bromofluorobenzene	103			69.7-129

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3139540-1 05/24/16 20:22 • (LCSD) R3139540-2 05/24/16 20:42

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0216	0.0216	86.5	86.4	72.6-120			0.0900	20
Ethylbenzene	0.0250	0.0236	0.0232	94.6	92.8	78.6-124			1.85	20
Toluene	0.0250	0.0224	0.0225	89.5	90.1	76.7-116			0.740	20
Xylenes, Total	0.0750	0.0711	0.0715	94.8	95.3	78.1-123			0.510	20
(S) Toluene-d8				108	108	88.7-115				
(S) Dibromofluoromethane				101	101	76.3-123				
(S) a,a,a-Trifluorotoluene				107	106	87.2-117				
(S) 4-Bromofluorobenzene				103	102	69.7-129				

L836637-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836637-05 05/26/16 11:45 • (MS) R3139988-1 05/26/16 12:04 • (MSD) R3139988-2 05/26/16 12:24

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0285	29.5	137	134	81.9	79.6	4600	47.8-131			2.25	22.8
Ethylbenzene	0.0285	108	229	232	91.7	94.6	4600	44.8-135			1.67	26.9
Toluene	0.0285	222	339	347	89.5	95.7	4600	47.8-127			2.37	24.3
Xylenes, Total	0.0855	527	895	913	93.6	98.1	4600	42.7-135			1.94	26.6
(S) Toluene-d8					108	107		88.7-115				
(S) Dibromofluoromethane					102	99.1		76.3-123				
(S) a,a,a-Trifluorotoluene					106	107		87.2-117				



L836637-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L836637-05 05/26/16 11:45 • (MS) R3139988-1 05/26/16 12:04 • (MSD) R3139988-2 05/26/16 12:24

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
(S) 4-Bromofluorobenzene					104	105		69.7-129				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3137334-1 05/17/16 03:42

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
C10-C28 Diesel Range	U		0.0222	0.100
C28-C40 Oil Range	U		0.0118	0.100
(S) o-Terphenyl	105			50.0-150

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3137334-2 05/17/16 03:59 • (LCSD) R3137334-3 05/17/16 04:16

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	1.50	1.48	1.44	98.5	96.1	70.0-130			2.44	20
(S) o-Terphenyl				104	97.9	50.0-150				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3138554-1 05/20/16 10:03

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
C10-C28 Diesel Range	U		1.61	4.00
C28-C40 Oil Range	U		0.274	4.00
(S) o-Terphenyl	88.1			50.0-150

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138554-2 05/20/16 10:17 • (LCSD) R3138554-3 05/20/16 10:31

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	47.4	48.5	78.9	80.9	50.0-100			2.44	20
(S) o-Terphenyl				88.9	91.0	50.0-150				

L835353-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835353-06 05/20/16 19:28 • (MS) R3138554-4 05/20/16 19:42 • (MSD) R3138554-5 05/20/16 19:57

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
C10-C28 Diesel Range	60.0	U	43.1	44.1	71.8	73.6	1	50.0-100			2.39	20
(S) o-Terphenyl					67.2	65.3		50.0-150				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Method Blank (MB)

(MB) R3138702-3 05/19/16 14:49

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
4-Chloro-3-methylphenol	U		0.000263	0.0100
2-Chlorophenol	U		0.000283	0.0100
2,4-Dichlorophenol	U		0.000284	0.0100
2,4-Dimethylphenol	U		0.000624	0.0100
4,6-Dinitro-2-methylphenol	U		0.00262	0.0100
2,4-Dinitrophenol	U		0.00325	0.0100
2-Nitrophenol	U		0.000320	0.0100
4-Nitrophenol	U		0.00201	0.0100
Pentachlorophenol	U		0.000313	0.0100
Phenol	U		0.000334	0.0100
2,4,6-Trichlorophenol	U		0.000297	0.0100
(S) Nitrobenzene-d5	77.9			21.8-123
(S) 2-Fluorobiphenyl	84.2			29.5-131
(S) p-Terphenyl-d14	93.8			29.3-137
(S) Phenol-d5	38.1			5.00-70.1
(S) 2-Fluorophenol	55.7			10.0-77.9
(S) 2,4,6-Tribromophenol	70.6			11.2-130

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138702-1 05/19/16 14:02 • (LCSD) R3138702-2 05/19/16 14:25

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.0500	0.0439	0.0424	87.8	84.8	35.7-100			3.47	22.9
2-Chlorophenol	0.0500	0.0377	0.0354	75.3	70.8	26.2-91.5			6.19	26.5
2,4-Dichlorophenol	0.0500	0.0441	0.0428	88.1	85.7	31.4-103			2.83	24.9
2,4-Dimethylphenol	0.0500	0.0430	0.0431	86.1	86.2	31.9-107			0.150	25.7
4,6-Dinitro-2-methylphenol	0.0500	0.0375	0.0383	75.0	76.7	18.4-148			2.20	24.4
2,4-Dinitrophenol	0.0500	0.0258	0.0157	51.5	31.3	24.2-128		J3	48.8	20.5
2-Nitrophenol	0.0500	0.0447	0.0434	89.3	86.7	25.9-106			2.97	26.9
4-Nitrophenol	0.0500	0.0190	0.0153	38.0	30.6	10.0-52.7			21.7	40
Pentachlorophenol	0.0500	0.0392	0.0347	78.3	69.4	10.0-97.4			12.0	35.1
Phenol	0.0500	0.0200	0.0177	40.0	35.5	10.0-57.9			12.1	35
2,4,6-Trichlorophenol	0.0500	0.0452	0.0456	90.5	91.2	29.8-107			0.790	24.1
(S) Nitrobenzene-d5				84.3	87.2	21.8-123				
(S) 2-Fluorobiphenyl				86.0	90.9	29.5-131				



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138702-1 05/19/16 14:02 • (LCSD) R3138702-2 05/19/16 14:25

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
(S) p-Terphenyl-d14				96.1	98.8	29.3-137				
(S) Phenol-d5				37.7	32.4	5.00-70.1				
(S) 2-Fluorophenol				52.3	43.9	10.0-77.9				
(S) 2,4,6-Tribromophenol				88.7	88.5	11.2-130				

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



Method Blank (MB)

(MB) R3138667-3 05/20/16 10:56

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
4-Chloro-3-methylphenol	U		0.00477	0.333
2-Chlorophenol	U		0.00831	0.333
2,4-Dichlorophenol	U		0.00746	0.333
2,4-Dimethylphenol	U		0.0471	0.333
4,6-Dinitro-2-methylphenol	U		0.124	0.333
2,4-Dinitrophenol	U		0.0980	0.333
2-Nitrophenol	U		0.0130	0.333
4-Nitrophenol	U		0.0525	0.333
Pentachlorophenol	U		0.0480	0.333
Phenol	U		0.00695	0.333
2,4,6-Trichlorophenol	U		0.00779	0.333
(S) Nitrobenzene-d5	61.8			21.9-129
(S) 2-Fluorobiphenyl	61.7			34.9-129
(S) p-Terphenyl-d14	68.7			21.5-128
(S) Phenol-d5	70.1			26.3-121
(S) 2-Fluorophenol	64.2			21.1-116
(S) 2,4,6-Tribromophenol	52.9			21.6-142

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138667-1 05/20/16 10:08 • (LCSD) R3138667-2 05/20/16 10:32

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.667	0.451	0.496	67.7	74.4	51.1-113			9.51	20
2-Chlorophenol	0.667	0.345	0.432	51.7	64.8	40.8-103		J3	22.6	20
2,4-Dichlorophenol	0.667	0.452	0.451	67.8	67.5	46.2-109			0.350	20
2,4-Dimethylphenol	0.667	0.420	0.451	62.9	67.6	42.2-110			7.12	20
4,6-Dinitro-2-methylphenol	0.667	0.457	0.470	68.5	70.5	23.1-119			2.97	23.7
2,4-Dinitrophenol	0.667	0.430	0.404	64.5	60.6	10.0-105			6.29	36.5
2-Nitrophenol	0.667	0.421	0.463	63.1	69.4	44.2-113			9.50	20.9
4-Nitrophenol	0.667	0.393	0.365	58.9	54.7	34.8-109			7.41	20
Pentachlorophenol	0.667	0.517	0.487	77.5	73.0	16.2-102			5.87	22.9
Phenol	0.667	0.367	0.442	55.0	66.3	41.5-106			18.6	20
2,4,6-Trichlorophenol	0.667	0.512	0.479	76.8	71.8	44.4-108			6.68	20
(S) Nitrobenzene-d5				59.1	63.6	21.9-129				
(S) 2-Fluorobiphenyl				69.2	60.8	34.9-129				



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3138667-1 05/20/16 10:08 • (LCSD) R3138667-2 05/20/16 10:32

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
(S) p-Terphenyl-d14				65.8	64.2	21.5-128				
(S) Phenol-d5				56.0	67.8	26.3-121				
(S) 2-Fluorophenol				59.1	73.1	21.1-116				
(S) 2,4,6-Tribromophenol				57.7	55.4	21.6-142				

L835349-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L835349-02 05/20/16 13:46 • (MS) R3138667-4 05/20/16 14:10 • (MSD) R3138667-5 05/20/16 14:34

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
4-Chloro-3-methylphenol	0.767	U	0.592	0.713	77.2	93.1	1	27.0-154			18.6	26.6
2-Chlorophenol	0.767	U	0.450	0.513	58.8	67.0	1	33.2-121			13.1	29.3
2,4-Dichlorophenol	0.767	U	0.536	0.619	70.0	80.7	1	34.8-134			14.3	27.3
2,4-Dimethylphenol	0.767	U	0.502	0.634	65.4	82.8	1	12.3-149			23.4	32.3
4,6-Dinitro-2-methylphenol	0.767	U	0.558	0.641	72.8	83.6	1	10.0-144			13.8	32.7
2,4-Dinitrophenol	0.767	U	0.495	0.577	64.6	75.2	1	10.0-121			15.2	39.4
2-Nitrophenol	0.767	U	0.523	0.563	68.3	73.4	1	29.5-144			7.26	29.9
4-Nitrophenol	0.767	U	0.493	0.569	64.3	74.2	1	20.0-133			14.3	30.2
Pentachlorophenol	0.767	U	0.648	0.726	84.5	94.7	1	10.0-139			11.4	28.3
Phenol	0.767	U	0.581	0.646	75.8	84.3	1	25.1-130			10.6	29.6
2,4,6-Trichlorophenol	0.767	U	0.602	0.649	78.5	84.6	1	33.8-133			7.56	28.1
(S) Nitrobenzene-d5					67.5	80.4		21.9-129				
(S) 2-Fluorobiphenyl					59.8	65.2		34.9-129				
(S) p-Terphenyl-d14					47.5	54.0		21.5-128				
(S) Phenol-d5					63.4	68.3		26.3-121				
(S) 2-Fluorophenol					66.7	73.0		21.1-116				
(S) 2,4,6-Tribromophenol					68.4	64.6		21.6-142				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc



Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.

Qualifier Description

J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
V	The sample concentration is too high to evaluate accurate spike recoveries.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina ¹	DW21704
Florida	E87487	North Carolina ²	41
Georgia	NELAP	North Dakota	R-140
Georgia ¹	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky ¹	90010	South Dakota	n/a
Kentucky ²	16	Tennessee ¹⁴	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

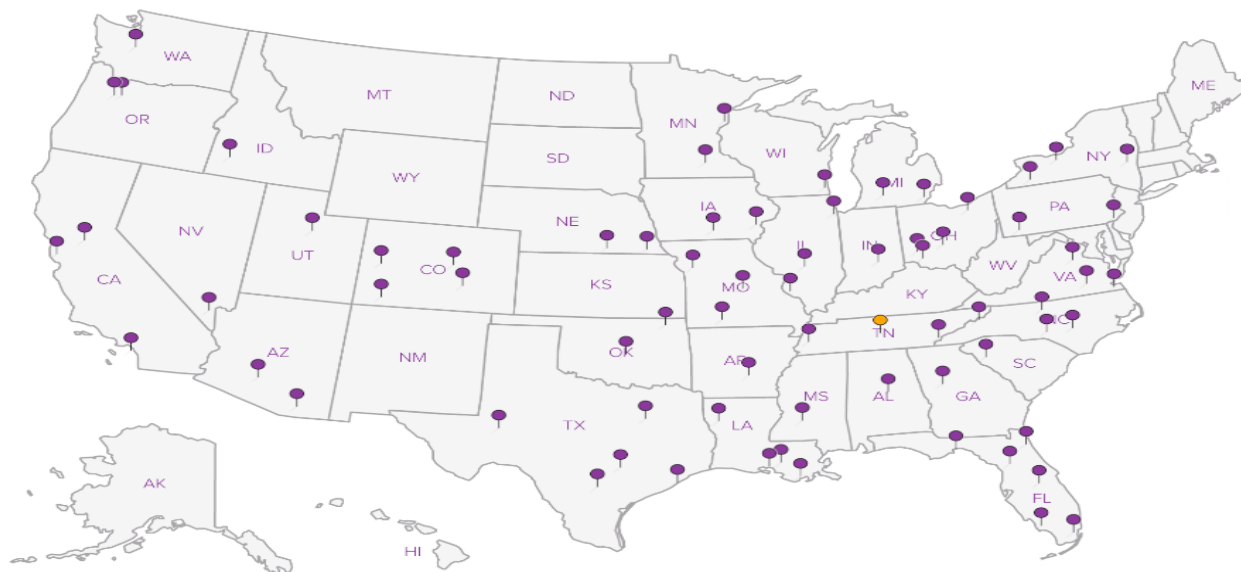
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ^{n/a} Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



AMEC Foster Wheeler - Houston, TX

585 N. Dairy Ashford
Houston, TX 77079

Billing Information:

Accounts Payable
585 N. Dairy Ashford
Houston, TX 77079

Email To: pamela.krueger@amecfw.com

Report to:
Pamela Krueger

Project: *WASTE WATER LINE*
Description: *Slurry Slinger Sump Investigation*

Phone: 713-929-5674
Fax:

Client Project #
6703160012.00

City/State
Collected:

Lab Project #
AMECFWHTX-SLURRY

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Rush? (Lab MUST Be Notified)
 ___ Same Day200%
 ___ Next Day100%
 ___ Two Day50%
 ___ Three Day25%

Date Results Needed

Email? ___ No ☒ Yes
FAX? ___ No ___ Yes

Immediately
Packed on Ice N ___ Y ___

No.
of
Cntrs

8270 100ml Amb NoPres

DROOROLVI 40mlAmb-HCl-BT

DRORLA,SV8270 40zClr-NoPres

GRO 40mlAmb HCl

GRO,V8260 20zClr-NoPres

Skinner's List Mtls. 250mlHDPE-HNO3

Skinner's List Mtls. 20zClr-NoPres

V8260 40mlAmb-HCl

V8260- Trip Blank 40mlAmb-HCl-Bik

Chain of Custody Page ___ of ___



YOUR LAB OF CHOICE

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859



L# *1835353*
1198

Acctnum: AMECFWHTX

Template: T112081

Prelogin: P552543

TSR: 526 - Chris McCord

PB: *5-4-10 KM*

Shipped Via: FedEx Ground

Rem./Contaminant Sample # (lab only)

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8270 100ml Amb NoPres	DROOROLVI 40mlAmb-HCl-BT	DRORLA,SV8270 40zClr-NoPres	GRO 40mlAmb HCl	GRO,V8260 20zClr-NoPres	Skinner's List Mtls. 250mlHDPE-HNO3	Skinner's List Mtls. 20zClr-NoPres	V8260 40mlAmb-HCl	V8260- Trip Blank 40mlAmb-HCl-Bik	Rem./Contaminant	Sample # (lab only)
		SS				3			X		X		X				
		SS				3			X		X		X				
		SS				3			X		X		X				
<i>TMW-WWL1</i>		GW		<i>5/12/16</i>	<i>8:30</i>	10	X	X		X		X		X			<i>-01</i>
<i>TMW-WWL2</i>		GW		<i>5/12/16</i>	<i>9:00</i>	10	X	X		X		X		X			<i>02</i>
<i>TMW-WWL2D</i>		GW		<i>5/12/16</i>	<i>9:05</i>	10	X	X		X		X		X			<i>03</i>
<i>TRIP Blank</i>		GW				1									X		<i>04</i>
<i>TRIP Blank</i>		GW				1									X		<i>05</i>
<i>TRIP Blank</i>		GW				1									X		

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other

Remarks: ** Pamela Krueger will call in analysis for WWL1 Soil Pit Composite Sample*

Relinquished by: (Signature) *[Signature]*

Date: *5/12/16*

Time: *11:00*

Received by: (Signature)

Samples returned via: ☐ UPS

☐ FedEx ☐ Courier ☐

Temp: °C Bottles Received:

2.6 *35*

Date: *5-12-16* Time: *9:00*

Relinquished by: (Signature)

Date:

Time:

Received by: (Signature)

Received for lab by: (Signature)

Date: Time:

Condition: (lab use only)

5-054

COC Seal Intact: ☒ Y ☐ N ☐ NA

pH Checked: NCF:

JW7
OK

ESC Lab Sciences Non-Conformance Form

Login #: L835353	Client: AMECFWHTX	Date: 5/13/16	Evaluated by: Jeremy
------------------	-------------------	---------------	----------------------

Non-Conformance (check applicable items)

Sample Integrity		Chain of Custody Clarification	
Parameter(s) past holding time	x	Login Clarification Needed	If Broken Container:
Improper temperature		Chain of custody is incomplete	Insufficient packing material around container
Improper container type		Please specify Metals requested.	Insufficient packing material inside cooler
Improper preservation		Please specify TCLP requested.	Improper handling by carrier (FedEx / UPS / Courier)
Insufficient sample volume.		Received additional samples not listed on coc.	Sample was frozen
Sample is biphasic.		Sample ids on containers do not match ids on coc	Container lid not intact
Vials received with headspace.		Trip Blank not received.	If no Chain of Custody:
Broken container		Client did not "X" analysis.	Received by:
Broken container:		Chain of Custody is missing	Date/Time:
Sufficient sample remains			Temp./Cont. Rec./pH:
			Carrier:
			Tracking#

Login Comments: Received a 125ml-NP for Anions for all TMW ID's not listed on COC.

Client informed by:	Call	Email	Voice Mail	Date:	Time:
TSR Initials: CM	Client Contact:				

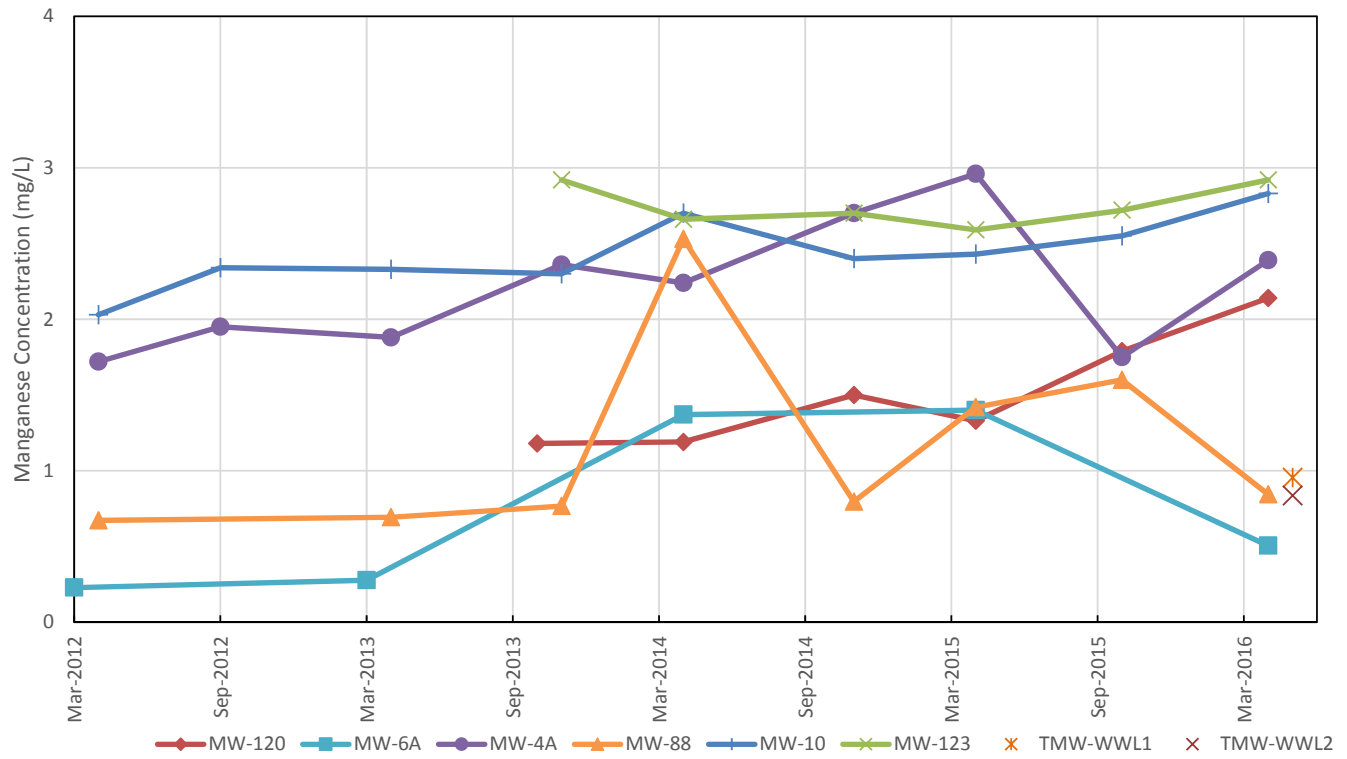
Login Instructions:

Log 125mL-NP for CHLORIDE, FLUORIDE and SULFATE.

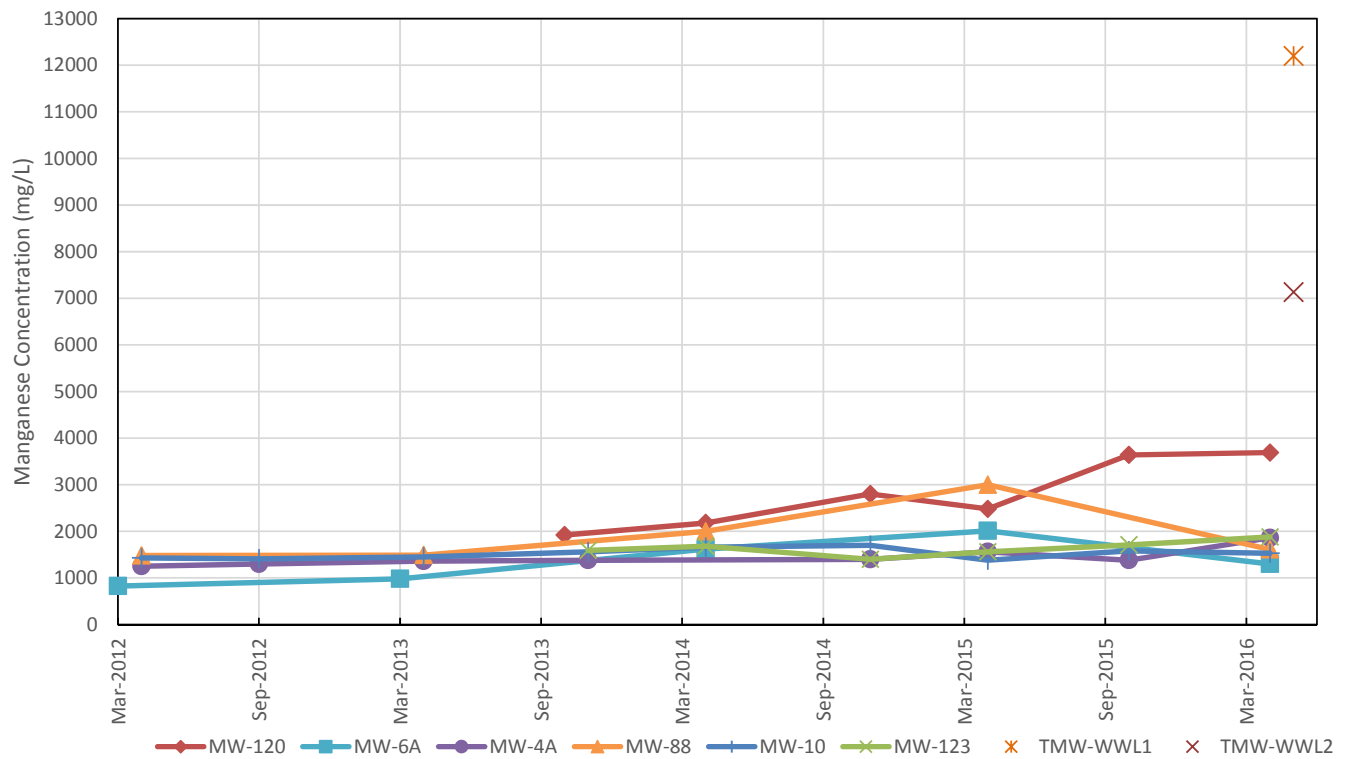
Also, change on all IDs: 8270 to 8270ACID; V8260 to V8260BTEX and only log metals FEICP and MNICP.

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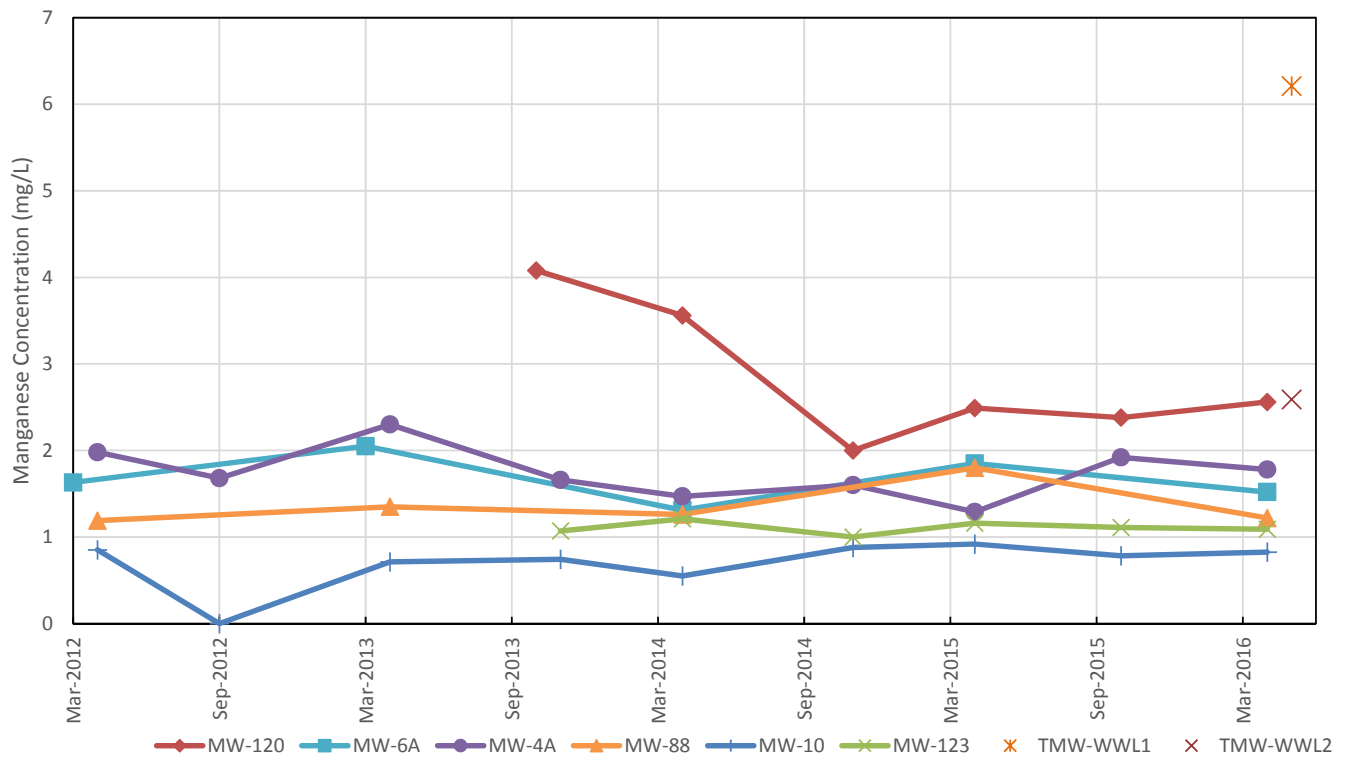
Manganese



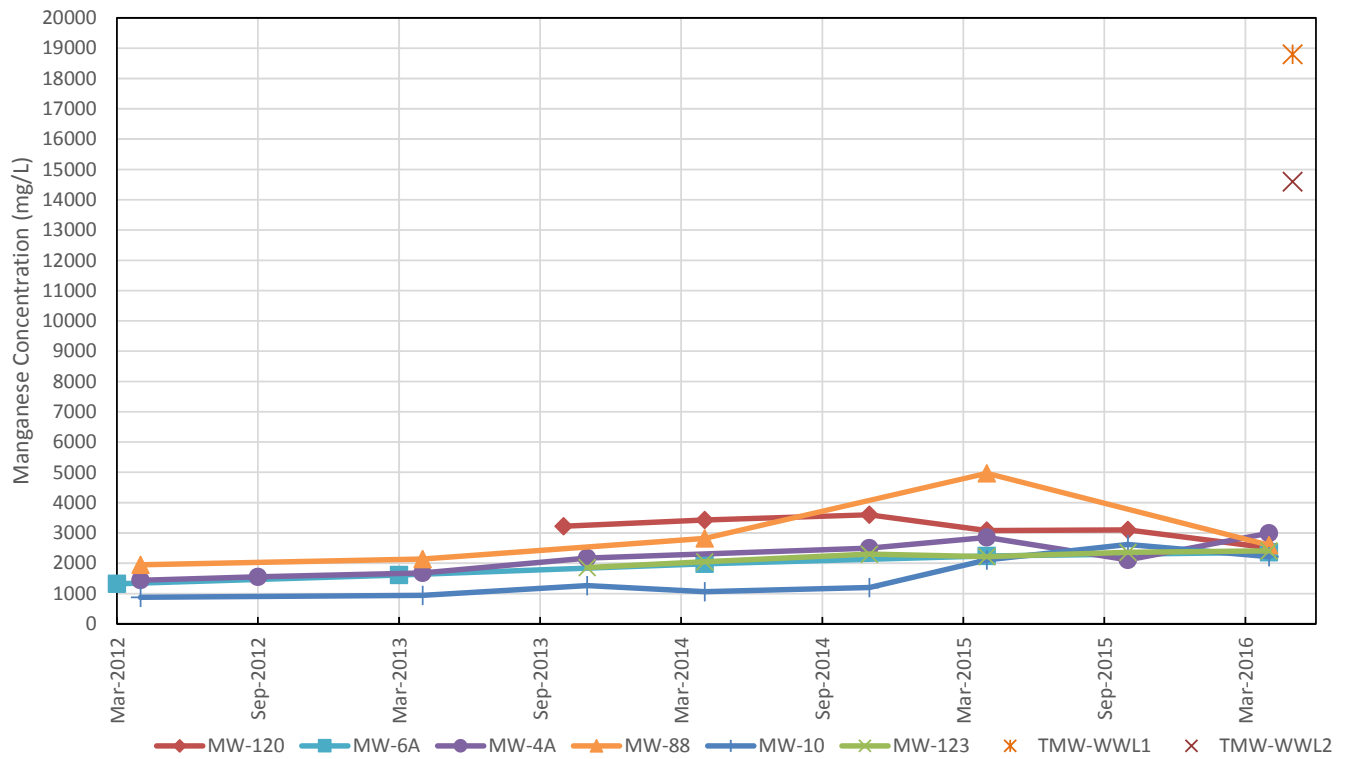
Chloride



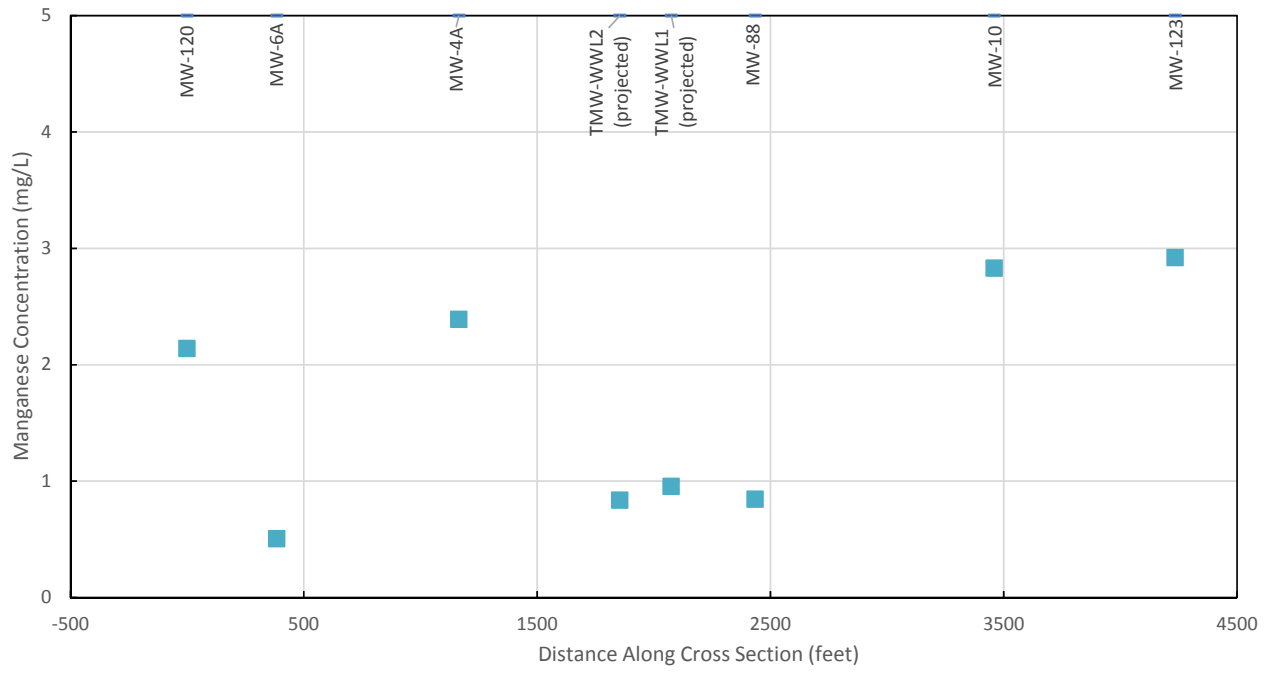
Fluoride



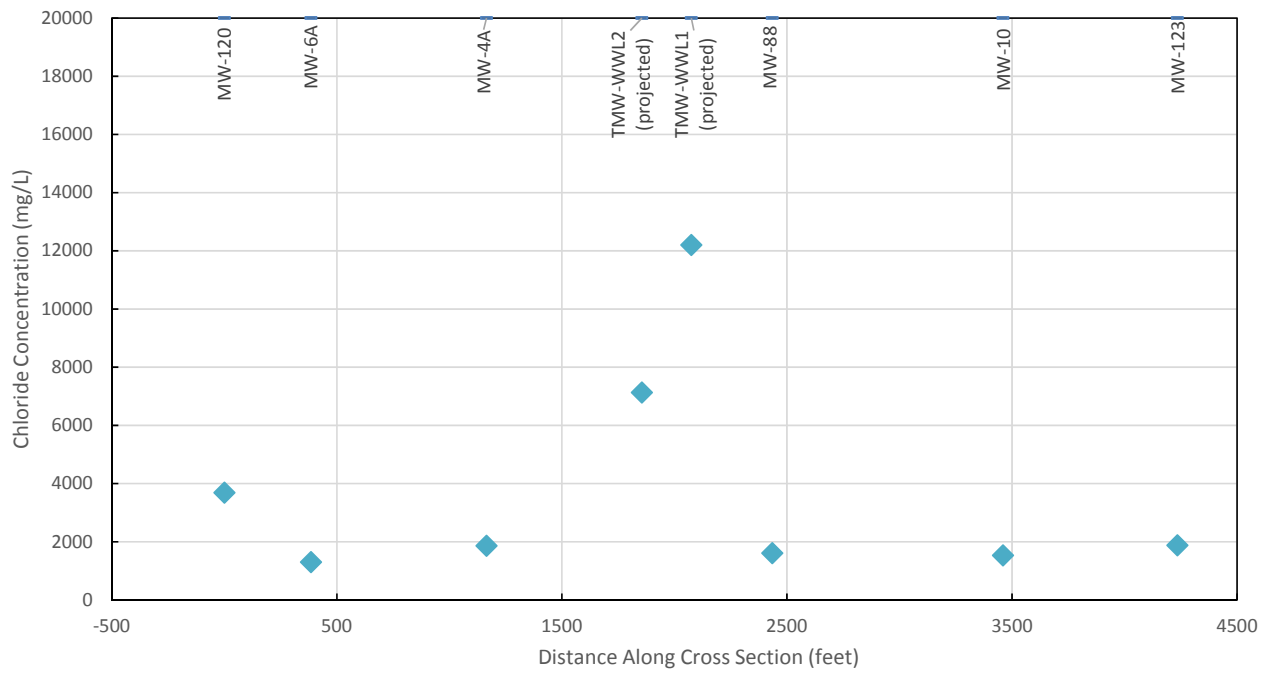
Sulfate



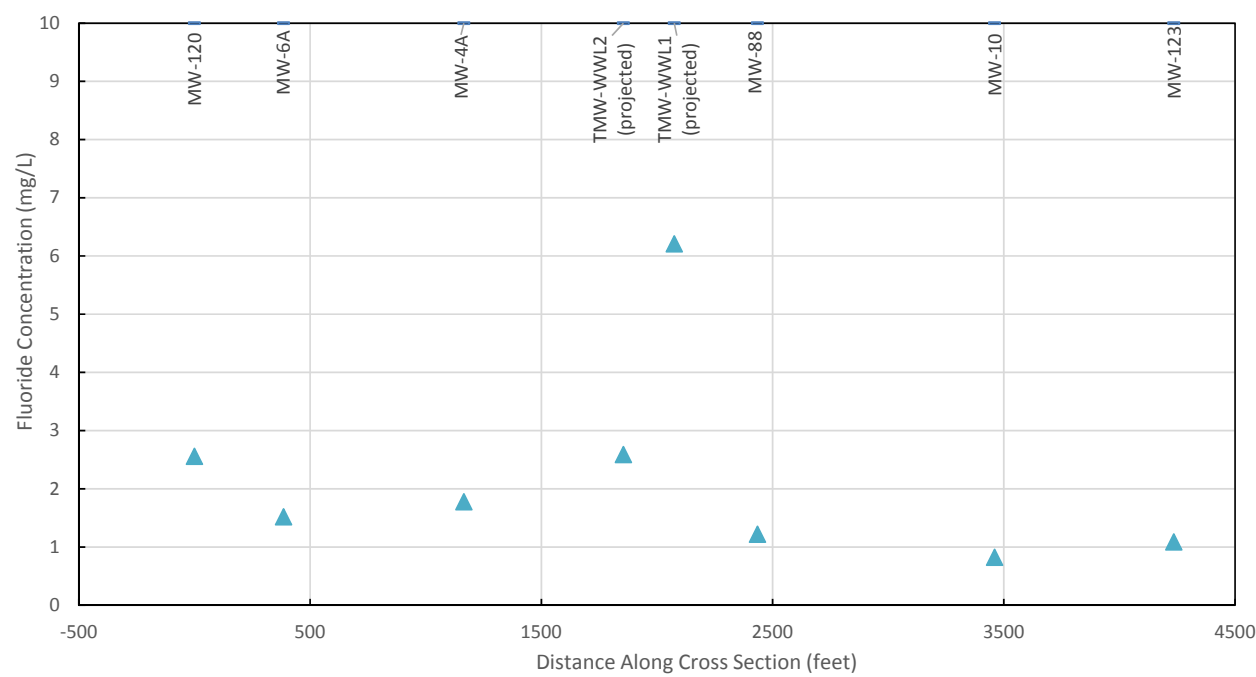
Manganese



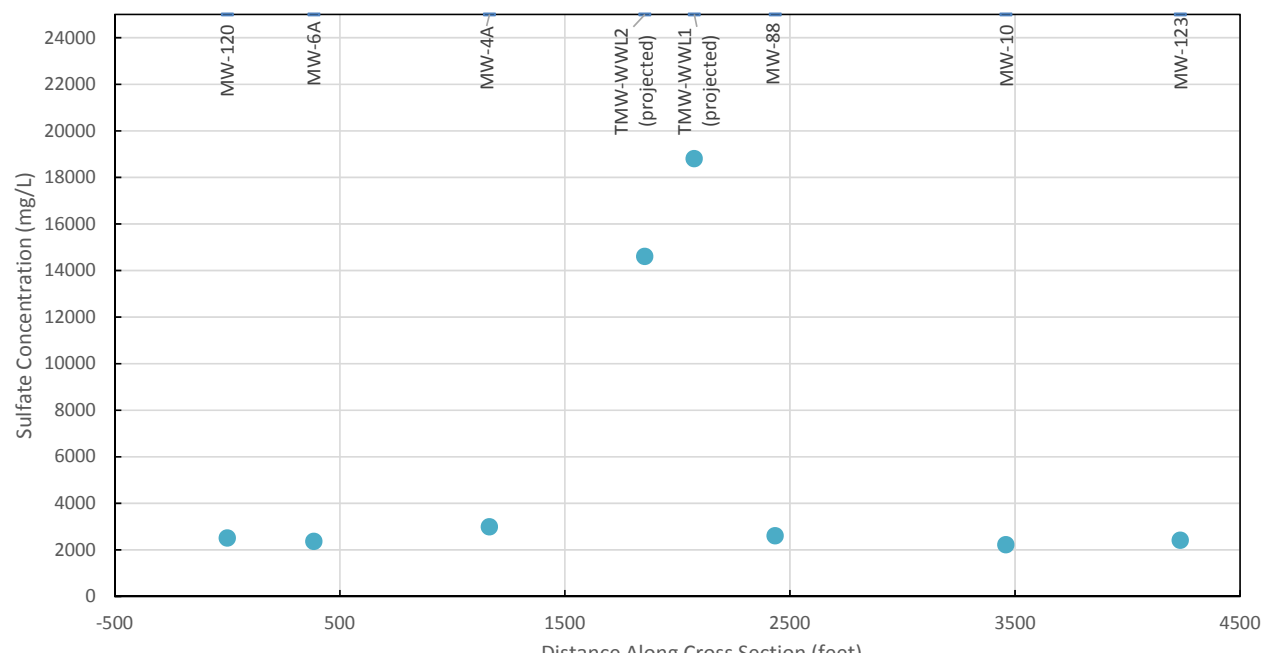
Chloride



Fluoride



Sulfate



Chavez, Carl J, EMNRD

From: Combs, Robert <Robert.Combs@HollyFrontier.com>
Sent: Thursday, June 11, 2015 3:46 PM
To: Chavez, Carl J, EMNRD
Cc: Tsinnajinnie, Leona, NMENV; Griswold, Jim, EMNRD; Denton, Scott
Subject: RE: Initial C-141 report - Effluent Pipeline Leak 2015-04-12
Attachments: 041215 effluent line release - Action Levels evaluation.pdf; ATT00001.txt

Carl,

In your response below (4/21/15), you recommend that Navajo develop a remediation plan to address the impacted area. We plan to excavate any impacted soil for off-site disposal, but would first like to determine, with OCD, the appropriate action levels for each analyte of concern. In 2013 as part of another investigation (Evaporation Ponds Phase IV Corrective Actions Investigation Report), Navajo performed a study to examine background concentrations (not impacted by refinery use of the area) of several metals and anions; please see the attached evaluation.

As with OCD, Navajo wants to address the impacted area through delineation and soil removal. In the interim, we have backfilled the area excavated for line repair with clean fill material purchased from an off-site source. We will characterize the remediation waste as well as the excavated material dispose of the material at an off-site facility.

Please let me know if you would like to discuss.

Thanks,
Robert

Robert Combs
Environmental Specialist
The HollyFrontier Companies
P.O. Box 159
Artesia, NM 88211-0159
office: 575-746-5382
cell: 575-308-2718
fax: 575-746-5451
Robert.Combs@hollyfrontier.com

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From: Chavez, Carl J, EMNRD [mailto:CarlJ.Chavez@state.nm.us]
Sent: Tuesday, April 21, 2015 9:36 AM
To: Combs, Robert
Cc: Tsinnajinnie, Leona, NMENV; Griswold, Jim, EMNRD
Subject: RE: Initial C-141 report - Effluent Pipeline Leak 2015-04-12

Robert:

Received. OCD wants to make sure this properly cleaned up.

This is high Chloride and Sulfate containing fluids with other parameters of concern. Please note the depth to GW and make sure in your CA that the release is properly investigated (i.e., characterization 500 mg/kg Chloride to delineate horiz./vertical extent of release) and OCD expects to receive a remediation plan for final CA.

Thank you.

Carl J. Chavez, CHMM

New Mexico Energy, Minerals & Natural Resources Department
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Drive, Santa Fe, New Mexico 87505
O: (505) 476-3490

E-mail: CarlJ.Chavez@State.NM.US

Web: <http://www.emnrd.state.nm.us/ocd/>

“Why Not Prevent Pollution; Minimize Waste; Reduce the Cost of Operations; & Move Forward With the Rest of the Nation?” To see how, please go to: “Pollution Prevention & Waste Minimization” at <http://www.emnrd.state.nm.us/ocd/environmental.htm#environmental>



From: Combs, Robert [<mailto:Robert.Combs@HollyFrontier.com>]
Sent: Friday, April 17, 2015 2:22 PM
To: Chavez, Carl J, EMNRD; Tsinnajinnie, Leona, NMENV
Cc: Denton, Scott; Schultz, Michele; Strange, Aaron
Subject: Initial C-141 report - Effluent Pipeline Leak 2015-04-12

Carl and Leona,

Please see the attached C-141 form regarding the effluent pipeline leak on 4/12/15. A Final C-141 form will be prepared once all field activities are complete.

Please contact me for any questions.

Thanks,
Robert

Robert Combs

Environmental Specialist
The HollyFrontier Companies
P.O. Box 159
Artesia, NM 88211-0159
office: 575-746-5382
cell: 575-308-2718
fax: 575-746-5451
Robert.Combs@hollyfrontier.com

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Mr. Scott Denton
Environmental Manager
Navajo Refining Company, LLC
501 East Main
Artesia, New Mexico 88211

ARCADIS U.S., Inc.
2929 Briarpark Drive
Suite 300
Houston
Texas 77042
Tel 713 953 4800
Fax 713 977 4620
www.arcadis-us.com

Subject:

Potential Soil Response Action Levels for Wastewater Pipeline Break near the
Evaporation Ponds Area, Navajo Refining Company Artesia Refinery

ENVIRONMENT

Dear Mr. Denton:

Date:
June 11, 2015

ARCADIS is providing this letter discussing potential soil response action levels in relation to the reported release of wastewater that occurred south of the inactive former Evaporation Ponds (EPs) associated with the Navajo Refining Company, L.L.C. (NRC) Artesia Refinery (Refinery). It is our understanding that the release occurred due to a break in the pipeline that conveys treated wastewater from the Refinery to injection wells located approximately 12 miles east of the Refinery. The break occurred approximately one-half mile south of the southwestern corner of the EPs (Figure 1).

Contact:
Pamela R. Krueger

Phone:
713.953.4816

Email:
pam.krueger@arcadis-us.com

The wastewater that is conveyed through the pipeline is sampled quarterly and analyzed for waste characterization purposes. A copy of the most recent wastewater analytical report is provided in Attachment 1 to this letter. The sample was analyzed for total metals, anions, cations, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), corrosivity, reactivity, ignitability, specific conductance, specific gravity, total dissolved solids (TDS), and pH. In addition, the sample was analyzed for eight metals using the toxicity characteristic leaching procedure (TCLP).

Our ref:
TX001155

The analytical results indicate that the wastewater is not corrosive, not reactive, not ignitable, not toxic (no TCLP metals detected), and contains no VOCs above the New Mexico Water Quality Control Commission (WQCC) standards. The following compounds were reported above the WQCC standards:

- Phenol was reported at 0.0081 mg/L, above the WQCC standard of 0.005mg/L
- Iron was reported at 3.7 mg/L, above the WQCC standard of 1.0 mg/L
- Manganese was reported at 0.25 mg/L, above the WQCC standard of 0.2 mg/L
- Chloride was reported at 300 mg/L, above the WQCC standard of 250 mg/L

Imagine the result

- Fluoride was reported at 11 mg/L, above the WQCC standard of 1.6 mg/L
- Sulfate was reported at 2,100 mg/L, above the WQCC standard of 600 mg/L
- TDS was reported at 3,710 mg/L, above the WQCC standard of 1,000 mg/L

ARCADIS understands that the New Mexico Energy, Minerals and Natural Resources Department Oil Conservation Division (OCD) requested that a soil investigation and remediation be performed, focused on chloride and sulfate.

Although the wastewater sample analytical results do exceed the WQCC standards for water quality parameters, including chloride, it should be noted that the area in which the release occurred is known to have elevated chloride concentrations, along with other cations, anions and total metals. In 2013, as part of the Phase IV Corrective Action Investigation of the EPs, ARCADIS collected soil samples from 12 soil borings and analyzed the samples for thirteen total metals and for three anions, including chloride, fluoride, and sulfate. A statistical evaluation of the background soil sample results was performed to determine an appropriate upper tolerance limit (UTL) for the data obtained. A copy of the statistical evaluation memo is provided as Attachment 2 to this letter, including a table with a summary of the UTLs calculated for each parameter evaluated.

Figure 1 shows the locations of the background soil samples collected in 2013. The borings were located on both sides of the Pecos River, in locations both to the east and west of the EPs. These areas were selected based on their proximity to the EPs, yet outside the area of potential impacts from the operation of the EPs. Thus, these soil borings were considered representative of the native conditions of soil in the vicinity of the EPs. As a result, it would be appropriate to use the UTLs from this background soil study as alternative action levels for screening potential impacts from the wastewater line release.

It is our recommendation that soil samples be collected from either side of the excavation that was performed to repair the wastewater pipeline, within approximately 15 feet of the location of the break. Soil samples should be collected from the surface and from a depth corresponding with the bottom of the pipeline. The samples should be analyzed for the following:

- Total Petroleum Hydrocarbons (TPH):
 - Gasoline Range Organics (GRO)
 - Diesel Range Organics (DRO)
- Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)

- Chloride
- Fluoride
- Sulfate
- Iron
- Manganese
- Phenol

The analytical results should be compared to the calculated background UTL (chloride, fluoride, sulfate, iron, and manganese). For parameters that do not have a calculated background UTL, the analytical results should be compared to the lower of the residential or soil-leaching-to-groundwater soil screening levels (SSLs). Table 1 presents the proposed screening values for the analytical suite. If any of the soil results exceed these screening levels, then additional delineation may be warranted.

Should you have any questions or comments, please feel free to contact me at 713.953.4816.

Sincerely,

ARCADIS U.S., Inc.



Pamela R. Krueger
Principal-in-Charge

Enclosures:

Figure 1

Table 1

Attachment 1: Wastewater Analytical Report

Attachment 2: EP Background Soil Statistical Evaluation Memo

Table

Table 1
Proposed Action Levels for Soil Delineation
Wastewater Line Leak, Artesia, NM

Parameter	Background UTL (mg/kg)	Residential SSL (mg/kg)	DAF 20 SSL (mg/kg)
TPH GRO	--	--	--
TPH DRO	--	1000	--
Benzene	--	1.78E+01	3.80E-02
Ethylbenzene	--	7.51E+01	2.62E-01
Toluene	--	5.23E+03	1.21E+01
Xylenes	--	8.71E+02	2.98E+00
Chloride	5264	--	--
Fluoride	17.9	--	--
Sulfate	9336	--	--
Iron	17344	--	--
Manganese	488	--	--
Phenol	--	1.85E+04	5.23E+01

DAF 20 = dilution attenuation factor of 20

DRO = diesel range organics

GRO = gasoline range organics

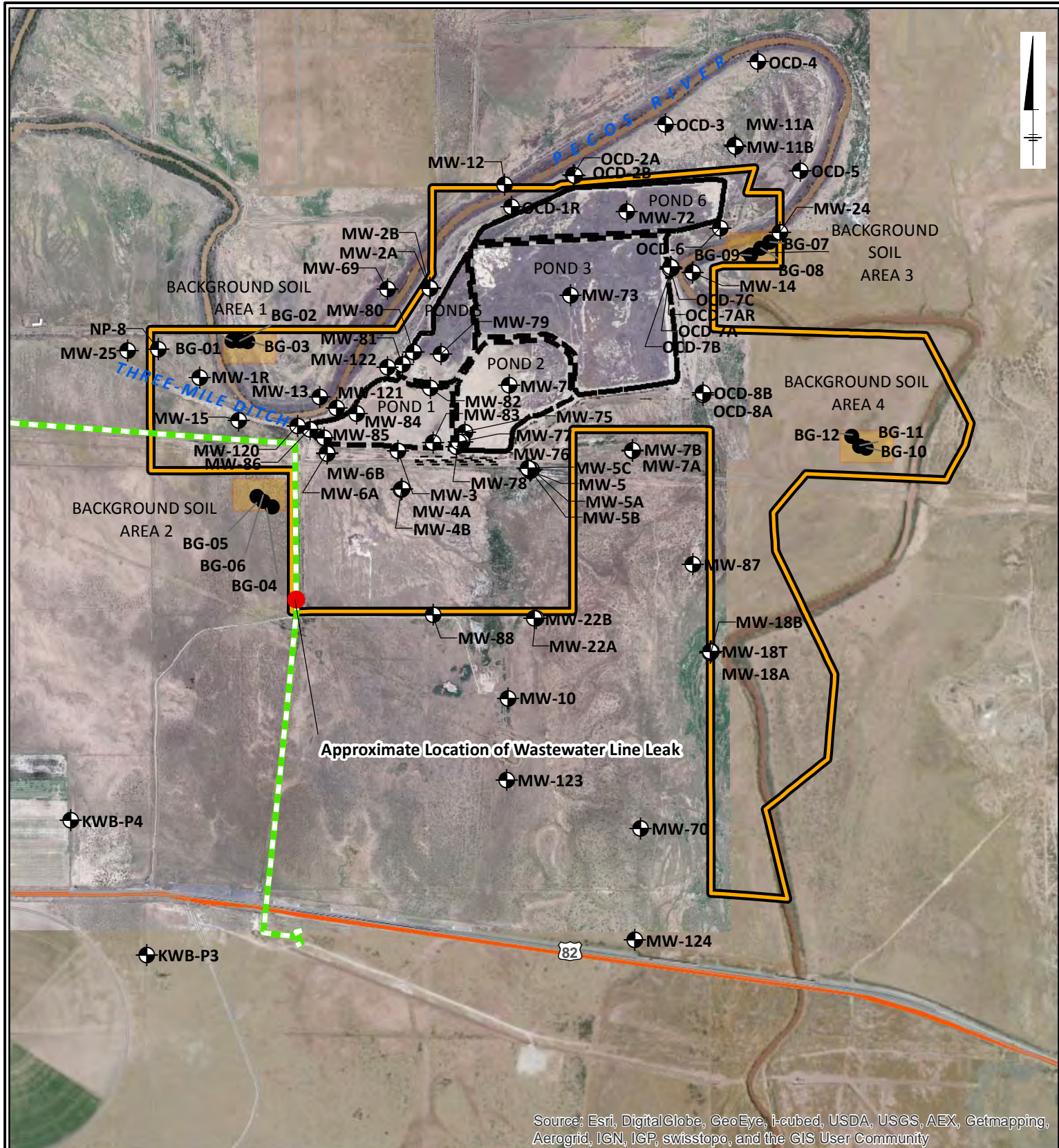
mg/kg = milligrams per kilogram

SSL = soil screening level

TPH = total petroleum hydrocarbons

UTL = upper tolerance limit

Figure



LEGEND

- EXISTING MONITORING WELLS
- BACKGROUND SOIL SAMPLES
- WASTE WATER
- APPROXIMATE PIPELINE LOCATION
- POND BOUNDARIES
- NAVAJO PROPERTY BOUNDARY
- PHASE IV BACKGROUND SAMPLE LOCATION

NAVAJO REFINING COMPANY
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

APPROXIMATE LOCATION OF WASTEWATER LINE LEAK



FIGURE

1



Attachment 1

Wastewater Analytical Report



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

March 25, 2015

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

RE: Quarterly WDW-1, 2, &3 Inj Well

OrderNo.: 1502959

Dear Dan Crawford:

Hall Environmental Analysis Laboratory received 2 sample(s) on 2/24/2015 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,

A handwritten signature in black ink, appearing to read 'Andy Freeman', is written over a horizontal line.

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109



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

Case Narrative

WO#: 1502959
Date: 3/25/2015

CLIENT: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

The following compounds were also scanned for by NIST library search and not detected. The detection level for these compounds would be ~10ppb:

Allyl alcohol
t-amyl ethyl ether
Bis(2-chloroethyl)sulfide
Bromoacetone
Chloral hydrate
1-chlorobutane
1-chlorohexane
2-chloroethanol
Crotonaldehyde
Cis-1,4-Dichloro-2butene
1,3-Dichloro-2-propanol
1,2,3,4-Depoxybutane
Ethanol
Ethylene oxide
Malonitrile
Methanol
Methyl acrylate
2-Nitropropane
Paraldehyde
Pentafluorobenzene
2-Pentanone
2-picoline
1-propanol
2-propanol
Propargyl alcohol
Beta-propiolactone
n-propylamine

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1502959**

Date Reported: **3/25/2015**

CLIENT: Navajo Refining Company

Client Sample ID: WDW-1,2,&3 Effluent

Project: Quarterly WDW-1, 2, &3 Inj Well

Collection Date: 2/23/2015 8:30:00 AM

Lab ID: 1502959-001

Matrix: AQUEOUS

Received Date: 2/24/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 300.0: ANIONS							Analyst: LGT
Fluoride	11	5.0	*	mg/L	50	2/24/2015 11:37:59 PM	R24502
Chloride	300	25		mg/L	50	2/24/2015 11:37:59 PM	R24502
Nitrogen, Nitrite (As N)	ND	0.50		mg/L	5	2/24/2015 11:25:35 PM	R24502
Bromide	1.1	0.50		mg/L	5	2/24/2015 11:25:35 PM	R24502
Nitrogen, Nitrate (As N)	ND	0.50		mg/L	5	2/24/2015 11:25:35 PM	R24502
Phosphorus, Orthophosphate (As P)	ND	2.5		mg/L	5	2/24/2015 11:25:35 PM	R24502
Sulfate	2100	25		mg/L	50	2/24/2015 11:37:59 PM	R24502
EPA METHOD 7470: MERCURY							Analyst: MED
Mercury	ND	0.00020		mg/L	1	2/26/2015 9:31:31 AM	17887
MERCURY, TCLP							Analyst: MED
Mercury	ND	0.020		mg/L	1	3/10/2015 8:26:24 AM	18037
EPA METHOD 6010B: TCLP METALS							Analyst: ELS
Arsenic	ND	5.0		mg/L	1	3/7/2015 2:01:03 PM	18024
Barium	ND	100		mg/L	1	3/7/2015 2:01:03 PM	18024
Cadmium	ND	1.0		mg/L	1	3/7/2015 2:01:03 PM	18024
Chromium	ND	5.0		mg/L	1	3/7/2015 2:01:03 PM	18024
Lead	ND	5.0		mg/L	1	3/7/2015 2:01:03 PM	18024
Selenium	ND	1.0		mg/L	1	3/7/2015 2:01:03 PM	18024
Silver	ND	5.0		mg/L	1	3/7/2015 2:01:03 PM	18024
EPA 6010B: TOTAL METALS							Analyst: ELS
Aluminum	2.0	0.020		mg/L	1	3/7/2015 1:56:58 PM	18024
Antimony	ND	0.050		mg/L	1	3/7/2015 1:56:58 PM	18024
Arsenic	0.029	0.020		mg/L	1	3/7/2015 1:56:58 PM	18024
Barium	ND	0.020		mg/L	1	3/7/2015 1:56:58 PM	18024
Beryllium	ND	0.0030		mg/L	1	3/7/2015 1:56:58 PM	18024
Cadmium	ND	0.0020		mg/L	1	3/7/2015 1:56:58 PM	18024
Calcium	85	1.0		mg/L	1	3/10/2015 12:46:11 PM	18050
Chromium	ND	0.0060		mg/L	1	3/7/2015 1:56:58 PM	18024
Cobalt	ND	0.0060		mg/L	1	3/7/2015 1:56:58 PM	18024
Copper	0.0068	0.0060		mg/L	1	3/7/2015 1:56:58 PM	18024
Iron	3.7	0.050		mg/L	1	3/7/2015 1:56:58 PM	18024
Lead	ND	0.0050		mg/L	1	3/7/2015 1:56:58 PM	18024
Magnesium	26	1.0		mg/L	1	3/10/2015 12:46:11 PM	18050
Manganese	0.25	0.0020		mg/L	1	3/7/2015 1:56:58 PM	18024
Nickel	0.035	0.010		mg/L	1	3/7/2015 1:56:58 PM	18024
Potassium	35	1.0		mg/L	1	3/10/2015 12:46:11 PM	18050
Selenium	ND	0.050		mg/L	1	3/7/2015 1:56:58 PM	18024

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
	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
	O RSD is greater than RSDlimit	P Sample pH Not In Range
	R RPD outside accepted recovery limits	RL Reporting Detection Limit
	S Spike Recovery outside accepted recovery limits	

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1502959

Date Reported: 3/25/2015

CLIENT: Navajo Refining Company

Client Sample ID: WDW-1,2,&3 Effluent

Project: Quarterly WDW-1, 2, &3 Inj Well

Collection Date: 2/23/2015 8:30:00 AM

Lab ID: 1502959-001

Matrix: AQUEOUS

Received Date: 2/24/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA 6010B: TOTAL METALS							Analyst: ELS
Silver	ND	0.0050		mg/L	1	3/7/2015 1:56:58 PM	18024
Sodium	1300	20		mg/L	20	3/10/2015 12:51:05 PM	18050
Thallium	ND	0.050		mg/L	1	3/7/2015 1:56:58 PM	18024
Vanadium	ND	0.050		mg/L	1	3/7/2015 1:56:58 PM	18024
Zinc	0.064	0.020		mg/L	1	3/7/2015 1:56:58 PM	18024
EPA METHOD 8260B: VOLATILES							Analyst: SUB
Acetonitrile	ND	5.0		µg/L	1	3/3/2015	R24992
Allyl chloride	ND	0.50		µg/L	1	3/3/2015	R24992
Chloroprene	ND	0.50		µg/L	1	3/3/2015	R24992
Cyclohexane	ND	0.50		µg/L	1	3/3/2015	R24992
Diethyl ether	ND	0.50		µg/L	1	3/3/2015	R24992
Diisopropyl ether	ND	0.50		µg/L	1	3/3/2015	R24992
Epichlorohydrin	ND	5.0		µg/L	1	3/3/2015	R24992
Ethyl acetate	ND	0.50		µg/L	1	3/3/2015	R24992
Ethyl methacrylate	ND	2.5		µg/L	1	3/3/2015	R24992
Ethyl tert-butyl ether	ND	0.50		µg/L	1	3/3/2015	R24992
Freon-113	ND	0.50		µg/L	1	3/3/2015	R24992
Isobutanol	ND	50		µg/L	1	3/3/2015	R24992
Isopropyl acetate	ND	0.50		µg/L	1	3/3/2015	R24992
Methacrylonitrile	ND	5.0		µg/L	1	3/3/2015	R24992
Methyl acetate	ND	0.50		µg/L	1	3/3/2015	R24992
Methyl ethyl ketone	ND	2.5		µg/L	1	3/3/2015	R24992
Methyl isobutyl ketone	ND	2.5		µg/L	1	3/3/2015	R24992
Methyl methacrylate	ND	2.5		µg/L	1	3/3/2015	R24992
Methylcyclohexane	ND	1.0		µg/L	1	3/3/2015	R24992
n-Amyl acetate	ND	0.50		µg/L	1	3/3/2015	R24992
n-Hexane	ND	1.0		µg/L	1	3/3/2015	R24992
Nitrobenzene	ND	5.0		µg/L	1	3/3/2015	R24992
Pentachloroethane	ND	5.0		µg/L	1	3/3/2015	R24992
p-isopropyltoluene	1.4	0.50		µg/L	1	3/3/2015	R24992
Propionitrile	ND	5.0		µg/L	1	3/3/2015	R24992
Tetrahydrofuran	ND	0.50		µg/L	1	3/3/2015	R24992
Benzene	ND	0.50		µg/L	1	3/3/2015	R24992
Toluene	ND	0.50		µg/L	1	3/3/2015	R24992
Ethylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Methyl tert-butyl ether (MTBE)	ND	10		µg/L	1	3/3/2015	R24992
1,2,4-Trimethylbenzene	2.8	0.50		µg/L	1	3/3/2015	R24992
1,3,5-Trimethylbenzene	2.7	0.50		µg/L	1	3/3/2015	R24992
1,2-Dichloroethane (EDC)	ND	0.50		µg/L	1	3/3/2015	R24992

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
	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
	O	RSD is greater than RSDlimit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	Spike Recovery outside accepted recovery limits		

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1502959**

Date Reported: **3/25/2015**

CLIENT: Navajo Refining Company

Client Sample ID: WDW-1,2,&3 Effluent

Project: Quarterly WDW-1, 2, &3 Inj Well

Collection Date: 2/23/2015 8:30:00 AM

Lab ID: 1502959-001

Matrix: AQUEOUS

Received Date: 2/24/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
1,2-Dibromoethane (EDB)	ND	0.50		µg/L	1	3/3/2015	R24992
Naphthalene	ND	0.50		µg/L	1	3/3/2015	R24992
Acetone	57	2.5		µg/L	1	3/3/2015	R24992
Bromobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Bromodichloromethane	ND	0.50		µg/L	1	3/3/2015	R24992
Bromoform	ND	0.50		µg/L	1	3/3/2015	R24992
Bromomethane	ND	0.50		µg/L	1	3/3/2015	R24992
Carbon disulfide	0.53	0.50		µg/L	1	3/3/2015	R24992
Carbon Tetrachloride	ND	0.50		µg/L	1	3/3/2015	R24992
Chlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Chloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
Chloroform	ND	0.50		µg/L	1	3/3/2015	R24992
Chloromethane	ND	0.50		µg/L	1	3/3/2015	R24992
2-Chlorotoluene	ND	0.50		µg/L	1	3/3/2015	R24992
4-Chlorotoluene	ND	0.50		µg/L	1	3/3/2015	R24992
cis-1,2-DCE	ND	0.50		µg/L	1	3/3/2015	R24992
cis-1,3-Dichloropropene	ND	0.50		µg/L	1	3/3/2015	R24992
1,2-Dibromo-3-chloropropane	ND	0.50		µg/L	1	3/3/2015	R24992
Dibromochloromethane	ND	0.50		µg/L	1	3/3/2015	R24992
Dibromomethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,2-Dichlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
1,3-Dichlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
1,4-Dichlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Dichlorodifluoromethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,1-Dichloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,1-Dichloroethene	ND	0.50		µg/L	1	3/3/2015	R24992
1,2-Dichloropropane	ND	0.50		µg/L	1	3/3/2015	R24992
1,3-Dichloropropane	ND	0.50		µg/L	1	3/3/2015	R24992
2,2-Dichloropropane	ND	0.50		µg/L	1	3/3/2015	R24992
1,1-Dichloropropene	ND	0.50		µg/L	1	3/3/2015	R24992
Hexachlorobutadiene	ND	0.50		µg/L	1	3/3/2015	R24992
2-Hexanone	ND	0.50		µg/L	1	3/3/2015	R24992
Isopropylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Methylene Chloride	ND	2.5		µg/L	1	3/3/2015	R24992
n-Butylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
n-Propylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
sec-Butylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Styrene	ND	0.50		µg/L	1	3/3/2015	R24992
tert-Butylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992

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	Page 4 of 25
	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	
	O	RSD is greater than RSDlimit	P	Sample pH Not In Range	
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit	
	S	Spike Recovery outside accepted recovery limits			

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1502959**

Date Reported: **3/25/2015**

CLIENT: Navajo Refining Company

Client Sample ID: WDW-1,2,&3 Effluent

Project: Quarterly WDW-1, 2, &3 Inj Well

Collection Date: 2/23/2015 8:30:00 AM

Lab ID: 1502959-001

Matrix: AQUEOUS

Received Date: 2/24/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
1,1,1,2-Tetrachloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,1,2,2-Tetrachloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
Tetrachloroethene (PCE)	ND	0.50		µg/L	1	3/3/2015	R24992
trans-1,2-DCE	ND	0.50		µg/L	1	3/3/2015	R24992
trans-1,3-Dichloropropene	ND	0.50		µg/L	1	3/3/2015	R24992
1,2,3-Trichlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
1,2,4-Trichlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
1,1,1-Trichloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,1,2-Trichloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
Trichloroethene (TCE)	ND	0.50		µg/L	1	3/3/2015	R24992
Trichlorofluoromethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,2,3-Trichloropropane	ND	0.50		µg/L	1	3/3/2015	R24992
Vinyl chloride	ND	0.50		µg/L	1	3/3/2015	R24992
mp-Xylenes	2.4	1.0		µg/L	1	3/3/2015	R24992
o-Xylene	1.7	0.50		µg/L	1	3/3/2015	R24992
tert-Amyl methyl ether	ND	0.50		µg/L	1	3/3/2015	R24992
tert-Butyl alcohol	21	10		µg/L	1	3/3/2015	R24992
Acrolein	ND	0.50		µg/L	1	3/3/2015	R24992
Acrylonitrile	ND	0.50		µg/L	1	3/3/2015	R24992
Bromochloromethane	ND	0.50		µg/L	1	3/3/2015	R24992
2-Chloroethyl vinyl ether	ND	0.50		µg/L	1	3/3/2015	R24992
Iodomethane	ND	0.50		µg/L	1	3/3/2015	R24992
trans-1,4-Dichloro-2-butene	ND	0.50		µg/L	1	3/3/2015	R24992
Vinyl acetate	ND	0.50		µg/L	1	3/3/2015	R24992
1,4-Dioxane	ND	20		µg/L	1	3/3/2015	R24992
Surr: 1,2-Dichlorobenzene-d4	110	70-130		%REC	1	3/3/2015	R24992
Surr: 4-Bromofluorobenzene	100	70-130		%REC	1	3/3/2015	R24992
Surr: Toluene-d8	99.6	70-130		%REC	1	3/3/2015	R24992
EPA 8270C: SEMIVOLATILES/MOD							Analyst: SUB
1,1-Biphenyl	ND	5.0		µg/L	1	3/2/2015	R24992
Atrazine	ND	5.0		µg/L	1	3/2/2015	R24992
Benzaldehyde	ND	5.0		µg/L	1	3/2/2015	R24992
Caprolactam	ND	5.0		µg/L	1	3/2/2015	R24992
N-Nitroso-di-n-butylamine	ND	5.0		µg/L	1	3/2/2015	R24992
Acetophenone	ND	10		µg/L	1	3/2/2015	R24992
1-Methylnaphthalene	ND	10		µg/L	1	3/2/2015	R24992
2,3,4,6-Tetrachlorophenol	ND	10		µg/L	1	3/2/2015	R24992
2,4,5-Trichlorophenol	ND	10		µg/L	1	3/2/2015	R24992
2,4,6-Trichlorophenol	ND	10		µg/L	1	3/2/2015	R24992

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	Page 5 of 25
	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	
	O	RSD is greater than RSDlimit	P	Sample pH Not In Range	
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit	
	S	Spike Recovery outside accepted recovery limits			

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 1502959

Date Reported: 3/25/2015

CLIENT: Navajo Refining Company

Client Sample ID: WDW-1,2,&3 Effluent

Project: Quarterly WDW-1, 2, &3 Inj Well

Collection Date: 2/23/2015 8:30:00 AM

Lab ID: 1502959-001

Matrix: AQUEOUS

Received Date: 2/24/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA 8270C: SEMIVOLATILES/MOD							Analyst: SUB
2,4-Dichlorophenol	ND	10		µg/L	1	3/2/2015	R24992
2,4-Dimethylphenol	710	10		µg/L	1	3/2/2015	R24992
2,4-Dinitrophenol	ND	10		µg/L	1	3/2/2015	R24992
2,4-Dinitrotoluene	ND	10		µg/L	1	3/2/2015	R24992
2,6-Dinitrotoluene	ND	10		µg/L	1	3/2/2015	R24992
2-Chloronaphthalene	ND	10		µg/L	1	3/2/2015	R24992
2-Chlorophenol	ND	10		µg/L	1	3/2/2015	R24992
2-Methylnaphthalene	ND	10		µg/L	1	3/2/2015	R24992
2-Methylphenol	480	10		µg/L	1	3/2/2015	R24992
2-Nitroaniline	ND	10		µg/L	1	3/2/2015	R24992
2-Nitrophenol	ND	10		µg/L	1	3/2/2015	R24992
3,3'-Dichlorobenzidine	ND	10		µg/L	1	3/2/2015	R24992
3-Nitroaniline	ND	10		µg/L	1	3/2/2015	R24992
4,6-Dinitro-2-methylphenol	ND	10		µg/L	1	3/2/2015	R24992
4-Bromophenyl phenyl ether	ND	10		µg/L	1	3/2/2015	R24992
4-Chloro-3-methylphenol	ND	5.0		µg/L	1	3/2/2015	R24992
4-Chloroaniline	ND	10		µg/L	1	3/2/2015	R24992
4-Chlorophenyl phenyl ether	ND	10		µg/L	1	3/2/2015	R24992
4-Nitroaniline	ND	10		µg/L	1	3/2/2015	R24992
4-Nitrophenol	ND	10		µg/L	1	3/2/2015	R24992
Acenaphthene	ND	10		µg/L	1	3/2/2015	R24992
Acenaphthylene	ND	10		µg/L	1	3/2/2015	R24992
Anthracene	ND	10		µg/L	1	3/2/2015	R24992
Benzo(g,h,i)perylene	ND	10		µg/L	1	3/2/2015	R24992
Benz(a)anthracene	ND	0.10		µg/L	1	3/2/2015	R24992
Benzo(a)pyrene	ND	0.10		µg/L	1	3/2/2015	R24992
Benzo(b)fluoranthene	ND	0.10		µg/L	1	3/2/2015	R24992
Benzo(k)fluoranthene	ND	0.10		µg/L	1	3/2/2015	R24992
Bis(2-chloroethoxy)methane	ND	10		µg/L	1	3/2/2015	R24992
Bis(2-chloroethyl)ether	ND	10		µg/L	1	3/2/2015	R24992
Bis(2-chloroisopropyl)ether	ND	10		µg/L	1	3/2/2015	R24992
Bis(2-ethylhexyl)phthalate	ND	5.0		µg/L	1	3/2/2015	R24992
Butyl benzyl phthalate	ND	10		µg/L	1	3/2/2015	R24992
Carbazole	ND	10		µg/L	1	3/2/2015	R24992
Chrysene	ND	0.10		µg/L	1	3/2/2015	R24992
Dibenz(a,h)anthracene	ND	0.10		µg/L	1	3/2/2015	R24992
Dibenzofuran	ND	10		µg/L	1	3/2/2015	R24992
Diethyl phthalate	ND	10		µg/L	1	3/2/2015	R24992
Dimethyl phthalate	ND	10		µg/L	1	3/2/2015	R24992

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	Page 6 of 25
	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	
	O	RSD is greater than RSDlimit	P	Sample pH Not In Range	
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit	
	S	Spike Recovery outside accepted recovery limits			

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1502959**

Date Reported: **3/25/2015**

CLIENT: Navajo Refining Company

Client Sample ID: WDW-1,2,&3 Effluent

Project: Quarterly WDW-1, 2, &3 Inj Well

Collection Date: 2/23/2015 8:30:00 AM

Lab ID: 1502959-001

Matrix: AQUEOUS

Received Date: 2/24/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA 8270C: SEMIVOLATILES/MOD							Analyst: SUB
Di-n-butyl phthalate	ND	10		µg/L	1	3/2/2015	R24992
Di-n-octyl phthalate	ND	10		µg/L	1	3/2/2015	R24992
Fluoranthene	ND	10		µg/L	1	3/2/2015	R24992
Fluorene	ND	10		µg/L	1	3/2/2015	R24992
Hexachlorobenzene	ND	1.0		µg/L	1	3/2/2015	R24992
Hexachlorobutadiene	ND	10		µg/L	1	3/2/2015	R24992
Hexachlorocyclopentadiene	ND	10		µg/L	1	3/2/2015	R24992
Hexachloroethane	ND	10		µg/L	1	3/2/2015	R24992
Indeno(1,2,3-cd)pyrene	ND	5.0		µg/L	1	3/2/2015	R24992
Isophorone	ND	10		µg/L	1	3/2/2015	R24992
Naphthalene	ND	10		µg/L	1	3/2/2015	R24992
Nitrobenzene	ND	10		µg/L	1	3/2/2015	R24992
N-Nitrosodi-n-propylamine	ND	10		µg/L	1	3/2/2015	R24992
N-Nitrosodiphenylamine	ND	2.0		µg/L	1	3/2/2015	R24992
Pentachlorophenol	ND	10		µg/L	1	3/2/2015	R24992
Phenanthrene	ND	10		µg/L	1	3/2/2015	R24992
Phenol	8.1	5.0		µg/L	1	3/2/2015	R24992
Pyrene	ND	10		µg/L	1	3/2/2015	R24992
o-Toluidine	ND	5.0		µg/L	1	3/2/2015	R24992
Pyridine	ND	5.0		µg/L	1	3/2/2015	R24992
1,2,4,5-Tetrachlorobenzene	ND	10		µg/L	1	3/2/2015	R24992
Surr: 2,4,6-Tribromophenol	121	10-123		%REC	1	3/2/2015	R24992
Surr: 2-Fluorobiphenyl	80.8	19-130		%REC	1	3/2/2015	R24992
Surr: 2-Fluorophenol	83.8	21-110		%REC	1	3/2/2015	R24992
Surr: Nitrobenzene-d5	85.6	25-130		%REC	1	3/2/2015	R24992
Surr: Phenol-d5	86.4	10-125		%REC	1	3/2/2015	R24992
Surr: Terphenyl-d14	29.7	21-141		%REC	1	3/2/2015	R24992
CORROSIVITY							Analyst: SUB
pH	7.01	0.100		pH Units	1	2/27/2015	R24992
IGNITABILITY METHOD 1010							Analyst: SUB
Ignitability	>200	0		°F	1	3/6/2015	R24992
CYANIDE, REACTIVE							Analyst: SUB
Cyanide, Reactive	ND	1.00		mg/L	1	3/5/2015	R24992
SULFIDE, REACTIVE							Analyst: SUB
Reactive Sulfide	ND	1.0		mg/L	1	3/3/2015	R24992
SM2510B: SPECIFIC CONDUCTANCE							Analyst: JRR
Conductivity	4600	0.010		µmhos/cm	1	3/3/2015 3:37:29 PM	R24621

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.
	E	Value above quantitation range
	J	Analyte detected below quantitation limits
	O	RSD is greater than RSDlimit
	R	RPD outside accepted recovery limits
	S	Spike Recovery outside accepted recovery limits

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

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1502959**

Date Reported: **3/25/2015**

CLIENT: Navajo Refining Company

Client Sample ID: WDW-1,2,&3 Effluent

Project: Quarterly WDW-1, 2, &3 Inj Well

Collection Date: 2/23/2015 8:30:00 AM

Lab ID: 1502959-001

Matrix: AQUEOUS

Received Date: 2/24/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
SM4500-H+B: PH							Analyst: JRR
pH	7.13	1.68	H	pH units	1	3/3/2015 3:37:29 PM	R24621
SM2320B: ALKALINITY							Analyst: JRR
Bicarbonate (As CaCO3)	240	20		mg/L CaCO3	1	3/3/2015 3:37:29 PM	R24621
Carbonate (As CaCO3)	ND	2.0		mg/L CaCO3	1	3/3/2015 3:37:29 PM	R24621
Total Alkalinity (as CaCO3)	240	20		mg/L CaCO3	1	3/3/2015 3:37:29 PM	R24621
SPECIFIC GRAVITY							Analyst: JRR
Specific Gravity	1.002	0			1	3/5/2015 12:07:00 PM	R24648
SM2540C MOD: TOTAL DISSOLVED SOLIDS							Analyst: KS
Total Dissolved Solids	3710	200	*	mg/L	1	2/27/2015 8:17:00 AM	17895

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
	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
	O	RSD is greater than RSDlimit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	Spike Recovery outside accepted recovery limits		

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1502959**

Date Reported: **3/25/2015**

CLIENT: Navajo Refining Company

Client Sample ID: TRIP BLANK

Project: Quarterly WDW-1, 2, &3 Inj Well

Collection Date:

Lab ID: 1502959-002

Matrix: TRIP BLANK

Received Date: 2/24/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
Acetonitrile	ND	5.0		µg/L	1	3/3/2015	R24992
Allyl chloride	ND	0.50		µg/L	1	3/3/2015	R24992
Chloroprene	ND	0.50		µg/L	1	3/3/2015	R24992
Cyclohexane	ND	0.50		µg/L	1	3/3/2015	R24992
Diethyl ether	ND	0.50		µg/L	1	3/3/2015	R24992
Diisopropyl ether	ND	0.50		µg/L	1	3/3/2015	R24992
Epichlorohydrin	ND	5.0		µg/L	1	3/3/2015	R24992
Ethyl acetate	ND	0.50		µg/L	1	3/3/2015	R24992
Ethyl methacrylate	ND	2.5		µg/L	1	3/3/2015	R24992
Ethyl tert-butyl ether	ND	0.50		µg/L	1	3/3/2015	R24992
Freon-113	ND	0.50		µg/L	1	3/3/2015	R24992
Isobutanol	ND	0.50		µg/L	1	3/3/2015	R24992
Isopropyl acetate	ND	0.50		µg/L	1	3/3/2015	R24992
Methacrylonitrile	ND	2.5		µg/L	1	3/3/2015	R24992
Methyl acetate	ND	0.50		µg/L	1	3/3/2015	R24992
Methyl ethyl ketone	ND	2.5		µg/L	1	3/3/2015	R24992
Methyl isobutyl ketone	ND	2.5		µg/L	1	3/3/2015	R24992
Methyl methacrylate	ND	2.5		µg/L	1	3/3/2015	R24992
Methylcyclohexane	ND	1.0		µg/L	1	3/3/2015	R24992
n-Amyl acetate	ND	0.50		µg/L	1	3/3/2015	R24992
n-Hexane	ND	1.0		µg/L	1	3/3/2015	R24992
Nitrobenzene	ND	5.0		µg/L	1	3/3/2015	R24992
Pentachloroethane	ND	5.0		µg/L	1	3/3/2015	R24992
p-isopropyltoluene	ND	0.50		µg/L	1	3/3/2015	R24992
Propionitrile	ND	5.0		µg/L	1	3/3/2015	R24992
Tetrahydrofuran	ND	0.50		µg/L	1	3/3/2015	R24992
Benzene	ND	0.50		µg/L	1	3/3/2015	R24992
Toluene	ND	0.50		µg/L	1	3/3/2015	R24992
Ethylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Methyl tert-butyl ether (MTBE)	ND	10		µg/L	1	3/3/2015	R24992
1,2,4-Trimethylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
1,3,5-Trimethylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
1,2-Dichloroethane (EDC)	ND	0.50		µg/L	1	3/3/2015	R24992
1,2-Dibromoethane (EDB)	ND	0.50		µg/L	1	3/3/2015	R24992
Naphthalene	ND	0.50		µg/L	1	3/3/2015	R24992
Acetone	5.0	2.5		µg/L	1	3/3/2015	R24992
Bromobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Bromodichloromethane	ND	0.50		µg/L	1	3/3/2015	R24992
Bromoform	ND	0.50		µg/L	1	3/3/2015	R24992

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	Page 9 of 25
	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	
	O	RSD is greater than RSDlimit	P	Sample pH Not In Range	
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit	
	S	Spike Recovery outside accepted recovery limits			

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1502959**

Date Reported: **3/25/2015**

CLIENT: Navajo Refining Company

Client Sample ID: TRIP BLANK

Project: Quarterly WDW-1, 2, &3 Inj Well

Collection Date:

Lab ID: 1502959-002

Matrix: TRIP BLANK

Received Date: 2/24/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
Bromomethane	ND	0.50		µg/L	1	3/3/2015	R24992
Carbon disulfide	ND	0.50		µg/L	1	3/3/2015	R24992
Carbon Tetrachloride	ND	0.50		µg/L	1	3/3/2015	R24992
Chlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Chloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
Chloroform	ND	0.50		µg/L	1	3/3/2015	R24992
Chloromethane	ND	0.50		µg/L	1	3/3/2015	R24992
2-Chlorotoluene	ND	0.50		µg/L	1	3/3/2015	R24992
4-Chlorotoluene	ND	0.50		µg/L	1	3/3/2015	R24992
cis-1,2-DCE	ND	0.50		µg/L	1	3/3/2015	R24992
cis-1,3-Dichloropropene	ND	0.50		µg/L	1	3/3/2015	R24992
1,2-Dibromo-3-chloropropane	ND	0.50		µg/L	1	3/3/2015	R24992
Dibromochloromethane	ND	0.50		µg/L	1	3/3/2015	R24992
Dibromomethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,2-Dichlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
1,3-Dichlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
1,4-Dichlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Dichlorodifluoromethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,1-Dichloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,1-Dichloroethene	ND	0.50		µg/L	1	3/3/2015	R24992
1,2-Dichloropropane	ND	0.50		µg/L	1	3/3/2015	R24992
1,3-Dichloropropane	ND	0.50		µg/L	1	3/3/2015	R24992
2,2-Dichloropropane	ND	0.50		µg/L	1	3/3/2015	R24992
1,1-Dichloropropene	ND	0.50		µg/L	1	3/3/2015	R24992
Hexachlorobutadiene	ND	0.50		µg/L	1	3/3/2015	R24992
2-Hexanone	ND	0.50		µg/L	1	3/3/2015	R24992
Isopropylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Methylene Chloride	ND	2.5		µg/L	1	3/3/2015	R24992
n-Butylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
n-Propylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
sec-Butylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
Styrene	ND	0.50		µg/L	1	3/3/2015	R24992
tert-Butylbenzene	ND	0.50		µg/L	1	3/3/2015	R24992
1,1,1,2-Tetrachloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,1,2,2-Tetrachloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
Tetrachloroethene (PCE)	ND	0.50		µg/L	1	3/3/2015	R24992
trans-1,2-DCE	ND	0.50		µg/L	1	3/3/2015	R24992
trans-1,3-Dichloropropene	ND	0.50		µg/L	1	3/3/2015	R24992
1,2,3-Trichlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992

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
	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
	O	RSD is greater than RSDlimit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	Spike Recovery outside accepted recovery limits		

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **1502959**

Date Reported: **3/25/2015**

CLIENT: Navajo Refining Company

Client Sample ID: TRIP BLANK

Project: Quarterly WDW-1, 2, &3 Inj Well

Collection Date:

Lab ID: 1502959-002

Matrix: TRIP BLANK

Received Date: 2/24/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: SUB
1,2,4-Trichlorobenzene	ND	0.50		µg/L	1	3/3/2015	R24992
1,1,1-Trichloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,1,2-Trichloroethane	ND	0.50		µg/L	1	3/3/2015	R24992
Trichloroethene (TCE)	ND	0.50		µg/L	1	3/3/2015	R24992
Trichlorofluoromethane	ND	0.50		µg/L	1	3/3/2015	R24992
1,2,3-Trichloropropane	ND	0.50		µg/L	1	3/3/2015	R24992
Vinyl chloride	ND	0.50		µg/L	1	3/3/2015	R24992
mp-Xylenes	ND	1.0		µg/L	1	3/3/2015	R24992
o-Xylene	ND	0.50		µg/L	1	3/3/2015	R24992
tert-Amyl methyl ether	ND	0.50		µg/L	1	3/3/2015	R24992
tert-Butyl alcohol	ND	10		µg/L	1	3/3/2015	R24992
Acrolein	ND	1.0		µg/L	1	3/3/2015	R24992
Acrylonitrile	ND	0.50		µg/L	1	3/3/2015	R24992
Bromochloromethane	ND	0.50		µg/L	1	3/3/2015	R24992
2-Chloroethyl vinyl ether	ND	0.50		µg/L	1	3/3/2015	R24992
Iodomethane	ND	0.50		µg/L	1	3/3/2015	R24992
trans-1,4-Dichloro-2-butene	ND	0.50		µg/L	1	3/3/2015	R24992
Vinyl acetate	ND	0.50		µg/L	1	3/3/2015	R24992
1,4-Dioxane	ND	20		µg/L	1	3/3/2015	R24992
Surr: 1,2-Dichlorobenzene-d4	102	70-130		%REC	1	3/3/2015	R24992
Surr: 4-Bromofluorobenzene	98.4	70-130		%REC	1	3/3/2015	R24992
Surr: Toluene-d8	100	70-130		%REC	1	3/3/2015	R24992

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
	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
	O	RSD is greater than RSDlimit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	Spike Recovery outside accepted recovery limits		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID MB	SampType: MBLK		TestCode: EPA Method 300.0: Anions							
Client ID: PBW	Batch ID: R24502		RunNo: 24502							
Prep Date:	Analysis Date: 2/24/2015		SeqNo: 721446		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								
Bromide	ND	0.10								
Nitrogen, Nitrate (As N)	ND	0.10								
Phosphorus, Orthophosphate (As P)	ND	0.50								
Sulfate	ND	0.50								

Sample ID LCS	SampType: LCS		TestCode: EPA Method 300.0: Anions							
Client ID: LCSW	Batch ID: R24502		RunNo: 24502							
Prep Date:	Analysis Date: 2/24/2015		SeqNo: 721447		Units: mg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.54	0.10	0.5000	0	108	90	110			
Chloride	4.8	0.50	5.000	0	95.3	90	110			
Nitrogen, Nitrite (As N)	0.95	0.10	1.000	0	95.4	90	110			
Bromide	2.5	0.10	2.500	0	99.1	90	110			
Nitrogen, Nitrate (As N)	2.5	0.10	2.500	0	101	90	110			
Phosphorus, Orthophosphate (As P)	5.0	0.50	5.000	0	100	90	110			
Sulfate	9.8	0.50	10.00	0	97.6	90	110			

Qualifiers:

- | | |
|---|--|
| * Value exceeds Maximum Contaminant Level. | B Analyte detected in the associated Method Blank |
| E Value above quantitation range | H Holding times for preparation or analysis exceeded |
| J Analyte detected below quantitation limits | ND Not Detected at the Reporting Limit |
| O RSD is greater than RSDlimit | P Sample pH Not In Range |
| R RPD outside accepted recovery limits | RL Reporting Detection Limit |
| S Spike Recovery outside accepted recovery limits | |

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	MB-R24992		SampType:	MBLK		TestCode:	EPA Method 8260B: VOLATILES			
Client ID:	PBW		Batch ID:	R24992		RunNo:	24992			
Prep Date:			Analysis Date:	3/3/2015		SeqNo:	736964	Units:	µg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acetonitrile	ND	0.50								
Allyl chloride	ND	0.50								
Chloroprene	ND	0.50								
Ethyl methacrylate	ND	0.50								
Isobutanol	ND	0.50								
Methacrylonitrile	ND	0.50								
Methyl ethyl ketone	ND	2.5								
Methyl isobutyl ketone	ND	2.5								
Methyl methacrylate	ND	0.50								
Propionitrile	ND	0.50								
Benzene	ND	0.50								
Toluene	ND	0.50								
Ethylbenzene	ND	0.50								
1,2-Dichloroethane (EDC)	ND	0.50								
1,2-Dibromoethane (EDB)	ND	0.50								
Acetone	ND	2.5								
Bromodichloromethane	ND	0.50								
Bromoform	ND	0.50								
Bromomethane	ND	0.50								
Carbon disulfide	ND	0.50								
Carbon Tetrachloride	ND	0.50								
Chlorobenzene	ND	0.50								
Chloroethane	ND	0.50								
Chloroform	ND	0.50								
Chloromethane	ND	0.50								
cis-1,2-DCE	ND	0.50								
cis-1,3-Dichloropropene	ND	0.50								
1,2-Dibromo-3-chloropropane	ND	0.50								
Dibromochloromethane	ND	0.50								
Dibromomethane	ND	0.50								
1,2-Dichlorobenzene	ND	0.50								
1,4-Dichlorobenzene	ND	0.50								
Dichlorodifluoromethane	ND	0.50								
1,1-Dichloroethane	ND	0.50								
1,1-Dichloroethene	ND	0.50								
1,2-Dichloropropane	ND	0.50								
1,3-Dichloropropane	ND	0.50								
2,2-Dichloropropane	ND	0.50								
1,1-Dichloropropene	ND	0.50								

Qualifiers:

* Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
O RSD is greater than RSDlimit
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID MB-R24992	SampType: MBLK			TestCode: EPA Method 8260B: VOLATILES						
Client ID: PBW	Batch ID: R24992			RunNo: 24992						
Prep Date:	Analysis Date: 3/3/2015			SeqNo: 736964		Units: µg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2-Hexanone	ND	0.50								
Methylene Chloride	ND	2.5								
Styrene	ND	0.50								
1,1,1,2-Tetrachloroethane	ND	0.50								
1,1,2,2-Tetrachloroethane	ND	0.50								
Tetrachloroethene (PCE)	ND	0.50								
trans-1,2-DCE	ND	0.50								
trans-1,3-Dichloropropene	ND	0.50								
1,1,1-Trichloroethane	ND	0.50								
1,1,2-Trichloroethane	ND	0.50								
Trichloroethene (TCE)	ND	0.50								
Trichlorofluoromethane	ND	0.50								
1,2,3-Trichloropropane	ND	0.50								
Vinyl chloride	ND	0.50								
mp-Xylenes	ND	1.0								
o-Xylene	ND	0.50								
Acrolein	ND	0.50								
Acrylonitrile	ND	0.50								
Bromochloromethane	ND	0.50								
Iodomethane	ND	0.50								
trans-1,4-Dichloro-2-butene	ND	0.50								
Vinyl acetate	ND	0.50								

Sample ID LCS-R24992	SampType: LCS			TestCode: EPA Method 8260B: VOLATILES						
Client ID: LCSW	Batch ID: R24992			RunNo: 24992						
Prep Date:	Analysis Date: 3/3/2015			SeqNo: 736965		Units: µg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	9.8		10.00	0	98.4	80	120			
Toluene	10		10.00	0	99.8	80	120			
Ethylbenzene	10		10.00	0	101	80	120			
Chlorobenzene	9.8		10.00	0	98.5	80	120			
1,1-Dichloroethene	9.2		10.00	0	91.7	80	120			
Tetrachloroethene (PCE)	9.8		10.00	0	98.4	80	120			
Trichloroethene (TCE)	9.6		10.00	0	96.1	80	120			
o-Xylene	10		10.00	0	104	80	120			

Qualifiers:

* Value exceeds Maximum Contaminant Level.	B Analyte detected in the associated Method Blank
E Value above quantitation range	H Holding times for preparation or analysis exceeded
J Analyte detected below quantitation limits	ND Not Detected at the Reporting Limit
O RSD is greater than RSDlimit	P Sample pH Not In Range
R RPD outside accepted recovery limits	RL Reporting Detection Limit
S Spike Recovery outside accepted recovery limits	

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID MB-R24992	SampType: MBLK			TestCode: EPA 8270C: Semivolatiles/Mod						
Client ID: PBW	Batch ID: R24992			RunNo: 24992						
Prep Date:	Analysis Date: 3/2/2015			SeqNo: 736968		Units: µg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acetophenone	ND	10								
1-Methylnaphthalene	ND	10								
2,3,4,6-Tetrachlorophenol	ND	10								
2,4,5-Trichlorophenol	ND	10								
2,4,6-Trichlorophenol	ND	10								
2,4-Dichlorophenol	ND	10								
2,4-Dimethylphenol	ND	10								
2,4-Dinitrophenol	ND	10								
2,4-Dinitrotoluene	ND	10								
2,6-Dinitrotoluene	ND	10								
2-Chloronaphthalene	ND	10								
2-Chlorophenol	ND	10								
2-Methylnaphthalene	ND	10								
2-Methylphenol	ND	10								
2-Nitroaniline	ND	10								
2-Nitrophenol	ND	10								
3,3'-Dichlorobenzidine	ND	10								
3-Nitroaniline	ND	10								
4,6-Dinitro-2-methylphenol	ND	10								
4-Bromophenyl phenyl ether	ND	10								
4-Chloro-3-methylphenol	ND	5.0								
4-Chloroaniline	ND	10								
4-Chlorophenyl phenyl ether	ND	10								
4-Nitroaniline	ND	10								
4-Nitrophenol	ND	10								
Acenaphthene	ND	10								
Acenaphthylene	ND	10								
Anthracene	ND	10								
Benzo(g,h,i)perylene	ND	10								
Benz(a)anthracene	ND	0.10								
Benzo(a)pyrene	ND	0.10								
Benzo(b)fluoranthene	ND	0.10								
Benzo(k)fluoranthene	ND	0.10								
Bis(2-chloroethoxy)methane	ND	10								
Bis(2-chloroethyl)ether	ND	10								
Bis(2-chloroisopropyl)ether	ND	10								
Bis(2-ethylhexyl)phthalate	ND	5.0								
Butyl benzyl phthalate	ND	10								
Carbazole	ND	10								

Qualifiers:

* Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
O RSD is greater than RSDlimit
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID MB-R24992	SampType: MBLK			TestCode: EPA 8270C: Semivolatiles/Mod						
Client ID: PBW	Batch ID: R24992			RunNo: 24992						
Prep Date:	Analysis Date: 3/2/2015			SeqNo: 736968		Units: µg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chrysene	ND	0.10								
Dibenz(a,h)anthracene	ND	0.10								
Dibenzofuran	ND	10								
Diethyl phthalate	ND	10								
Dimethyl phthalate	ND	10								
Di-n-butyl phthalate	ND	10								
Di-n-octyl phthalate	ND	10								
Fluoranthene	ND	10								
Fluorene	ND	10								
Hexachlorobenzene	ND	1.0								
Hexachlorobutadiene	ND	10								
Hexachlorocyclopentadiene	ND	10								
Hexachloroethane	ND	10								
Isophorone	ND	10								
Naphthalene	ND	10								
Nitrobenzene	ND	10								
N-Nitrosodi-n-propylamine	ND	10								
Pentachlorophenol	ND	10								
Phenanthrene	ND	1.0								
Phenol	ND	5.0								
Pyrene	ND	10								
1,2,4,5-Tetrachlorobenzene	ND	10								

Sample ID LCS-R24992	SampType: LCS			TestCode: EPA 8270C: Semivolatiles/Mod						
Client ID: LCSW	Batch ID: R24992			RunNo: 24992						
Prep Date:	Analysis Date: 3/2/2015			SeqNo: 736969		Units: µg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2,4-Dinitrotoluene	5.6		5.000	0	112	49	134			
2-Chlorophenol	4.7		5.000	0	94.8	50	131			
4-Chloro-3-methylphenol	4.2		5.000	0	83.0	42	139			
4-Nitrophenol	2.8		5.000	0	56.8	19	137			
Acenaphthene	5.3		5.000	0	106	36	122			
Bis(2-ethylhexyl)phthalate	5.4		5.000	0	109	43	142			
N-Nitrosodi-n-propylamine	5.3		5.000	0	107	46	135			
Pentachlorophenol	4.0		5.000	0	79.4	22	138			
Phenol	4.1		5.000	0	81.2	45	134			
Pyrene	6.2		5.000	0	123	45	138			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	MB-17887		SampType:	MBLK		TestCode:	EPA Method 7470: Mercury				
Client ID:	PBW		Batch ID:	17887		RunNo:	24523				
Prep Date:	2/25/2015		Analysis Date:	2/26/2015		SeqNo:	722178		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercury	ND	0.00020									

Sample ID	LCS-17887		SampType: LCS		TestCode: EPA Method 7470: Mercury					
Client ID:	LCSW		Batch ID: 17887		RunNo: 24523					
Prep Date:	2/25/2015		Analysis Date: 2/26/2015		SeqNo: 722179		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0051	0.00020	0.005000	0	102	80	120			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
O RSD is greater than RSDlimit
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	MB-18037		SampType:	MBLK		TestCode:	MERCURY, TCLP				
Client ID:	PBW		Batch ID:	18037		RunNo:	24714				
Prep Date:	3/9/2015		Analysis Date:	3/10/2015		SeqNo:	728042		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercury	ND	0.020									

Sample ID	LCS-18037			SampType:	LCS		TestCode:	MERCURY, TCLP			
Client ID:	LCSW			Batch ID:	18037		RunNo:	24714			
Prep Date:	3/9/2015			Analysis Date:	3/10/2015		SeqNo:	728043		Units:	mg/L
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercury	ND	0.020	0.005000	0	105	80	120				

Qualifiers:

* Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
O RSD is greater than RSDlimit
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID MB-18024	SampType: MBLK		TestCode: EPA 6010B: Total Metals							
Client ID: PBW	Batch ID: 18024		RunNo: 24683							
Prep Date: 3/6/2015	Analysis Date: 3/7/2015		SeqNo: 727309		Units: mg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020								
Antimony	ND	0.050								
Arsenic	ND	0.020								
Barium	ND	0.020								
Beryllium	ND	0.0030								
Cadmium	ND	0.0020								
Chromium	ND	0.0060								
Cobalt	ND	0.0060								
Copper	ND	0.0060								
Iron	ND	0.050								
Lead	ND	0.0050								
Manganese	ND	0.0020								
Nickel	ND	0.010								
Selenium	ND	0.050								
Silver	ND	0.0050								
Thallium	ND	0.050								
Vanadium	ND	0.050								
Zinc	ND	0.020								

Sample ID LCS-18024	SampType: LCS		TestCode: EPA 6010B: Total Metals							
Client ID: LCSW	Batch ID: 18024		RunNo: 24683							
Prep Date: 3/6/2015	Analysis Date: 3/7/2015		SeqNo: 727310		Units: mg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.48	0.020	0.5000	0	95.4	80	120			
Antimony	0.52	0.050	0.5000	0	104	80	120			
Arsenic	0.47	0.020	0.5000	0	93.5	80	120			
Barium	0.49	0.020	0.5000	0	97.1	80	120			
Beryllium	0.50	0.0030	0.5000	0	99.1	80	120			
Cadmium	0.48	0.0020	0.5000	0	96.1	80	120			
Chromium	0.49	0.0060	0.5000	0	97.8	80	120			
Cobalt	0.49	0.0060	0.5000	0	97.4	80	120			
Copper	0.52	0.0060	0.5000	0	105	80	120			
Iron	0.51	0.050	0.5000	0	102	80	120			
Lead	0.48	0.0050	0.5000	0	97.0	80	120			
Manganese	0.49	0.0020	0.5000	0	98.6	80	120			
Nickel	0.49	0.010	0.5000	0	98.6	80	120			
Selenium	0.49	0.050	0.5000	0	98.0	80	120			
Silver	0.10	0.0050	0.1000	0	102	80	120			

Qualifiers:

* Value exceeds Maximum Contaminant Level.	B Analyte detected in the associated Method Blank
E Value above quantitation range	H Holding times for preparation or analysis exceeded
J Analyte detected below quantitation limits	ND Not Detected at the Reporting Limit
O RSD is greater than RSDlimit	P Sample pH Not In Range
R RPD outside accepted recovery limits	RL Reporting Detection Limit
S Spike Recovery outside accepted recovery limits	

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	LCS-18024		SampType: LCS		TestCode: EPA 6010B: Total Metals					
Client ID:	LCSW		Batch ID: 18024		RunNo: 24683					
Prep Date:	3/6/2015		Analysis Date: 3/7/2015		SeqNo: 727310		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Thallium	0.48	0.050	0.5000	0	97.0	80	120			
Vanadium	0.49	0.050	0.5000	0	98.2	80	120			
Zinc	0.48	0.020	0.5000	0	95.1	80	120			

Sample ID	1502959-001BMS		SampType: MS		TestCode: EPA 6010B: Total Metals					
Client ID:	WDW-1,2,&3 Effluen		Batch ID: 18050		RunNo: 24731					
Prep Date:	3/9/2015		Analysis Date: 3/10/2015		SeqNo: 728505		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Magnesium	76	1.0	50.00	25.84	101	75	125			
Potassium	84	1.0	50.00	34.66	98.8	75	125			

Sample ID	1502959-001BMSD		SampType: MSD		TestCode: EPA 6010B: Total Metals					
Client ID:	WDW-1,2,&3 Effluen		Batch ID: 18050		RunNo: 24731					
Prep Date:	3/9/2015		Analysis Date: 3/10/2015		SeqNo: 728506		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Magnesium	75	1.0	50.00	25.84	98.6	75	125	1.52	20	
Potassium	86	1.0	50.00	34.66	102	75	125	1.89	20	

Sample ID	MB-18050	SampType: MBLK		TestCode: EPA 6010B: Total Metals						
Client ID:	PBW	Batch ID: 18050		RunNo: 24731						
Prep Date:	3/9/2015	Analysis Date: 3/10/2015		SeqNo: 728508		Units: mg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	ND	1.0								
Magnesium	ND	1.0								
Potassium	ND	1.0								
Sodium	ND	1.0								

Sample ID	LCS-18050		SampType: LCS		TestCode: EPA 6010B: Total Metals					
Client ID:	LCSW		Batch ID: 18050		RunNo: 24731					
Prep Date:	3/9/2015		Analysis Date: 3/10/2015		SeqNo: 728509		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	57	1.0	50.00	0	113	80	120			
Magnesium	56	1.0	50.00	0	113	80	120			
Potassium	53	1.0	50.00	0	105	80	120			
Sodium	58	1.0	50.00	0	116	80	120			

Qualifiers:

- | | |
|---|--|
| * Value exceeds Maximum Contaminant Level. | B Analyte detected in the associated Method Blank |
| E Value above quantitation range | H Holding times for preparation or analysis exceeded |
| J Analyte detected below quantitation limits | ND Not Detected at the Reporting Limit |
| O RSD is greater than RSDlimit | P Sample pH Not In Range |
| R RPD outside accepted recovery limits | RL Reporting Detection Limit |
| S Spike Recovery outside accepted recovery limits | |

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	MB-R24992		SampType:	MBLK		TestCode:	CYANIDE, Reactive				
Client ID:	PBW		Batch ID:	R24992		RunNo:	24992				
Prep Date:			Analysis Date:	3/5/2015		SeqNo:	736973		Units:	mg/L	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Cyanide, Reactive	ND	1.00									

Sample ID	LCS-R24992		SampType: LCS		TestCode: CYANIDE, Reactive					
Client ID:	LCSW		Batch ID: R24992		RunNo: 24992					
Prep Date:			Analysis Date: 3/5/2015		SeqNo: 736974		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cyanide, Reactive	0.480		0.5000	0	96.0	80	120			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
O RSD is greater than RSDlimit
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	MB-R24992		SampType: MBLK		TestCode: SULFIDE, Reactive					
Client ID:	PBW		Batch ID: R24992		RunNo: 24992					
Prep Date:			Analysis Date: 3/3/2015		SeqNo: 736976		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Reactive Sulfide	ND	1.0								

Sample ID	LCS-R24992		SampType: LCS		TestCode: SULFIDE, Reactive					
Client ID:	LCSW		Batch ID: R24992		RunNo: 24992					
Prep Date:			Analysis Date: 3/3/2015		SeqNo: 736977		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Reactive Sulfide	0.20		0.2000	0	100	70	130			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
O RSD is greater than RSDlimit
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID mb-1	SampType: MBLK			TestCode: SM2320B: Alkalinity						
Client ID: PBW	Batch ID: R24621			RunNo: 24621						
Prep Date:	Analysis Date: 3/3/2015			SeqNo: 725674		Units: mg/L CaCO3				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	ND	20								

Sample ID lcs-1	SampType: LCS			TestCode: SM2320B: Alkalinity						
Client ID: LCSW	Batch ID: R24621			RunNo: 24621						
Prep Date:	Analysis Date: 3/3/2015			SeqNo: 725675		Units: mg/L CaCO3				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	79	20	80.00	0	99.2	90	110			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
O RSD is greater than RSDlimit
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	1502959-001ADUP	SampType:	DUP	TestCode:	Specific Gravity					
Client ID:	WDW-1,2,&3 Effluen	Batch ID:	R24648	RunNo:	24648					
Prep Date:		Analysis Date:	3/5/2015	SeqNo:	726439	Units:				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Specific Gravity	0.9999	0						0.220	20	

Qualifiers:

* Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
O RSD is greater than RSDlimit
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 1502959

25-Mar-15

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	MB-17895		SampType:	MBLK		TestCode:	SM2540C MOD: Total Dissolved Solids				
Client ID:	PBW		Batch ID:	17895		RunNo:	24545				
Prep Date:	2/25/2015		Analysis Date:	2/27/2015		SeqNo:	722782		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-17895		SampType: LCS		TestCode: SM2540C MOD: Total Dissolved Solids					
Client ID:	LCSW		Batch ID: 17895		RunNo: 24545					
Prep Date:	2/25/2015		Analysis Date: 2/27/2015		SeqNo: 722783		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			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
E Value above quantitation range
J Analyte detected below quantitation limits
O RSD is greater than RSDlimit
R RPD outside accepted recovery limits
S Spike Recovery outside accepted recovery limits

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



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

Sample Log-In Check List

Client Name: NAVAJO REFINING CO

Work Order Number: 1502959

RcptNo: 1

Received by/date:

Ag 02/24/15

Logged By: Ashley Gallegos

2/24/2015 8:00:00 AM

Ag

Completed By: Ashley Gallegos

2/24/2015 9:49:07 AM

Ag

Reviewed By:

CS 02/24/15

Chain of Custody

1. Custody seals intact on sample bottles?

Yes ☐

No ☐

Not Present ☒

2. Is Chain of Custody complete?

Yes ☒

No ☐

Not Present ☐

3. How was the sample delivered?

Courier

Log In

4. Was an attempt made to cool the samples?

Yes ☒

No ☐

NA ☐

5. Were all samples received at a temperature of $>0^{\circ}\text{C}$ to 6.0°C ?

Yes ☒

No ☐

NA ☐

6. Sample(s) in proper container(s)?

Yes ☒

No ☐

7. Sufficient sample volume for indicated test(s)?

Yes ☒

No ☐

8. Are samples (except VOA and ONG) properly preserved?

Yes ☒

No ☐

9. Was preservative added to bottles?

Yes ☐

No ☒

NA ☐

10. VOA vials have zero headspace?

Yes ☒

No ☒

No VOA Vials ☐

11. Were any sample containers received broken?

Yes ☐

No ☒

of preserved bottles checked for pH:

2 2
(<2 or >12 unless noted)

12. Does paperwork match bottle labels?

Yes ☒

No ☐

(Note discrepancies on chain of custody)

Adjusted? *NA*

13. Are matrices correctly identified on Chain of Custody?

Yes ☒

No ☐

14. Is it clear what analyses were requested?

Yes ☒

No ☐

15. Were all holding times able to be met?

Yes ☒

No ☐

(If no, notify customer for authorization.)

Checked by: *JA*

Special Handling (if applicable)

16. 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:

17. Additional remarks:

18. Cooler Information

Cooler No	Temp $^{\circ}\text{C}$	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.0	Good	Yes			

Chain-of-Custody Record

Client: Navajo Refining Co.

Mailing Address: P.O. Box 159 Artesia,

NM 88211-0159

Phone #: 575-748-3311

Email or Fax#: 575-748-5451

QA/QC Package:

☐ Standard ☐ Level 4 (Full Validation)

☐ Other _____

☐ EDD (Type) _____

Turn-Around Time:

☐ Standar ☐ Rush

Project Name:

Quarterly WDW-1, 2, & 3 Inj Well

Project #: P.O. # 167796

Project Manager:

Dan Crawford

Sampler:

On Ice: ☒ Yes ☐ No

Sample Temperature: 1.0

Container Type and #

Preservative Type

HEAL No.

1502959

-001

-001

-003

-00

-00

-00

-00

-00

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-00

-00

Received by:

Date

Time

Elizabeth Salsberry

02/24/15

0800

Received by:

Date

Time

Elizabeth Salsberry

02/24/15

0800

Remarks: Report these results separately from all other

Chain of Custody kits provided.

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 noted on the analytical report.

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

Analysis Request

Specific Gravity, HCO₃, CO₃, Cl,

SO₄, TDS, pH, cond., Fl,

Cation/anion bal., Br, Eh/40

VOCs/SW-846 Method 8260C

(see attached list 'VOCs')

SVOCs/SW-846 Method 8270D

(see attached list 'SVOCs')

R,C,l/40 CFR part 261

Metals/SW-846 Mthd 6010,

7470 (see attached list 'Metals')

Ca, K, Mg, Na/40 CFR 136.3

TCLP Metals, only /40 CFR Part

261/ SW-846 Method 1311



Navajo Refining Company, LLC
501 E. Main
Artesia, NM 88210
(Tel) 575.748.3311
(Fax) 575.746.5451

Injection Well Quarterly Sample Details Attachment



Project Name	WDW-1,2, & 3 Qrtly Inj Well
Samplers Name	Elizabeth Salsberry
Samplers Affiliation	Navajo Refining Co. LLC
Start Date and Time	2/23/2015 @ 08:25
End Date and Time	2/23/2015 @ 08:35

Sample Type	Grab <input checked="" type="checkbox"/>
Time Weighted Composite	<input type="checkbox"/>
Flow Weighted Composite	<input type="checkbox"/>
Parts / Sample Intervals	One

Physical Property	Solid <input type="checkbox"/>
	Liquid <input checked="" type="checkbox"/>
	Sludge <input type="checkbox"/>

Type of Sampler	Directly to sample jars
-----------------	-------------------------

Outfall / Sample Location:	Waste water effluent pumps to injection wells.
	<input type="checkbox"/> P-849 sample point (first from east) <input type="checkbox"/> P-856 sample point (third from east)
	<input checked="" type="checkbox"/> P-854 sample point (second from east) <input type="checkbox"/> P-857 sample point (fourth from east)

Container	Size	Material	# of Containers	Preservatives						Other	Analysis and/or Method Requested
				Neat (None)	HCL	HNO3	H2SO4	NaOH	Na2S2O3	NaHSO4	
1			3	X			X				Specific Gravity HCO3, CO3, Cl, SO4, TDS, pH, cond., FI, Cation/anion bal., Br, Eh/40 CFR 136.3
2			1			X					VOCs/SW-846 Method 8260C (see attached list 'VOCs')
3			3		X						SVOCs/SW-846 Method 8270D (see attached list 'SVOCs')
4			2	X							R.C.140 CFR part 261
5			2	X							Metals/SW-846 Mthd 6010, 7470 (see attached list 'Metals')
6			2	X							Ca, K, Mg, Na/40 CFR 136.3
7			1	X							TCLP Metals, only /40 CFR Part 261/SW-846 Method 1311
8											
9											
10											

Storage Method	Ice <input checked="" type="checkbox"/>
	Refrigerated <input type="checkbox"/>
	Other <input type="checkbox"/>

Shipping Media	Ice <input checked="" type="checkbox"/>
	Other <input type="checkbox"/>

Field Data (Weather, Observations, Etc):	2/23/2015 08:35 Tmp. 19.4, Humidity 100%, Wind Dir. NNE, Wind Speed 11.5 mph, Conditions light snow
Date and Time:	
Field Temp. 95.6°F	Field pH 6.86

Classification	Analyte name ⁽¹⁾	Method	Units	RL
Inorganics	Mercury	SW-846 Method 7470		
Inorganics	Arsenic	SW-846 Method 6010		
Inorganics	Silver	SW-846 Method 6010		
Inorganics	Aluminum	SW-846 Method 6010		
Inorganics	Barium	SW-846 Method 6010		
Inorganics	Beryllium	SW-846 Method 6010		
Inorganics	Calcium	SW-846 Method 6010		
Inorganics	Cadmium	SW-846 Method 6010		
Inorganics	Cobalt	SW-846 Method 6010		
Inorganics	Chromium	SW-846 Method 6010		
Inorganics	Copper	SW-846 Method 6010		
Inorganics	Iron	SW-846 Method 6010		
Inorganics	Mercury	SW-846 Method 6010		
Inorganics	Potassium	SW-846 Method 6010		
Inorganics	Magnesium	SW-846 Method 6010		
Inorganics	Manganese	SW-846 Method 6010		
Inorganics	Sodium	SW-846 Method 6010		
Inorganics	Nickel	SW-846 Method 6010		
Inorganics	Lead	SW-846 Method 6010		
Inorganics	Antimony	SW-846 Method 6010		
Inorganics	Selenium	SW-846 Method 6010		
Inorganics	Thallium	SW-846 Method 6010		
Inorganics	Vanadium	SW-846 Method 6010		
Inorganics	Zinc	SW-846 Method 6010		

** dilute elements only if necessary

⁽¹⁾ 23 TAL Metals



Attachment 2

EP Background Soil Statistical
Evaluation Memo



ARCADIS U.S., Inc.
100 East Campus View Blvd.
Suite 200
Columbus
Ohio 43235
Tel 614 985 9100
Fax 614 985 9170

MEMO

To:
Karel Schnebele

Copies:
Pam Krueger

From:
Mark Lupo

A handwritten signature in blue ink, appearing to read "mjl", is placed over the printed name "Mark Lupo".

Date:
August 14, 2013

ARCADIS Project No.:
TX000864.0004

Subject:
Statistical Determination of Background Concentrations in Soil, Navajo Refinery,
Artesia, New Mexico.

Soil borings were advanced in four designated background soil areas surrounding the Evaporation Ponds near the Navajo Refinery in Artesia, New Mexico in order to determine the background concentrations of key constituents in soil. The data were statistically analyzed in order to calculate values representative of naturally occurring background concentrations. In this memo, the method and results of these calculations are presented.

Location of the Soil Borings

Four areas were designated as "background soil areas" in which soil borings were advanced for collecting background samples. The areas were selected to be representative of native soils similar to those encountered both in the Refinery and in the Evaporation Ponds. However, the four areas were also selected in locations that would not be expected to have impacts from refinery operations or other potential hydrocarbon impacts. Three borings were advanced in each of the areas, designated BG-01 to BG-12. Two samples were collected for analysis from each boring. The first sample was collected one foot below ground surface (bgs) in a soil identified in the boring logs as sandy silt. The second sample was collected within the first foot after encountering a soil identified as silty clay in the boring logs. Table 1 lists the borings, the depths of the samples, and the background areas from which they were obtained.

List of Chemical Constituents

Statistical analysis was conducted for the following thirteen metallic constituents: arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, vanadium, and zinc. Three ions were also selected for statistical analysis due to interest to the project team: chloride, fluoride, and sulfate. Of the metals for which data were available, only silver lacked a sufficient number of detections to allow parametric testing. Silver was detected only once out of 24 samples, in BG-05 at a depth of one foot bgs. Eleven of the metals were detected in 24 of 24 samples, as were the ions. Selenium had one non-detection, and mercury had three. The analytical data used in the statistical analysis are presented in Table 1.

Statistical Test Method

Representative background concentrations of the COCs were determined by constructing a statistical interval that would capture 95 percent (%) of the background values with 95% confidence. In statistics, this interval is called a Tolerance Interval, and its upper limit is called the Upper Tolerance Limit (UTL). Because of the application and the COCs, the interval was single-tailed. In this memorandum, all UTLs are "95/95 UTLs", that is, they are the upper limit of an interval designed to capture 95% of the background values with 95% confidence.

A UTL can be computed for a given COC from the mean of the background values (\bar{x}) and the standard deviation (S) using the following parametric formula:

$$UTL = \bar{x} + S \kappa$$

The value of the parameter κ is chosen based upon the level of confidence, the coverage, and the number of points in the data set. The appropriate values of κ can be found in a table provided by the United States Environmental Protection Agency (USEPA) in its 2009 Unified Guidance document for groundwater statistics. (Table 17-3, USEPA, 2009). These values are also available in the statistics literature. In computing the UTLs in this memorandum, we used the table provided by the USEPA (USEPA, 2009).

There are requirements for the use of the above equation. The data must be independent, normally distributed, and free of severe outliers. The distribution of the data points can be tested using a normality test. The Shapiro-Wilk test was run at a 5% level of significance. The Shapiro-Wilk Test is a robust test and is recommended in Unified Guidance (USEPA, 2009). If the data set failed the normality test, a transformation was made and the normality test was repeated. The transformations were made in the following order: square root, cube root, and logarithmic (Box and Cox, 1964). In the event that the data could not be normalized, the parametric equation above could not be used and a non-parametric method for determining the UTL was used. Non-parametric methods are not discussed further in this memo, because their use was not necessary, as discussed below. In addition to testing for normality, the Dixon

test was applied to identify any statistical outliers that might be present. The Dixon test was run at a 5% level of significance. Only one outlier was identified (for cadmium) and its handling is discussed below where the cadmium results are presented.

Environmental data often include non-detected results. Statisticians refer to this condition as censorship. If the detection rate is 85% or better, non-detections were replaced by one half of the detection limit. If the detection rate had been less than 85% for any data set, procedures specified in Unified Guidance (USEPA, 2009) would have been applied. These measures were not needed, because none of the data sets for which UTLs were computed had detection rates less than 85%.

Because the data were collected from two distinct soil types, it was of interest to see if the background data points were of the same statistical population. Toward that end, the data collected from sandy silt and silty clay were compared using a parametric Student's t-test at 95% confidence. If the test identified a statistical difference between the two groups, separate UTLs were computed for each of the two soil types.

Laboratories indicate the concentration as "estimated" and place a "J-flag" if a COC is detected at a concentration higher than the Method Detection Limit (MDL), but lower than the Practical Quantitation Limit (PQL), sometimes called a "reporting limit". All values that were J-flagged were used in the computation of UTLs as if they were quantitative.

Results

The results of the UTL calculations are summarized in Table 2. Each of the sixteen COCs for which a UTL was computed is discussed in a separate section below. In these sections, distribution determinations and outlier tests are discussed. Statistical independence was assumed, since it appears that an effort was made to identify the background soil areas. It is also clear that no two data points came from the same location, but that the twelve borings were distinct.

Arsenic

Arsenic was detected in all of the 24 background samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 2.18 mg/kg. The average concentrations of arsenic in the two soil types were 2.11 mg/kg and 2.24 mg/kg for the sandy silt and the silty clay, respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 3.92 mg/kg. This means that 95% of soil samples can be expected to have a naturally occurring arsenic concentration of 3.92 mg/kg or less with 95% confidence. Thus 3.92 mg/kg can be adopted as the background concentration for arsenic in soil at this site.

Barium

Barium was detected in all of the 24 background samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 144 mg/kg. The average concentrations of barium in the two soil types were 158 mg/kg and 130 mg/kg for the sandy silt and the silty clay, respectively. The t-test indicated that barium was statistically elevated in the sandy silt. The parametric analysis of variance (ANOVA) did not indicate a difference in the populations, but its non-parametric counterpart, the Kruskal-Wallis test did. Therefore the barium data for sandy silt and silty clay were treated as separate statistical populations. Both data sets were normally distributed. No statistical outliers were identified in either group. The sandy silt data had a UTL of 252 mg/kg. The silty clay had a UTL of 227 mg/kg. Thus, a soil sample collected from sandy silt can be expected to have a naturally occurring barium concentration of 252 mg/kg or less. In like manner, a sample collected from silty clay can be expected to have a naturally occurring barium concentration of 227 mg/kg or less.

Cadmium

All but one of the cadmium analyses resulted in a concentration that was below the reporting limit. Cadmium was detected in all 24 samples at concentrations above the method detection limit. Although the data is thus 96% composed of J-flagged data, the data have a discernable distribution. The full data set failed the Shapiro-Wilk test of normality. Successive transformations were undertaken using the method of Box and Cox (1964). The data were found to be lognormally distributed. One statistical outlier was identified, which was the result from BG-12 at one foot bgs. Usually, that data point would be set aside. It would be compelling to do so, because the other 23 data points would be normally distributed (with no other outliers). However, removing the outlier from the calculation would also remove the only point that was not J-flagged.

The decision to include outlier was based upon the following reasoning. First, there is no evidence to suggest that the measurement of the cadmium concentration at BG-12 was the result of an error on the part of field personnel or the laboratory. On the contrary, this concentration of 0.465 mg/kg is believable when compared to the other two samples collected in sandy silt in Background Soil Area 4. BG-11 had the second highest concentration of 0.242 mg/kg. BG-10 had 0.184 mg/kg, which was also greater than the arithmetic mean for the sandy silt. It is therefore more likely that the high concentration is an accurate measurement rather than a sampling or analytical error. The present view of the environmental statistics community is to retain data points rather than dismiss them unless there is evidence of some sort of error or distortion in the data point. The evidence points in the opposite direction. Second, the data set is lognormally distributed with the data point from BG-12 included. That a known distribution is exhibited supports the view that the data point belongs to the population. Third, the twelve data points of each of the sandy silt and silty clay subsets pass the Shapiro-Wilk test when lognormally transformed. Finally, as stated already, the data point in question is the only member of the data set that is not flagged as estimated. For all of these reasons, the outlier was retained.

Whenever a data set is not normally distributed, the arithmetic mean may not be the best estimate of central tendency. It is more accurate to compute the mean in transformed space and back-transform the result. In lognormally distributed data sets, such a measure is known as the geometric mean. For the complete cadmium data set, the geometric mean was 0.139 mg/kg. The geometric mean of the sandy silt was 0.153 mg/kg; the geometric mean of the silty clay was 0.126 mg/kg. The parametric t-test was performed on the log-transformed data and indicated that the data from the two soil types were a single population. The UTL was computed and back-transformed to be 0.339 mg/kg. This means that a soil sample could be expected to have a naturally occurring cadmium concentration of 0.339 mg/kg or less.

Chromium

Chromium was detected in all 24 of the background soil samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 10.0 mg/kg. The average concentrations of chromium in the two soil types were nearly the same: 10.03 mg/kg and 9.97 mg/kg for the sandy silt and the silty clay respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 18.8 mg/kg. This means that a soil sample could be expected to have a naturally occurring chromium concentration of 18.8 mg/kg or less.

Copper

Copper was detected in all 24 of the background soil samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 6.62 mg/kg. The average concentrations of copper in the two soil types were nearly the same: 6.64 mg/kg and 6.61 mg/kg for the sandy silt and the silty clay respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 12.4 mg/kg. This means that a soil sample could be expected to have a naturally occurring copper concentration of 12.4 mg/kg or less.

Iron

Iron was detected in all 24 of the background soil samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 9,242 mg/kg. The average concentrations of iron in the two soil types were nearly the same: 9,335 mg/kg and 9,149 mg/kg for the sandy silt and the silty clay respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 17,344 mg/kg. This means that a soil sample could be expected to have a naturally occurring iron concentration of 17,344 mg/kg or less.

Lead

Lead was detected in all 24 of the background soil samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 6.66 mg/kg. The

average concentrations of lead in the two soil types were 6.94 mg/kg and 6.38 mg/kg for the sandy silt and the silty clay respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 12.1 mg/kg. This means that a soil sample could be expected to have a naturally occurring lead concentration of 12.1 mg/kg or less.

Manganese

Manganese was detected in all 24 of the background soil samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 305 mg/kg. The average concentrations of manganese in the two soil types were 309 mg/kg and 301 mg/kg for the sandy silt and the silty clay respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 488 mg/kg. This means that a soil sample could be expected to have a naturally occurring manganese concentration of 488 mg/kg or less.

Mercury

The mercury data set contained 21 detections and 3 non-detections. The detection rate of 87.5% is greater than the 85% threshold, below which it would no longer be acceptable to replace the non-detections with one half of the method detection limit. With these substitutions, the data were found to be lognormally distributed. The geometric mean, the relevant measure of the mean of a lognormally distributed data set, was 0.00210 mg/kg. The geometric mean of the mercury concentration in sandy silt was 0.00195 mg/kg; the geometric mean in the silty clay was 0.00225 mg/kg. The parametric t-test was performed on the log-transformed data and indicated that the data from the two soil types were a single population. The UTL was computed and back-transformed to be 0.0302 mg/kg. This means that a soil sample could be expected to have a naturally occurring mercury concentration of 0.0302 mg/kg or less.

Nickel

Nickel was detected in all 24 of the background soil samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 9.15 mg/kg. The average concentrations of nickel in the two soil types were nearly the same: 9.25 mg/kg and 9.05 mg/kg for the sandy silt and the silty clay respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 16.2 mg/kg. This means that a soil sample could be expected to have a naturally occurring nickel concentration of 16.2 mg/kg or less.

Selenium

The selenium data set contained 23 detections out of 24 data points. The detection rate of 96% is great enough to justify replacing the non-detection with one half of the method detection limit. With this substitution, the data were statistically analyzed. The data set was found to be normally distributed and

free of outliers. The selenium data had an average value of 0.378 mg/kg. The average concentrations of selenium in the two soil types were 0.391 mg/kg and 0.365 mg/kg for the sandy silt and the silty clay respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 0.682 mg/kg. This means that a soil sample could be expected to have a naturally occurring selenium concentration of 0.682 mg/kg or less.

Vanadium

Vanadium was detected in all 24 of the background soil samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 15.6 mg/kg. The average concentrations of vanadium in the two soil types were 14.6 mg/kg and 16.6 mg/kg for the sandy silt and the silty clay respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 28.3 mg/kg. This means that a soil sample could be expected to have a naturally occurring vanadium concentration of 28.3 mg/kg or less.

Zinc

Zinc was detected in all 24 of the background soil samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 25.1 mg/kg. The average concentrations of zinc in the two soil types were 26.1 mg/kg and 24.1 mg/kg for the sandy silt and the silty clay respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 46.6 mg/kg. This means that a soil sample could be expected to have a naturally occurring zinc concentration of 46.6 mg/kg or less.

Chloride

Chloride was detected in all 24 of the background soil samples. The data set was tested and found to be normally distributed and free of statistical outliers. The data had an average value of 1,952 mg/kg. The average concentrations of chloride in the two soil types were 1,704 mg/kg and 2,200 mg/kg for the sandy silt and the silty clay respectively. The 24 data points were found to be a single population based upon a parametric t-test. The UTL was computed to be 5,264 mg/kg. This means that a soil sample could be expected to have a naturally occurring chloride concentration of 5,264 mg/kg or less.

Fluoride

Fluoride was detected in all of the 24 background soil samples. The data were found to be cube-root normally distributed. The relevant measure of the mean of a cube-root normal data set is to compute the mean of the cube roots of the data points and cube the result. This value was 3.56 mg/kg. The cube-root corrected mean of the fluoride concentration in sandy silt was 2.80 mg/kg; for the silty clay it was 4.45 mg/kg. The parametric t-test was performed on the cube-root transformed data and indicated that the

fluoride data from the two soil types were a single population. The UTL was computed and back-transformed to be 17.9 mg/kg. This means that a soil sample could be expected to have a naturally occurring fluoride concentration of 17.9 mg/kg or less.

Sulfate

Sulfate data was detected in all of the 24 background soil samples. The data were found to be cube-root normally distributed. The cube-root corrected mean was 1,464 mg/kg. The cube-root corrected mean of the sulfate concentration in sandy silt was 553 mg/kg; for the silty clay it was 3,113 mg/kg. The parametric t-test was performed on the cube-root transformed data and indicated that sulfate was statistically elevated in the silty clay compared to the sandy silt. The parametric analysis of variance (ANOVA) and its non-parametric counterpart, the Kruskal-Wallis test concurred. Therefore the sulfate data for sandy silt and silty clay were treated as separate statistical populations. Both data sets were cube-root normally distributed. No statistical outliers were identified in either group. The sandy silt data had a UTL of 9,336 mg/kg. The silty clay had a UTL of 21,620 mg/kg. Thus, a soil sample collected from sandy silt could be expected to have a naturally occurring sulfate concentration of 9,336 mg/kg or less. In like manner, a sample collected from silty clay could be expected to have a naturally occurring sulfate concentration of 21,260 mg/kg or less.

Discussion

It has been stated above that the tolerance intervals from which the UTLs were computed were designed with 95% coverage. By definition, 5% of all background samples will have concentrations that exceed the UTLs. From a practical standpoint, this means that if a soil sample has a concentration that is less than or equal to the UTL, it can be considered to be background, but the converse is not true. If a sample exceeds the UTL it might indicate contamination, but this is not necessarily the case. In order to categorize such a sample as “above background”, another line of evidence is necessary. It may be convenient to simply judge samples as “background” and “above background” on the basis of these UTLs, but in practice, one would be wrong 5% of the time. Stated another way, a suite of samples that were truly from the background and were compared to the UTLs presented in Table 2 would exceed the UTLs and be falsely identified as “above background” 5% of the time. In summary, a thorough interpretation of the field data must be made in view of the definition of the coverage of the UTL. To simply classify all concentrations that exceed the UTL as contaminated is a conservative assumption.

Conclusion

The background soil data were statistically analyzed for sixteen constituents, including thirteen metals and three ions. After testing to be sure the concentrations of the constituent collected from two soil types were a single population, UTLs were computed for the combined data set or for the subsets for the soil types, as appropriate. Procedures were followed to correctly identify the distribution of the data and to account

for outliers. The UTLs are presented in the text of this memo and in a summary table (Table 2). The UTLs were computed for 95% coverage and with 95% confidence. For a given constituent, 95% of background soil samples can be expected to have a concentration at or less than the UTL presented in this memo with 95% confidence. If a soil sample collected in the Refinery area or near the Evaporation Ponds had a concentration less than or equal to its UTL, that concentration of that constituent could be considered to be naturally occurring.

References

Box G.E.P. and D.R. Cox. 1964. An analysis of transformations (with discussion). *Journal of Royal Statistical Society Series B*, 26, 211-252.

United States Environmental Protection Agency. 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance. Office of Resource Conservation and Recovery, Program Implementation and Information Division, U.S. Environmental Protection Agency. EPA 530-R-09-007. March, 2009.



Table 1. Data from Background Soil Borings
Navajo Refining Company, Artesia Refinery, New Mexico

		Depth	Arsenic	Barium	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Mercury		
Boring	Area	feet	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		
BG-01	1	1	1.07	97.2	0.0964	J	3.70	2.25	3,740	3.00	191	0.00048	U
BG-01	1	5	2.12	144	0.0955	J	8.65	6.98	8,940	6.57	348	0.00157	J
BG-02	1	1	1.12	129	0.129	J	5.56	3.21	5,210	3.99	204	0.00121	J
BG-02	1	5	2.75	176	0.139	J	13.8	9.59	12,700	8.77	371	0.00448	
BG-03	1	1	2.28	186	0.131	J	10.9	6.44	10,400	6.62	344	0.00155	J
BG-03	1	6	2.88	162	0.198	J	16.9	10.1	15,300	9.54	431	0.00274	J
BG-04	2	1	2.62	153	0.187	J	14.8	9.48	13,700	9.13	405	0.00580	
BG-04	2	3	1.61	85.6	0.123	J	8.02	4.86	6,370	4.00	178	0.00184	J
BG-05	2	1	1.99	150	0.163	J	8.82	7.34	7,600	7.66	268	0.0300	
BG-05	2	4	3.56	58.6	0.145	J	9.58	7.11	8,070	5.43	241	0.00199	J
BG-06	2	1	2.54	178	0.144	J	10.6	7.49	9,670	7.80	348	0.00574	
BG-06	2	4	2.36	88.6	0.140	J	8.96	5.81	7,130	5.51	266	0.00181	J
BG-07	3	1	0.93	103	0.0719	J	3.80	2.27	3,810	2.93	181	0.00048	U
BG-07	3	5	1.42	139	0.0884	J	6.67	4.42	6,550	4.57	244	0.00157	J
BG-08	3	1	1.92	167	0.132	J	8.99	6.31	8,000	5.83	299	0.00050	U
BG-08	3	4	1.88	145	0.104	J	8.47	5.71	8,230	5.98	261	0.00141	J
BG-09	3	1	1.94	214	0.120	J	9.45	5.51	9,090	6.11	328	0.00076	J
BG-09	3	4	1.24	129	0.0906	J	6.47	3.39	5,910	4.05	232	0.00192	J
BG-10	4	1	2.34	176	0.184	J	12.2	8.33	11,500	8.30	307	0.00314	J
BG-10	4	4	2.62	158	0.140	J	12.5	8.45	12,200	8.56	358	0.00545	
BG-11	4	1	2.58	166	0.242	J	11.4	8.89	11,000	9.50	384	0.00662	
BG-11	4	5	2.59	127	0.184	J	10.4	7.47	9,580	8.09	386	0.00537	
BG-12	4	1	4.04	179	0.465		20.1	12.1	18,300	12.4	445	0.00707	
BG-12	4	5	1.80	152	0.114	J	9.25	5.44	8,810	5.53	301	0.00108	J

Notes:

Area: The designated background soil area in which the boring was advanced.

mg/kg: Milligrams per kilogram.

J: Estimated value; the constituent was detected at a concentration between the method detection limit and the reporting limit.

U: Non-detection; the constituent was not detected above the method detection limit, the value shown on this table. One half the method detection limit was the value used in the statistical calculations.



Table 1. Data from Background Soil Borings
Navajo Refining Company, Artesia Refinery, New Mexico

		Depth	Nickel	Selenium	Silver	Vanadium	Zinc	Chloride	Fluoride	Sulfate			
Boring	Area	feet	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg			
BG-01	1	1	3.60	0.351	J	0.483	U	6.57	10.0	47.6	0.816	J	164
BG-01	1	5	9.51	0.394	J	0.457	U	13.6	22.0	1120	4.33		972
BG-02	1	1	5.02	0.170	U	0.468	U	8.72	15.0	14.7	0.388	J	87.8
BG-02	1	5	12.7	0.485		0.440	U	20.4	33.3	3550	3.43		2560
BG-03	1	1	10.5	0.354	J	0.456	U	17.0	26.7	5760	4.10		4390
BG-03	1	6	13.5	0.433	J	0.467	U	23.9	38.9	1720	1.40		1910
BG-04	2	1	12.8	0.576		0.433	U	19.8	36.9	2480	1.75		4890
BG-04	2	3	5.83	0.192	J	0.425	U	14.2	16.1	860	11.0		7830
BG-05	2	1	8.22	0.399	J	0.262	J	12.1	31.9	45.1	2.56		18.2
BG-05	2	4	7.95	0.394	J	0.488	U	27.6	23.8	1950	20.7		13500
BG-06	2	1	10.8	0.451		0.419	U	15.1	28.1	993	2.21		1080
BG-06	2	4	7.64	0.316	J	0.456	U	16.7	20.8	865	12.1		10600
BG-07	3	1	3.64	0.168	J	0.431	U	6.68	9.94	607	3.34		56.5
BG-07	3	5	6.82	0.270	J	0.472	U	10.9	17.1	3260	3.04		2960
BG-08	3	1	8.46	0.467	J	0.468	U	13.2	21.7	4150	11.1		1130
BG-08	3	4	8.51	0.381	J	0.438	U	13.2	21.3	3810	3.78		4260
BG-09	3	1	9.91	0.287	J	0.443	U	14.9	24.0	1180	6.6		834
BG-09	3	4	5.85	0.222	J	0.453	U	10.2	15.0	2080	3.38		960
BG-10	4	1	11.3	0.394	J	0.425	U	17.9	29.5	2530	2.14		198
BG-10	4	4	11.5	0.468	J	0.484	U	19.0	30.3	2280	3.16		1520
BG-11	4	1	11.6	0.509		0.462	U	16.3	30.8	955	5.03		364
BG-11	4	5	10.3	0.495		0.425	U	14.3	28.3	2960	1.01		1080
BG-12	4	1	15.2	0.654		0.438	U	26.9	49.0	1680	1.64		90.4
BG-12	4	5	8.48	0.330	J	0.388	U	14.6	22.5	1950	1.87		1480

Notes:

Area: The designated background soil area in which the boring was advanced.

mg/kg: Milligrams per kilogram.

J: Estimated value; the constituent was detected at a concentration between the method detection limit and the reporting limit.

U: Non-detection; the constituent was not detected above the method detection limit, the value shown on this table. One half the method detection limit was the value used in the statistical calculations.



Table 2. Background Concentrations of Key Constituents in Soil Navajo Refining Company, Artesia Refinery, New Mexico

Constituent	Lithology	UTL mg/kg	Mean mg/kg	Distribution
Arsenic	All	3.92	2.18	Normal
Barium	Sandy silt	252	158	Normal
Barium	Silty clay	227	130	Normal
Cadmium	All	0.339	0.139	Lognormal
Chromium	All	18.8	10.0	Normal
Copper	All	12.4	6.62	Normal
Iron	All	17,344	9,242	Normal
Lead	All	12.1	6.66	Normal
Manganese	All	488	305	Normal
Mercury	All	0.0302	0.00210	Lognormal
Nickel	All	16.2	9.15	Normal
Selenium	All	0.682	0.378	Normal
Vanadium	All	28.3	15.6	Normal
Zinc	All	46.6	25.1	Normal
Chloride	All	5,264	1,952	Normal
Fluoride	All	17.9	3.56	Cube root
Sulfate	Sandy silt	9,336	533	Cube root
Sulfate	Silty clay	21,620	3,113	Cube root

Notes:

UTL: Upper tolerance limit, with 95% coverage and 95% confidence.

mg/kg: Milligrams per kilogram.

Mean: Not necessarily the arithmetic mean, but the mean computed according to the distribution indicated on this table and back-transformed. See text.

GW - 028

C-141s
(4)

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Wednesday, November 29, 2017 10:38 AM
To: 'Combs, Robert'
Cc: Denton, Scott; Sahba, Arsin M.; Dade, Lewis (Randy); Griswold, Jim, EMNRD
Subject: RE: 2017-10-22 Effluent Pipeline Release

Robert, et al.:

The New Mexico Oil Conservation Division (OCD) approves the corrective action(s) approach for the above subject release documented by Navajo below.

OCD awaits the receipt of the Final C-141 with attachments verifying soils have been remediated from the pipeline release.

Please contact me if you have questions. Thank you.

Mr. Carl J. Chavez, CHMM (#13099)
New Mexico Oil Conservation Division
Energy Minerals and Natural Resources Department
1220 South St Francis Drive
Santa Fe, New Mexico 87505
Ph. (505) 476-3490
E-mail: CarlJ.Chavez@state.nm.us

“Why not prevent pollution, minimize waste to reduce operating costs, reuse or recycle, and move forward with the rest of the Nation?” (To see how, go to: <http://www.emnrd.state.nm.us/OCD> and see “Publications”)

From: Combs, Robert [mailto:Robert.Combs@HollyFrontier.com]
Sent: Wednesday, November 1, 2017 6:56 AM
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Cc: Denton, Scott <Scott.Denton@HollyFrontier.com>; Sahba, Arsin M. <Arsin.Sahba@HollyFrontier.com>; Dade, Lewis (Randy) <Lewis.Dade@HollyFrontier.com>
Subject: RE: 2017-10-22 Effluent Pipeline Release

Carl,

Please see below for our remediation plan for the wastewater effluent release on 10/22/17. The release occurred from the Navajo pipeline that conveys treated wastewater from Navajo's Artesia Refinery (refinery) to injection wells for disposal in accordance with Discharge Permit GW-028 and UIC permits.

1. Actions completed:
 - a. Operations noticed flow and pressure changes and immediately shut down the pipeline.
 - b. The leak location was found and area was excavated to enable repairs of the line.
 - c. The impacted area was defined by wet soil, there was no staining present. Personnel used paint to outline the wet area.

- d. Free liquids, primarily from within the excavation, were removed by vacuum truck and returned to the refinery.
- e. A sample of the discharge water was collected near the pipeline pumps within the refinery and submitted for analysis of WQCC constituents (20.6.2.3103 A-C).
- f. Soil removed from the excavation was segregated by appearance with wet soil defined as impacted and dry soil as not impacted.
- g. The line was put back in service on 10/24/17.

2. Future Actions Pending Completion:

- a. Backfill of the excavation is underway utilizing sand from an off-site source to fill around the pipeline and will be completed using the dry excavation material. This is ongoing and expected to be complete by 11/3/17.
- b. The wet impacted soil from the line repair excavation will be characterized and disposed.
- c. Five discrete surface samples will be collected from within the outlined area to provide impacted concentrations and five discrete samples will be collected outside of the wet area to provide background concentrations. The samples will be analyzed for COCs that exceeded WQCC standards in the water effluent collected within the refinery. One duplicate sample will be collected from within the spill area and background location. Based on the attached preliminary report for the released water, the soil will be analyzed for fluoride, chloride, sulfate, iron, and DRO. Adequate sample volume will be collected for potential SPLP analysis.
- d. If the samples within the spill area (surface impacts) exceed the average concentrations of the background samples, those parameters will be analyzed for SPLP to determine leachability. If the SPLP concentrations exceed the WQCC standards, then those areas that exceed will be excavated to average background concentrations.
- e. Excavation of the area with SPLP exceedances will be limited due to the presence of several other buried pipelines and will proceed as needed.
- f. Confirmation samples will be collected from the bottom of the excavation for surface impacts. The confirmation samples will be analyzed for the same constituents that exceeded the WQCC standard for SPLP and results will be compared to the average background concentrations. The confirmation samples will also be analyzed for SPLP if concentrations exceed the average background concentrations. Additional excavation will be conducted as necessary.
- g. A letter report with findings and actions taken will be prepared and submitted to OCD with the Final C-141 form. This submittal will include all analytical reports, photos, copies of any waste manifests, and a discussion of the investigation findings.

We intend to implement this remediation plan (Item 2 above) by 11/3/17. Please reply to this email with any comments, or give me a call to discuss.

Thanks,
Robert

Robert Combs
Environmental Specialist
The HollyFrontier Companies
P.O. Box 159

Artesia, NM 88211-0159
office: 575-746-5382
cell: 575-308-2718
fax: 575-746-5451
Robert.Combs@hollyfrontier.com

From: Chavez, Carl J, EMNRD [<mailto:CarlJ.Chavez@state.nm.us>]
Sent: Tuesday, October 31, 2017 4:51 PM
To: Combs, Robert
Subject: RE: 2017-10-22 Effluent Pipeline Release

Robert:

The New Mexico Oil Conservation Division is in receipt of your C-141 submittal and will respond soon.

Also, after speaking with you this afternoon, a remediation plan will soon be submitted.

Thank you.

Mr. Carl J. Chavez, CHMM (#13099)
New Mexico Oil Conservation Division
Energy Minerals and Natural Resources Department
1220 South St Francis Drive
Santa Fe, New Mexico 87505
Ph. (505) 476-3490
E-mail: CarlJ.Chavez@state.nm.us

“Why not prevent pollution, minimize waste to reduce operating costs, reuse or recycle, and move forward with the rest of the Nation?” (To see how, go to: <http://www.emnrd.state.nm.us/OCD> and see “Publications”)

From: Combs, Robert [<mailto:Robert.Combs@HollyFrontier.com>]
Sent: Friday, October 27, 2017 3:34 PM
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Cc: Denton, Scott <Scott.Denton@HollyFrontier.com>; Sahba, Arsin M. <Arsin.Sahba@HollyFrontier.com>; Dade, Lewis (Randy) <Lewis.Dade@HollyFrontier.com>; Orosco, Richard <Richard.Orosco@HollyFrontier.com>
Subject: 2017-10-22 Effluent Pipeline Release

Carl,
Please see the attached initial C-141 form for the effluent pipeline release from 10/22/17.
If you have any questions please call to discuss.
Thanks,
Robert

Robert Combs
Environmental Specialist
The HollyFrontier Companies
P.O. Box 159
Artesia, NM 88211-0159
office: 575-746-5382
cell: 575-308-2718
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Robert.Combs@hollyfrontier.com

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Chavez, Carl J, EMNRD

From: Combs, Robert <Robert.Combs@HollyFrontier.com>
Sent: Friday, October 27, 2017 3:34 PM
To: Chavez, Carl J, EMNRD
Cc: Denton, Scott; Sahba, Arsin M.; Dade, Lewis (Randy); Orosco, Richard
Subject: 2017-10-22 Effluent Pipeline Release
Attachments: 2017-10-22 Effluent Leak Initial C-141.pdf

Carl,
Please see the attached initial C-141 form for the effluent pipeline release from 10/22/17.
If you have any questions please call to discuss.
Thanks,
Robert

Robert Combs

Environmental Specialist
The HollyFrontier Companies
P.O. Box 159
Artesia, NM 88211-0159
office: 575-746-5382
cell: 575-308-2718
fax: 575-746-5451
Robert.Combs@hollyfrontier.com

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District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources
Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised April 3, 2017

Submit 1 Copy to appropriate District Office in
accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company: HollyFrontier Navajo Refining LLC	Contact Robert Combs	
Address: 501 E. Main, Artesia, NM 88210	Telephone No. 575-746-5382	
Facility Name: HollyFrontier Navajo Refining LLC	Facility Type Petroleum Refinery	
Surface Owner	Mineral Owner	API No.

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
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Latitude 32°51'12.59"N Longitude 104°22'41.30"W NAD83

NATURE OF RELEASE

Type of Release Treated Refinery waste water effluent	Volume of Release: >25 bbls	Volume Recovered: TBD
Source of Release Effluent pipeline	Date and Hour of Occurrence 10/22/17, ~9:15 a.m.	Date and Hour of Discovery 10/22/17, ~11:00 a.m.
Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required	If YES, To Whom? Carl Chavez, OCD Santa Fe, left message	
By Whom? Robert Combs	Date and Hour 10/22/17 1:05 p.m.	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.* The treated waste water effluent pipeline developed a leak at approximately 9:15 a.m. on 10/22/17 as determined by the decrease in the effluent line pressure and increase in discharge flow. The pipeline pumps were shut down immediately.


Describe Area Affected and Cleanup Action Taken.*

The leak location was identified at approximately 11:00 a.m. on 10/22/17 at the Bolton Rd crossing, adjacent to Eagle Draw; an aerial photo is attached with the spill location indicated. The leak occurred within a steel cased section of the pipeline that passes below Bolton Rd. The water reached the surface on the east side of Bolton Rd and flowed to the south and southeast of the leak location, but did not enter Eagle Draw. A contract company was called to excavate and make line repairs. Soil was piled along the sidewalls of the waterway and impacted soil was segregated based on appearance (no staining present, only based on wet soil). Vacuum trucks were used to recover free liquid and returned the water to the refinery. The recovered volume will be reported with the final C-141 form.

A water sample was collected from the pipeline near the effluent pipeline pumps and submitted for analysis of WQCC standards (20.6.2.3103A-C NMAC). Pending those results, the site will be characterized for any parameters that exceed the standards.

The segregated (wet) material will be disposed at a non-hazardous waste facility as well as any remediation waste from the surface cleanup, if appropriate. A final C-141 form will be submitted following these actions as well as photos, analytical results, and any disposal records.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.


Signature: 	OIL CONSERVATION DIVISION	
Printed Name: Robert Combs	Approved by Environmental Specialist:	
Title: Environmental Specialist	Approval Date:	Expiration Date:
E-mail Address: robert.combs@hollyfrontier.com	Conditions of Approval:	Attached <input type="checkbox"/>
Date: 10/27/17 Phone: 575-746-5382		

* Attach Additional Sheets If Necessary

HFNR Release 10/22/17

Release location and spill area

Legend

 10/22/17 WW Effluent Release Location, 32°51'12.59"N, 104°22'41.30"W

10/22/17 WW Effluent Release Location, 32°51'12.59"N, 104°22'41.30"W



Analytical Report

Lab Order 1710C41

Date Reported:

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company

Client Sample ID: TRIP BLANK

Project:

Collection Date:

Lab ID: 1710C41-002

Matrix: TRIP BLANK

Received Date: 10/24/2017 9:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8011/504.1: EDB							Analyst: JME
1,2-Dibromoethane	ND	0.0096		µg/L	1	10/25/2017 11:08:44 PM	34591
EPA METHOD 8260B: VOLATILES							Analyst: RAA
Benzene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Toluene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Ethylbenzene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Naphthalene	ND	2.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
1-Methylnaphthalene	ND	4.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
2-Methylnaphthalene	ND	4.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Acetone	ND	10		µg/L	1	10/25/2017 9:53:00 AM	R46616
Bromobenzene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Bromodichloromethane	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Bromoform	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Bromomethane	ND	3.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
2-Butanone	ND	10		µg/L	1	10/25/2017 9:53:00 AM	R46616
Carbon disulfide	ND	10		µg/L	1	10/25/2017 9:53:00 AM	R46616
Carbon Tetrachloride	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Chlorobenzene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Chloroethane	ND	2.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Chloroform	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Chloromethane	ND	3.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
2-Chlorotoluene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
4-Chlorotoluene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
cis-1,2-DCE	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Dibromochloromethane	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Dibromomethane	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
1,2-Dichlorobenzene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
1,3-Dichlorobenzene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
1,4-Dichlorobenzene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Dichlorodifluoromethane	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
1,1-Dichloroethane	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
1,1-Dichloroethene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
1,2-Dichloropropane	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616

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 Quantitative 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

Analytical Report

Lab Order 1710C41

Date Reported:

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company

Client Sample ID: TRIP BLANK

Project:

Collection Date:

Lab ID: 1710C41-002

Matrix: TRIP BLANK

Received Date: 10/24/2017 9:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: RAA
1,3-Dichloropropane	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
2,2-Dichloropropane	ND	2.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
1,1-Dichloropropene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Hexachlorobutadiene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
2-Hexanone	ND	10		µg/L	1	10/25/2017 9:53:00 AM	R46616
Isopropylbenzene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
4-Isopropyltoluene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
4-Methyl-2-pentanone	ND	10		µg/L	1	10/25/2017 9:53:00 AM	R46616
Methylene Chloride	ND	3.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
n-Butylbenzene	ND	3.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
n-Propylbenzene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
sec-Butylbenzene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Styrene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
tert-Butylbenzene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
trans-1,2-DCE	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
1,1,1-Trichloroethane	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
1,1,2-Trichloroethane	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Trichloroethene (TCE)	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Trichlorofluoromethane	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
1,2,3-Trichloropropane	ND	2.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Vinyl chloride	ND	1.0		µg/L	1	10/25/2017 9:53:00 AM	R46616
Xylenes, Total	ND	1.5		µg/L	1	10/25/2017 9:53:00 AM	R46616
Surr: 1,2-Dichloroethane-d4	99.6	70-130		%Rec	1	10/25/2017 9:53:00 AM	R46616
Surr: 4-Bromofluorobenzene	99.6	70-130		%Rec	1	10/25/2017 9:53:00 AM	R46616
Surr: Dibromofluoromethane	103	70-130		%Rec	1	10/25/2017 9:53:00 AM	R46616
Surr: Toluene-d8	100	70-130		%Rec	1	10/25/2017 9:53:00 AM	R46616

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	Page 6 of 0
	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 Quantitative 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	

Analytical Report

Lab Order 1710C41

Date Reported:

Hall Environmental Analysis Laboratory, Inc.**CLIENT:** Navajo Refining Company**Client Sample ID:** Waste Water Effluent to Wells**Project:****Collection Date:** 10/23/2017 9:45:00 AM**Lab ID:** 1710C41-001**Matrix:** AQUEOUS**Received Date:** 10/24/2017 9:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA 200.8: DISSOLVED METALS							Analyst: JLF
Arsenic	0.019	0.0010	*	mg/L	1	10/25/2017 9:34:41 PM	C46652
Lead	ND	0.00050		mg/L	1	10/25/2017 9:34:41 PM	C46652
Selenium	0.041	0.0010		mg/L	1	10/25/2017 9:34:41 PM	C46652
Uranium	0.00070	0.00050		mg/L	1	10/25/2017 9:34:41 PM	C46652
EPA METHOD 300.0: ANIONS							Analyst: MRA
Fluoride	30	2.0	*	mg/L	20	10/25/2017 9:36:11 AM	R46679
Chloride	710	25		mg/L	50	10/25/2017 12:17:30 PM	R46679
Nitrogen, Nitrite (As N)	ND	0.50		mg/L	5	10/25/2017 9:23:47 AM	R46679
Nitrogen, Nitrate (As N)	ND	0.50		mg/L	5	10/25/2017 9:23:47 AM	R46679
Sulfate	920	10		mg/L	20	10/25/2017 9:36:11 AM	R46679
SM2540C MOD: TOTAL DISSOLVED SOLIDS							Analyst: KS
Total Dissolved Solids	2680	40.0	*D	mg/L	1	10/26/2017 8:06:00 PM	34626
SM4500-H+B: PH							Analyst: JRR
pH	7.88		H	pH units	1	10/26/2017 5:49:34 PM	R46730
EPA METHOD 200.7: DISSOLVED METALS							Analyst: pmf
Aluminum	0.34	0.020	*	mg/L	1	10/25/2017 7:52:43 PM	A46658
Barium	0.010	0.0020		mg/L	1	10/25/2017 7:52:43 PM	A46658
Boron	0.13	0.040		mg/L	1	10/25/2017 7:52:43 PM	A46658
Cadmium	ND	0.0020		mg/L	1	10/25/2017 7:52:43 PM	A46658
Chromium	ND	0.0060		mg/L	1	10/25/2017 7:52:43 PM	A46658
Cobalt	ND	0.0060		mg/L	1	10/25/2017 7:52:43 PM	A46658
Copper	ND	0.0060		mg/L	1	10/25/2017 7:52:43 PM	A46658
Iron	1.8	0.20	*	mg/L	10	10/25/2017 7:59:56 PM	A46658
Manganese	0.14	0.0020	*	mg/L	1	10/25/2017 7:52:43 PM	A46658
Molybdenum	0.014	0.0080		mg/L	1	10/25/2017 7:52:43 PM	A46658
Nickel	ND	0.010		mg/L	1	10/25/2017 7:52:43 PM	A46658
Silver	ND	0.0050		mg/L	1	10/25/2017 7:52:43 PM	A46658
Zinc	0.094	0.010		mg/L	1	10/25/2017 7:52:43 PM	A46658
EPA METHOD 245.1: MERCURY							Analyst: MED
Mercury	ND	0.00020		mg/L	1	10/27/2017 12:52:27 PM	34672
EPA METHOD 8011/504.1: EDB							Analyst: JME
1,2-Dibromoethane	ND	0.0092		µg/L	1	10/25/2017 10:53:29 PM	34591
EPA METHOD 8082A: PCB'S							Analyst: SCC
Aroclor 1016	ND	1.0		µg/L	1	10/26/2017 2:09:00 PM	34612
Aroclor 1221	ND	1.0		µg/L	1	10/26/2017 2:09:00 PM	34612
Aroclor 1232	ND	1.0		µg/L	1	10/26/2017 2:09:00 PM	34612

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	Page 1 of 0
	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 Quantitative 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	

Analytical Report

Lab Order 1710C41

Date Reported:

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company

Client Sample ID: Waste Water Effluent to Wells

Project:

Collection Date: 10/23/2017 9:45:00 AM

Lab ID: 1710C41-001

Matrix: AQUEOUS

Received Date: 10/24/2017 9:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8082A: PCB'S							Analyst: SCC
Aroclor 1242	ND	1.0		µg/L	1	10/26/2017 2:09:00 PM	34612
Aroclor 1248	ND	1.0		µg/L	1	10/26/2017 2:09:00 PM	34612
Aroclor 1254	ND	1.0		µg/L	1	10/26/2017 2:09:00 PM	34612
Aroclor 1260	ND	1.0		µg/L	1	10/26/2017 2:09:00 PM	34612
Surr: Decachlorobiphenyl	67.6	50.4-123		%Rec	1	10/26/2017 2:09:00 PM	34612
Surr: Tetrachloro-m-xylene	64.8	41.2-147		%Rec	1	10/26/2017 2:09:00 PM	34612
EPA METHOD 8015M/D: DIESEL RANGE							Analyst: TOM
Diesel Range Organics (DRO)	7.2	1.0		mg/L	1	10/27/2017 9:11:41 AM	34668
Motor Oil Range Organics (MRO)	ND	5.0		mg/L	1	10/27/2017 9:11:41 AM	34668
Surr: DNOP	119	77.5-161		%Rec	1	10/27/2017 9:11:41 AM	34668
EPA METHOD 8015D: GASOLINE RANGE							Analyst: NSB
Gasoline Range Organics (GRO)	ND	0.10	D	mg/L	2	10/25/2017 10:25:51 AM	G46639
Surr: BFB	114	69.3-150	D	%Rec	2	10/25/2017 10:25:51 AM	G46639
EPA METHOD 8310: PAHS							Analyst: SCC
Naphthalene	ND	2.0		µg/L	1	10/26/2017 12:18:00 PM	34613
1-Methylnaphthalene	ND	2.0		µg/L	1	10/26/2017 12:18:00 PM	34613
2-Methylnaphthalene	ND	2.0		µg/L	1	10/26/2017 12:18:00 PM	34613
Acenaphthylene	ND	2.5		µg/L	1	10/26/2017 12:18:00 PM	34613
Acenaphthene	ND	2.0		µg/L	1	10/26/2017 12:18:00 PM	34613
Fluorene	ND	0.80		µg/L	1	10/26/2017 12:18:00 PM	34613
Phenanthrene	ND	0.60		µg/L	1	10/26/2017 12:18:00 PM	34613
Anthracene	ND	0.60		µg/L	1	10/26/2017 12:18:00 PM	34613
Fluoranthene	ND	0.30		µg/L	1	10/26/2017 12:18:00 PM	34613
Pyrene	ND	0.30		µg/L	1	10/26/2017 12:18:00 PM	34613
Benz(a)anthracene	ND	0.070		µg/L	1	10/26/2017 12:18:00 PM	34613
Chrysene	ND	0.20		µg/L	1	10/26/2017 12:18:00 PM	34613
Benzo(b)fluoranthene	ND	0.10		µg/L	1	10/26/2017 12:18:00 PM	34613
Benzo(k)fluoranthene	ND	0.070		µg/L	1	10/26/2017 12:18:00 PM	34613
Benzo(a)pyrene	ND	0.070		µg/L	1	10/26/2017 12:18:00 PM	34613
Dibenz(a,h)anthracene	ND	0.12		µg/L	1	10/26/2017 12:18:00 PM	34613
Benzo(g,h,i)perylene	ND	0.12		µg/L	1	10/26/2017 12:18:00 PM	34613
Indeno(1,2,3-cd)pyrene	ND	0.25		µg/L	1	10/26/2017 12:18:00 PM	34613
Surr: Benzo(e)pyrene	83.6	49.1-127		%Rec	1	10/26/2017 12:18:00 PM	34613
EPA METHOD 8260B: VOLATILES							Analyst: RAA
Benzene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Toluene	7.0	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Ethylbenzene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616

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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 Quantitative 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

Analytical ReportLab Order **1710C41**

Date Reported:

Hall Environmental Analysis Laboratory, Inc.**CLIENT:** Navajo Refining Company**Client Sample ID:** Waste Water Effluent to Wells**Project:****Collection Date:** 10/23/2017 9:45:00 AM**Lab ID:** 1710C41-001**Matrix:** AQUEOUS**Received Date:** 10/24/2017 9:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: RAA
Methyl tert-butyl ether (MTBE)	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
1,2,4-Trimethylbenzene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
1,3,5-Trimethylbenzene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
1,2-Dichloroethane (EDC)	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
1,2-Dibromoethane (EDB)	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Naphthalene	ND	4.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
1-Methylnaphthalene	ND	8.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
2-Methylnaphthalene	ND	8.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Acetone	27	20	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Bromobenzene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Bromodichloromethane	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Bromoform	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Bromomethane	ND	6.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
2-Butanone	ND	20	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Carbon disulfide	ND	20	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Carbon Tetrachloride	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Chlorobenzene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Chloroethane	ND	4.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Chloroform	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Chloromethane	ND	6.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
2-Chlorotoluene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
4-Chlorotoluene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
cis-1,2-DCE	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
cis-1,3-Dichloropropene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
1,2-Dibromo-3-chloropropane	ND	4.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Dibromochloromethane	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Dibromomethane	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
1,2-Dichlorobenzene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
1,3-Dichlorobenzene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
1,4-Dichlorobenzene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Dichlorodifluoromethane	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
1,1-Dichloroethane	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
1,1-Dichloroethene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
1,2-Dichloropropane	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
1,3-Dichloropropane	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
2,2-Dichloropropane	ND	4.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
1,1-Dichloropropene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Hexachlorobutadiene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
2-Hexanone	ND	20	D	µg/L	2	10/25/2017 9:23:00 AM	R46616

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Analytical Report

Lab Order 1710C41

Date Reported:

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company

Client Sample ID: Waste Water Effluent to Wells

Project:

Collection Date: 10/23/2017 9:45:00 AM

Lab ID: 1710C41-001

Matrix: AQUEOUS

Received Date: 10/24/2017 9:45:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES							Analyst: RAA
Isopropylbenzene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
4-Isopropyltoluene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
4-Methyl-2-pentanone	ND	20	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Methylene Chloride	ND	6.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
n-Butylbenzene	ND	6.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
n-Propylbenzene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
sec-Butylbenzene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Styrene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
tert-Butylbenzene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
1,1,1,2-Tetrachloroethane	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
1,1,2,2-Tetrachloroethane	ND	4.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Tetrachloroethene (PCE)	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
trans-1,2-DCE	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
trans-1,3-Dichloropropene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
1,2,3-Trichlorobenzene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
1,2,4-Trichlorobenzene	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
1,1,1-Trichloroethane	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
1,1,2-Trichloroethane	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Trichloroethene (TCE)	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Trichlorofluoromethane	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
1,2,3-Trichloropropane	ND	4.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Vinyl chloride	ND	2.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Xylenes, Total	ND	3.0	D	µg/L	2	10/25/2017 9:23:00 AM	R46616
Surr: 1,2-Dichloroethane-d4	99.8	70-130	D	%Rec	2	10/25/2017 9:23:00 AM	R46616
Surr: 4-Bromofluorobenzene	96.9	70-130	D	%Rec	2	10/25/2017 9:23:00 AM	R46616
Surr: Dibromofluoromethane	103	70-130	D	%Rec	2	10/25/2017 9:23:00 AM	R46616
Surr: Toluene-d8	101	70-130	D	%Rec	2	10/25/2017 9:23:00 AM	R46616
TOTAL PHENOLICS BY SW-846 9067							Analyst: SCC
Phenolics	39	2.5		µg/L	1	10/26/2017	34649

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Collected date/time: 10/23/17 09:45

L946426

Wet Chemistry by Method 4500CN E-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Cyanide	0.0117		0.00500	1	10/30/2017 13:10	WG1036070

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc