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

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To: Combs, Robert
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Subject: FW: GW-28 Pipeline Release C-141s Due Today!

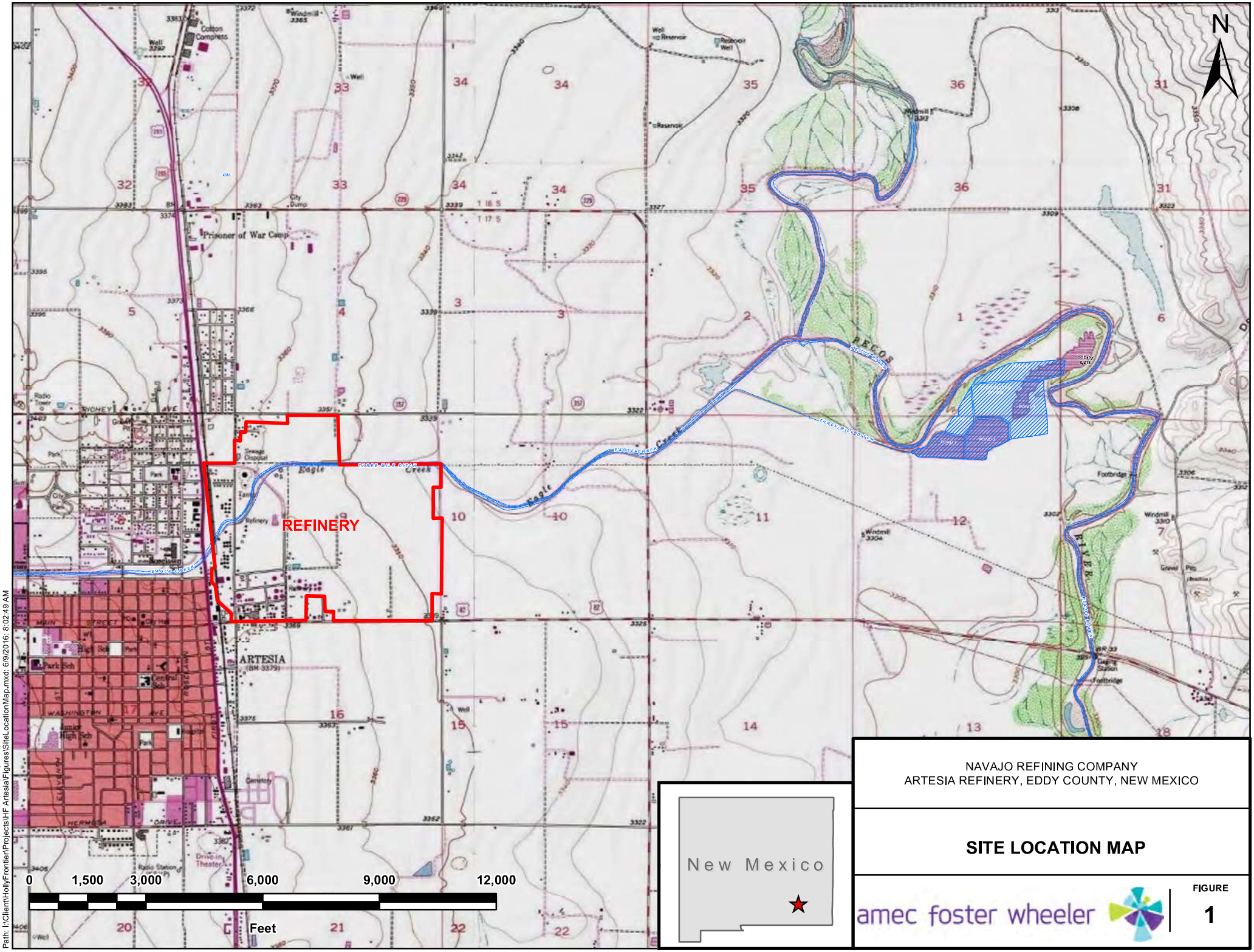
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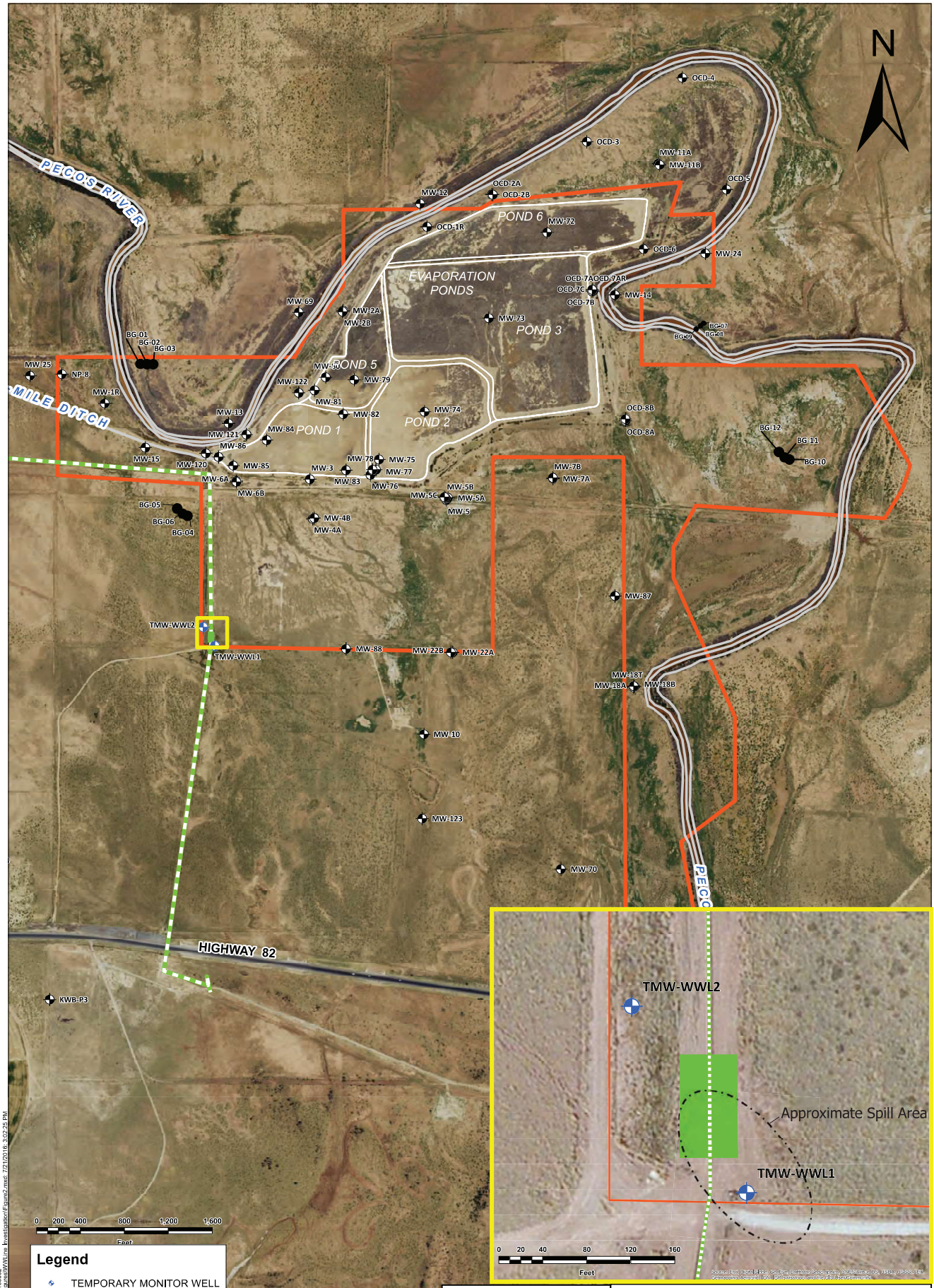
NAVAJO REFINING COMPANY
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

SITE LOCATION MAP

amec foster wheeler

FIGURE
1

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

BORING/TEMPORARY WELL LOCATION MAP

amec foster wheeler

FIGURE 2

DB: C RICHARDS PM: P KRUEGER Project (Project #) 6703160002
Path: K:\Client\Web\Frontier\Artesia\M Standard Figures\GIS Figures\WWL Line Investigation\Figure2.mxd 7/21/2016 3:02:25 PM

Chavez, Carl J, EMNRD

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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.
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Robert Combs
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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.

Amec Foster Wheeler Environment & Infrastructure, Inc.
585 North Dairy Ashford
Houston, Texas 77079
Tel: 713-929-5000
amecfw.com

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

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	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
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
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
Motor Oil Range Organics	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
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
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	< 0.00148
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
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

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 Levelfor 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,



Andy Freeman

Laboratory Manager

4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

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.

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.

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.

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.

CLIENT: Navajo Refining Company
Project: 2015 Effluent PL Release
Lab ID: 1704B58-005 **Matrix:** LEACHATE

Client Sample ID: Center Pile Sample 2
Collection Date: 5/12/2017 8:00:00 AM
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.

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.	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	**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.	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 **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.	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 **1704b58-002ams**	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.	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-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.	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

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° 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	2.1	Good	Yes			

Client:	HollyFrontier Navajo Refining LLC
Mailing Address:	PO Box 159 Artesia, NM 88211-0159
Phone #:	575-308-2718
email or Fax#:	
QA/QC Package:	Standard X Level 4 (Full Validation) ☐ Other ☐ EDD (Type)
Standard	☐ Rush X
Project Name	2015 Effluent PL Release
Project #:	PO: 231642
Project Manager:	Robert Combs Scott Denton
Sampler:	Dave Boyer
On Ice:	X Yes ☐ No
Sample Temperature:	4.1

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

Date	Time	Matrix	Sample Request ID	Container Type and # (4oz Glass)	Preservative Type	HEAL No. 1704B58	Analysis Request: 8260B:WQCC List VOCs	6010: WQCC Metals (Fe, Mn)	8015: GRO, DRO, ORO	300 Chloride, Fluoride, Sulfate
4/25/2017	1120	soil	South Pile sample 1	2, 4oz	Cool	001	X	X	X	X
4/25/2017	1125	soil	Center Pile sample 2	2, 4oz	Cool	002	X	X	X	X
4/25/2017	1130	soil	North Pile sample 3	2, 4oz	Cool	003	X	X	X	X

Date: 4/25/17	Time: 1500	Relinquished by:	Received by:	Date: 4/25/17	Time: 1500
Date: 4/26/17	Time: 0700	Relinquished by:	Received by:	Date: 04/26/17	Time: 0435

Remarks: cc: Randy Dade

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.

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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,

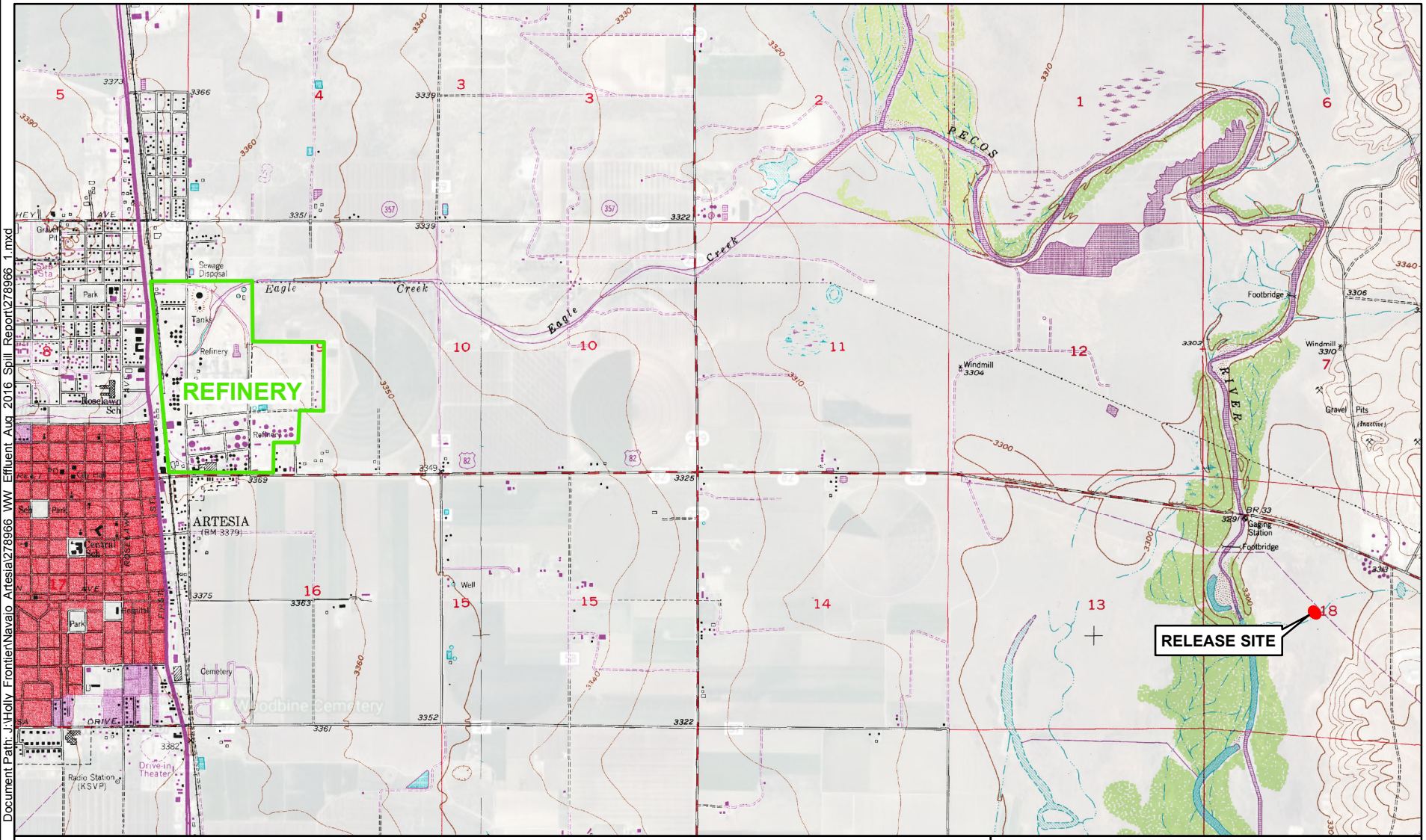


Julie Speer
Project Manager
TRC Environmental Corporation

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.

N

0 1,500 3,000
Feet

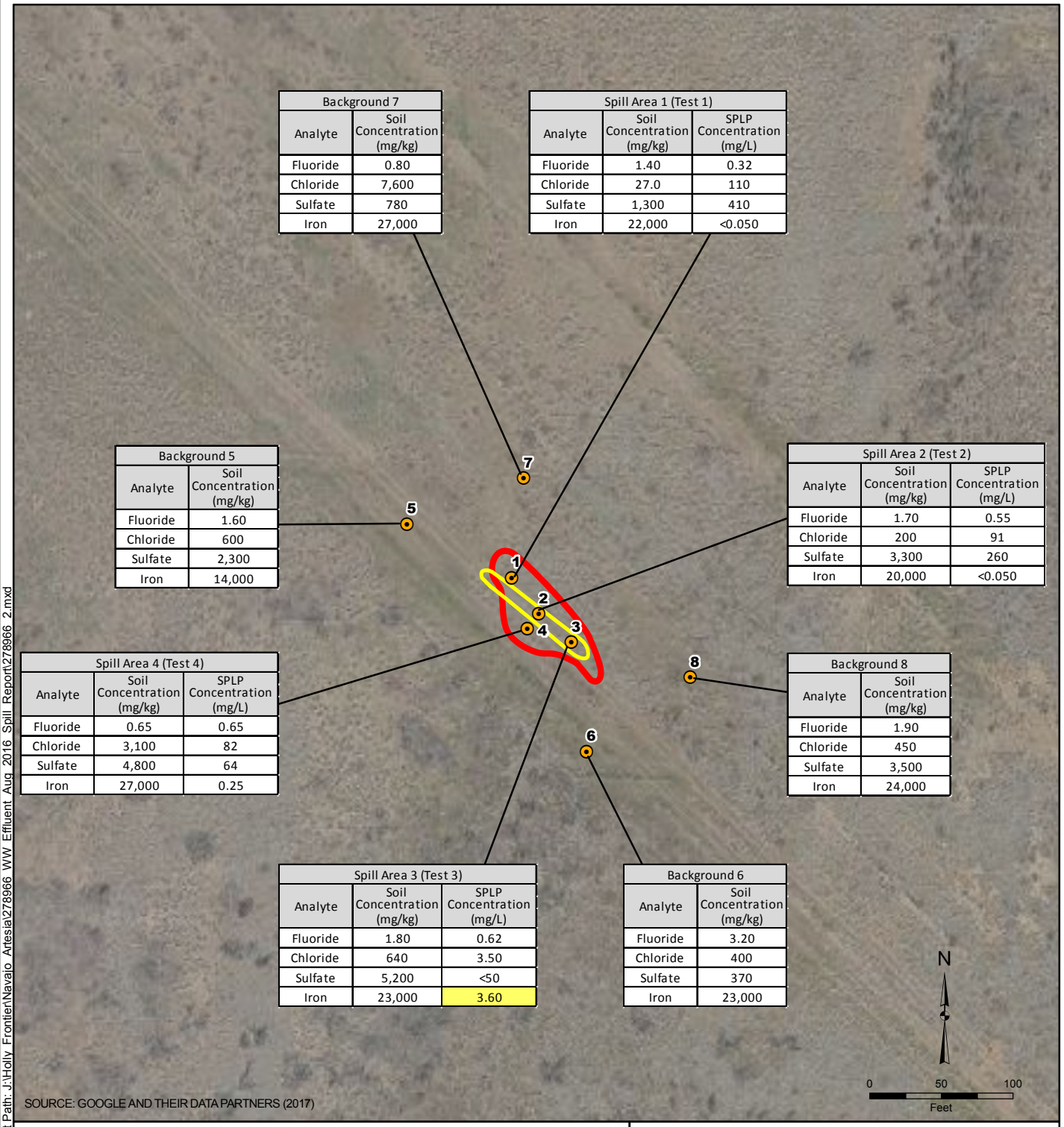
SITE LOCATION MAP

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

TRC
505 E. HUNTLAND DR.
SUITE 250
AUSTIN, TX 78752
PH:512-329-6080

FIGURE 1



Document Path: J:\Holly Frontier\Navajo Artesia\278966 WW Effluent Aug 2016 Spill Report\278966 2.mxd

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

TRC
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:	Wastewater Effluent
			Date:	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

	Release Area Soil Samples[1]				Non-Release "Background" Samples[1]				Max Release Area	Max Background
Sample Location:	**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

	Release Area Soil SPLP Samples[2]				Wastewater Effluent[3]	WQCC Standard[4]
Sample Location:	**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 yellw

[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,<<>>



Andy Freeman

Laboratory Manager

4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.	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	**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.	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**	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.	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-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.	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-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.	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

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: 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: 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 >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: ☐ 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

Client: Holly Frontier

Mailing Address: P.O. Box 159
ARTESIA, NM 88211

Phone #: 575-746-5281

email or Fax#: 575-746-5451

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

Accreditation:
☐ NELAP ☐ Other
☐ EDD (Type)

Turn-Around Time:
☒ Standard ☐ Rush

Project Name: Effluent Release 8/10/16

Project #: Effluent Release

Project Manager: ROBERT COMBS

Sampler:

On Ice: ☒ Yes ☐ No

Sample Temperature: ~~78° when collected~~ 4.7°C

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

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1610723	Analysis Request: Chloride	Fluoride	Sulfate	TDS	TDS (Cromic dissolved Solids) mg 10/14/16
10/12/16	8:27 AM	Soil	Test 1	Jar #1	on Ice	001	X	X	X	X	
10/12/16	8:32 AM		Test 2	#2		002					
10/12/16	8:37 AM		Test 3	#3		003					
10/12/16	8:44 AM		Test 4	#4		004					
10/12/16	8:56 AM		Background 5	#5		005					
10/12/16	9:01 AM		Background 6	#6		006					
10/12/16	9:08 AM		Background 7	#7		007					
10/12/16	9:14 AM	↓	Background 8	#8		008	↓	↓	↓	↓	
			SPLP			-011					
			Test 3 Leachate			-009					
			Test 4 Leachate			-010					
			~~Kr~~ 11/09/16								

Date	Time	Relinquished by:	Received by:	Date	Time
10/13/16	6:45 PM	L Dade		10/14/16	0945

Remarks: Verified analysis with Randy Dade mg 10/14/16.
Add SPLP -3, -4 for Cl, Fe
for fluor + sf 11/4

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 qualifers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

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

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

Sincerely,



Andy Freeman

Laboratory Manager

4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: 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:

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D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
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S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: 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:

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D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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.

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.

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.

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.

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

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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
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Hall Environmental Analysis Laboratory, Inc.

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:

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D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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.

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.

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:

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D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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.

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:

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D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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:

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H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **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:

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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:

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D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **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:

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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
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: **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:

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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.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **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.	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-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.	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-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
Mercury	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.	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-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.	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 **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.	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 **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.	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	**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.	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 **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.	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	**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.	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	**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.	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	**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.	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:	**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	**lcs-1**	SampType:	**lcs**	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.	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-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

HALL ENVIRONMENTAL ANALYSIS LABORATORY

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

Sample Log-In Check List

Client Name: **NAVAJO REFINING COM** Work Order Number: **1608660** RcptNo: **1**

Received by/date: AD 08/11/16

Logged By: **Lindsay Mangin** **8/11/2016 9:05:00 AM**

Completed By: **Lindsay Mangin** **8/11/2016 10:45:24 AM**

Reviewed By: aJ 08/11/16

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?	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 ☐	# of preserved bottles checked for pH: 3 2 (<2 or >12 unless noted)
13. Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	Adjusted? 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 ☐	Checked by: aJ

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			

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:

☐ Standard ☐ Level 4 (Full Validation)

☐ Other _____

☐ EDD (Type) _____

☐ Standar X Rush

Project Name:

Waste Water Effluent 8-10-16

Project #: P.O. # 167796

Project Manager: Robert Combs

Sampler: Brady Hubbard

On Ice: ☒ Yes ☐ No

Sample Temperature: 1.5°C

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1608460	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,I/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
8/10/16	10:55	Liquid	Waste Water Effluent 8-10-16	3	Neat/H2SO4	-001	X						X
8/10/16	10:55	Liquid	Waste Water Effluent 8-10-16	1	HNO3	-001					X	X	
8/10/16	10:55	Liquid	Waste Water Effluent 8-10-16	3	HCL	-001		X					
8/10/16	10:55	Liquid	Waste Water Effluent 8-10-16	2	Neat	-001			X				
8/10/16	10:55	Liquid	Waste Water Effluent 8-10-16	2	Neat	-001				X			
8/10/16	10:55	Liquid	Waste Water Effluent 8-10-16	2	Neat	-001		X					
8/10/16	10:55	Liquid	Waste Water Effluent 8-10-16	1	Neat	-001							

Date:	Time:	Relinquished by:	Received by:	Date	Time
8-10-16	4:00	Brady Hubbard			
Date:	Time:	Relinquished by:	Received by:	08/11/16	0905

Remarks: Send results to Robert Combs

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

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,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Analytical Report
Lab Order **1704B56**
Date Reported: **4/28/2017**

Hall Environmental Analysis Laboratory, Inc.

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.

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.

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.

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.	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-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.	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

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: 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: SRC 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 ☐	# of preserved bottles checked for pH: _____ (<2 or >12 unless noted)
13. Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	Adjusted? _____
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 ☐	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	4.1	Good	Yes			

Chain-of-Custody Record

Client:	HollyFrontier Navajo Refining LLC
Mailing Address:	PO Box 159 Artesia, NM 88211-0159
Phone #:	575-308-2718
email or Fax#:	
QA/QC Package:	Standard / X Level 4 (Full Validation)
	☐ Other _____
	☐ EDD (Type) _____
Turn-Around Time:	Standard ☐ Rush X
Project Name	2016 Effluent PL Release
Project #:	PO: 231642
Project Manager:	Robert Combs Scott Denton
Sampler:	Dave Boyer
On Ice:	X Yes ☐ No
Sample Temperature:	4.1

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1704B56	SPLP Cl, F, SO4, Fe
4/25/2017	1345	soil	SP-1 Test 1	4oz,2	Cool	-001	X
4/25/2017	1350	soil	SP-2 Test 2	"	"	-002	X
4/25/2017	1355	soil	SP-3 Test 3	"	"	-003	X
4/25/2017	1400	soil	SP-3 Test 4	4oz,2	Cool	-004	X

Date:	Time:	Relinquished by:	Received by:	Date	Time
4/25/17	1500			4/25/17	1500
4/25/17	1900			04/26/17	0935

Remarks: cc: Randy Dade

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	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
	18	17S	27E					

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? ☒ Yes ☐ No ☒ 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? ☐ Yes ☒ 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:	Attached ☐
Date: 5/23/17 Phone: 575-746-5382		

* 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.

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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.

Amec Foster Wheeler Environment & Infrastructure, Inc.
585 North Dairy Ashford
Houston, Texas 77079
Tel: 713-929-5000
amecfw.com

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

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	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
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
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
Motor Oil Range Organics	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
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
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	< 0.00148
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
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

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 Levelfor 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,



Andy Freeman

Laboratory Manager

4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

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.

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.

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.

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.

CLIENT: Navajo Refining Company
Project: 2015 Effluent PL Release
Lab ID: 1704B58-005 **Matrix:** LEACHATE

Client Sample ID: Center Pile Sample 2
Collection Date: 5/12/2017 8:00:00 AM
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.

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.	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	**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.	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 **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.	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 **1704b58-002ams**	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.	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-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.	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

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° 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	2.1	Good	Yes			

Client:	HollyFrontier Navajo Refining LLC
Mailing Address:	PO Box 159 Artesia, NM 88211-0159
Phone #:	575-308-2718
email or Fax#:	
QA/QC Package:	Standard X Level 4 (Full Validation) ☐ Other ☐ EDD (Type)
Standard	☐ Rush X
Project Name	2015 Effluent PL Release
Project #:	PO: 231642
Project Manager:	Robert Combs Scott Denton
Sampler:	Dave Boyer
On Ice:	X Yes ☐ No
Sample Temperature:	4.1

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

Date	Time	Matrix	Sample Request ID	Container Type and # (4oz Glass)	Preservative Type	HEAL No. 1704B58	Analysis Request: 8260B:WQCC List VOCs	6010: WQCC Metals (Fe, Mn)	8015: GRO, DRO, ORO	300 Chloride, Fluoride, Sulfate
4/25/2017	1120	soil	South Pile sample 1	2, 4oz	Cool	001	X	X	X	X
4/25/2017	1125	soil	Center Pile sample 2	2, 4oz	Cool	002	X	X	X	X
4/25/2017	1130	soil	North Pile sample 3	2, 4oz	Cool	003	X	X	X	X

Date: 4/25/17	Time: 1500	Relinquished by:	Received by:	Date: 4/25/17	Time: 1500
Date: 4/26/17	Time: 0700	Relinquished by:	Received by:	Date: 04/26/17	Time: 0435

Remarks: cc: Randy Dade

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.
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.

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	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
	18	17S	27E					

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? ☒ Yes ☐ No ☒ 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? ☐ Yes ☒ 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:	Attached ☐
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,

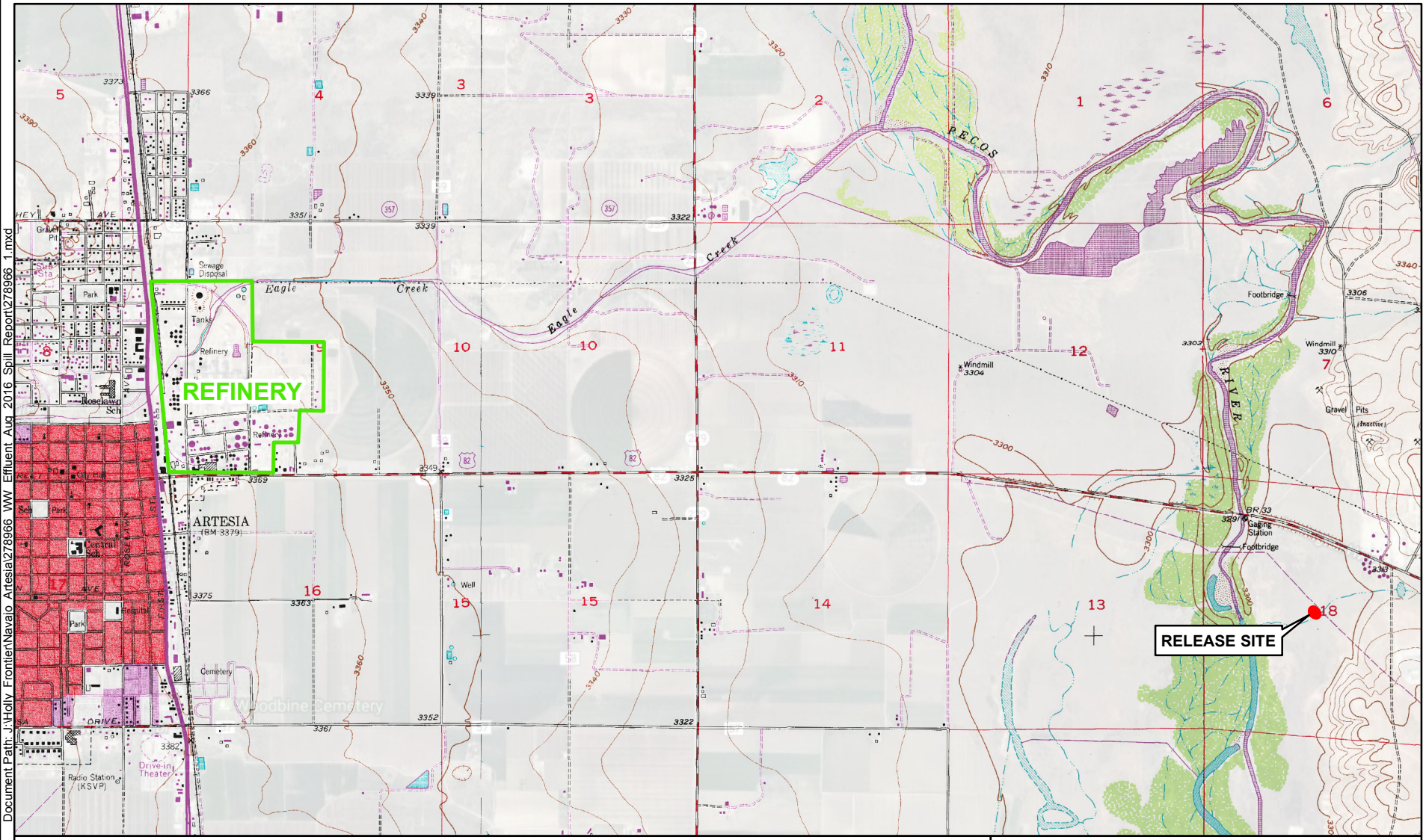


Julie Speer
Project Manager
TRC Environmental Corporation

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.

N

0 1,500 3,000
Feet

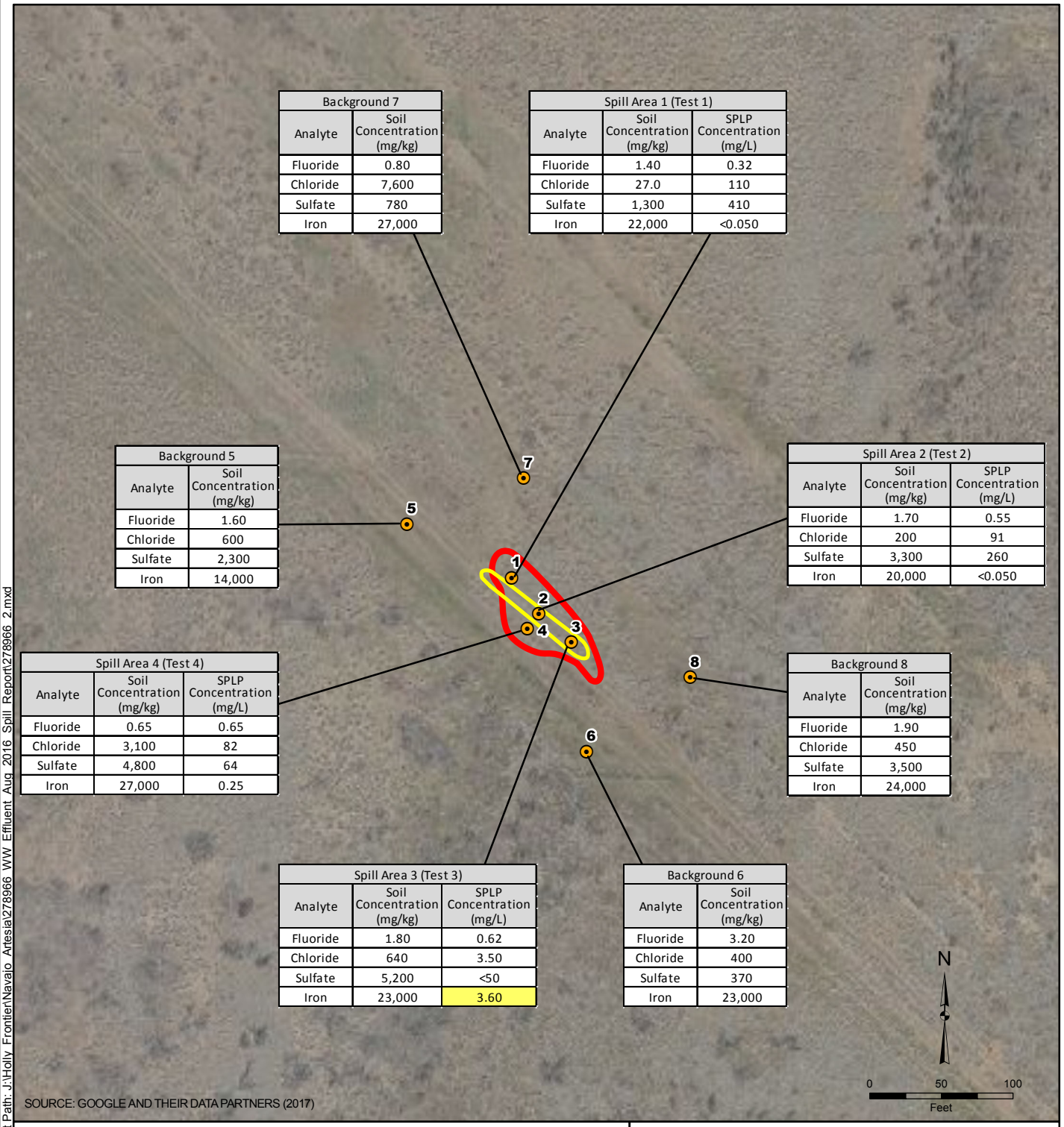
SITE LOCATION MAP

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

TRC
505 E. HUNTLAND DR.
SUITE 250
AUSTIN, TX 78752
PH:512-329-6080

FIGURE 1



Document Path: J:\Holly Frontier\Navajo Artesia\278966 WW Effluent Aug 2016 Spill Report\278966 2.mxd

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

TRC
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:	Wastewater Effluent
			Date:	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

	Release Area Soil Samples[1]				Non-Release "Background" Samples[1]				Max Release Area	Max Background
Sample Location:	**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

	Release Area Soil SPLP Samples[2]				Wastewater Effluent[3]	WQCC Standard[4]
Sample Location:	**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 yellw

[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,<<>>



Andy Freeman

Laboratory Manager

4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.	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	**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.	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**	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.	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-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.	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-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.	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

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: 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: 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 >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: ☐ 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

Client: Holly Frontier

Mailing Address: P.O. Box 159
ARTESIA, NM 88211

Phone #: 575-746-5281

email or Fax#: 575-746-5451

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

Accreditation:
☐ NELAP ☐ Other
☐ EDD (Type)

Turn-Around Time:
☒ Standard ☐ Rush

Project Name: Effluent Release 8/10/16

Project #: Effluent Release

Project Manager: ROBERT COMBS

Sampler:

On Ice: ☒ Yes ☐ No

Sample Temperature: ~~78° when collected~~ 4.7°C

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

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1610723	Analysis Request: Chloride	Fluoride	Sulfate	TDS	TDS (Cromic dissolved Solids) mg 10/14/16
10/12/16	8:27 AM	Soil	Test 1	Jar #1	on Ice	001	X	X	X	X	
10/12/16	8:32 AM		Test 2	#2		002					
10/12/16	8:37 AM		Test 3	#3		003					
10/12/16	8:44 AM		Test 4	#4		004					
10/12/16	8:56 AM		Background 5	#5		005					
10/12/16	9:01 AM		Background 6	#6		006					
10/12/16	9:08 AM		Background 7	#7		007					
10/12/16	9:14 AM	↓	Background 8	#8		008	↓	↓	↓	↓	
			SPLP			-011					
			Test 3 Leachate			-009					
			Test 4 Leachate			-010					
			~~Kr~~ 11/09/16								

Date	Time	Relinquished by:	Received by:	Date	Time
10/13/16	6:45 PM	L Dade		10/14/16	0945

Remarks: Verified analysis with Randy Dade mg 10/14/16.
Add SPLP -3, -4 for Cl, Fe
for fluor + sf 11/4

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 qualifers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

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

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

Sincerely,



Andy Freeman

Laboratory Manager

4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: 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

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Qualifiers:

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H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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.

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

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Hall Environmental Analysis Laboratory, Inc.

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

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Hall Environmental Analysis Laboratory, Inc.

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

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Hall Environmental Analysis Laboratory, Inc.

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

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Hall Environmental Analysis Laboratory, Inc.

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

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D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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.

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.

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.

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:

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D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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.

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:

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D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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:

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D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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: **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.	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: **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.	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: **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.	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: **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.	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: **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.	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	**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.	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-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.	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-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
Mercury	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.	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-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.	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 **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.	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 **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.	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	**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.	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 **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.	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	**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.	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	**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.	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	**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.	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:	**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	**lcs-1**	SampType:	**lcs**	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.	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-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

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
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Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: **NAVAJO REFINING COM** Work Order Number: **1608660** RcptNo: **1**

Received by/date: AD 08/11/16

Logged By: **Lindsay Mangin** **8/11/2016 9:05:00 AM**

Completed By: **Lindsay Mangin** **8/11/2016 10:45:24 AM**

Reviewed By: aJ 08/11/16

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?	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 ☐	# of preserved bottles checked for pH: 3 2 (<2 or >12 unless noted)
13. Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	Adjusted? 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 ☐	Checked by: aJ

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			

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:

☐ Standard ☐ Level 4 (Full Validation)

☐ Other _____

☐ EDD (Type) _____

☐ Standar X Rush

Project Name:

Waste Water Effluent 8-10-16

Project #: P.O. # 167796

Project Manager: Robert Combs

Sampler: Brady Hubbard

On Ice: ☒ Yes ☐ No

Sample Temperature: 1.5°C

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1608460	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,I/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
8/10/16	10:55	Liquid	Waste Water Effluent 8-10-16	3	Neat/H2SO4	-001	X						X
8/10/16	10:55	Liquid	Waste Water Effluent 8-10-16	1	HNO3	-001					X	X	
8/10/16	10:55	Liquid	Waste Water Effluent 8-10-16	3	HCL	-001		X					
8/10/16	10:55	Liquid	Waste Water Effluent 8-10-16	2	Neat	-001			X				
8/10/16	10:55	Liquid	Waste Water Effluent 8-10-16	2	Neat	-001				X			
8/10/16	10:55	Liquid	Waste Water Effluent 8-10-16	2	Neat	-001		X					
8/10/16	10:55	Liquid	Waste Water Effluent 8-10-16	1	Neat	-001							

Date:	Time:	Relinquished by:	Received by:	Date	Time
8-10-16	4:00	Brady Hubbard			
Date:	Time:	Relinquished by:	Received by:	08/11/16	0905

Remarks: Send results to Robert Combs

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

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,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Analytical Report
Lab Order **1704B56**
Date Reported: **4/28/2017**

Hall Environmental Analysis Laboratory, Inc.

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.

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.

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.

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.	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-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.	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

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: 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: SRC 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 ☐	# of preserved bottles checked for pH: _____ (<2 or >12 unless noted)
13. Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	Adjusted? _____
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 ☐	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	4.1	Good	Yes			

Chain-of-Custody Record

Client:	HollyFrontier Navajo Refining LLC
Mailing Address:	PO Box 159 Artesia, NM 88211-0159
Phone #:	575-308-2718
email or Fax#:	
QA/QC Package:	Standard / X Level 4 (Full Validation)
	☐ Other _____
	☐ EDD (Type) _____
Turn-Around Time:	Standard ☐ Rush X
Project Name	2016 Effluent PL Release
Project #:	PO: 231642
Project Manager:	Robert Combs Scott Denton
Sampler:	Dave Boyer
On Ice:	X Yes ☐ No
Sample Temperature:	4.1

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1704B56	SPLP Cl, F, SO4, Fe
4/25/2017	1345	soil	SP-1 Test 1	4oz,2	Cool	-001	X
4/25/2017	1350	soil	SP-2 Test 2	"	"	-002	X
4/25/2017	1355	soil	SP-3 Test 3	"	"	-003	X
4/25/2017	1400	soil	SP-3 Test 4	4oz,2	Cool	-004	X

Date:	Time:	Relinquished by:	Received by:	Date	Time
4/25/17	1500			4/25/17	1500
4/25/17	1900			04/26/17	0935

Remarks: cc: Randy Dade

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.

"Amended"

Release Notification and Corrective Action

OPERATOR

X☐X Initial Report ☐ Final Report

Name of Company: Hollyfrontier Navajo Refining LLC	Contact: Randy Dade
Address: P.O.Box 159	Telephone No.: 575-746-5281
Facility Name: Navajo Refinery	Facility Type: Refinery

Surface Owner: Hollyfrontier	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: EDDY

Latitude 32° 50' 34" N **Longitude** -104° 23' 31" W

NATURE OF RELEASE

Type of Release: Asphalt	Volume of Release: 15-20 BBLs	Volume Recovered: All of Release
Source of Release: Hole in Piping	Date and Hour of Occurrence:3/30/2017 @ 9:00AM	Date and Hour of Discovery: 3/30/2017 @ 9:00AM
Was Immediate Notice Given? ☐ Yes X☐X No ☐ Not Required	If YES, To Whom?	
By Whom?	Date and Hour	
Was a Watercourse Reached? ☐ Yes X☐X No	If YES, Volume Impacting the Watercourse. N/A	

If a Watercourse was Impacted, Describe Fully.*

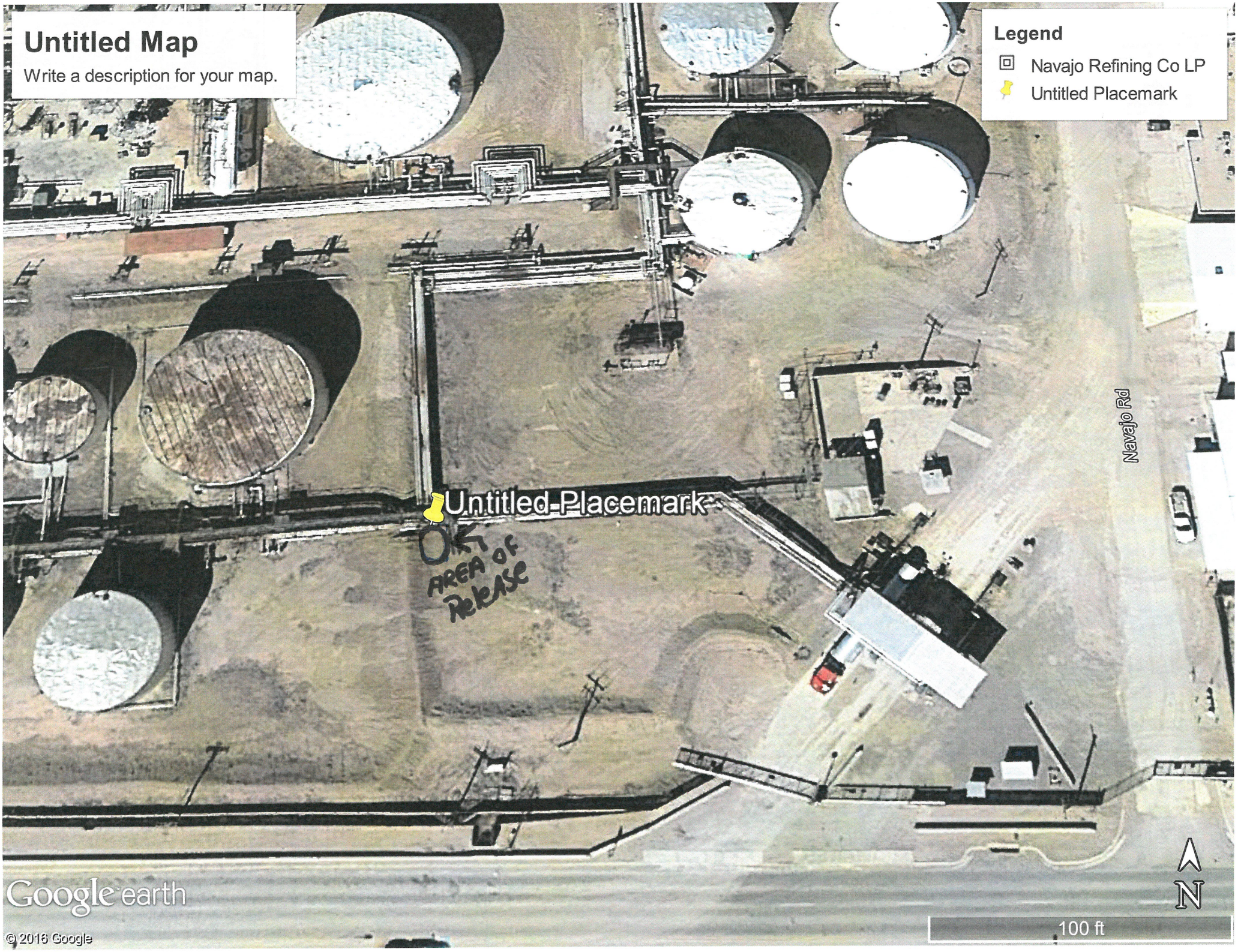
Describe Cause of Problem and Remedial Action Taken.*
Hole in piping at south truck unloading rack, trucks were shut down and maintence crew notified for clean up. Block Valves shut and LO/TO performed. Work order submitted to repair pipe. Truck Rack is shut down until repairs can be made.

Describe Area Affected and Cleanup Action Taken.*
Asphalt product was at 250 degrees and solidified in the dirt . Crew picked up material and disposed of material and dirt in a roll off bin.

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: Lewis R Dade	OIL CONSERVATION DIVISION	
Printed Name: Lewis R. Dade	Approved by Environmental Specialist:	
Title: Environmental Specialist	Approval Date:3/31/2017	Expiration Date:
E-mail Address: Lewis.Dade@HollyFrontier Corp	Conditions of Approval:	Attached ☐
Date: 3/31/2017 Phone: 575-746-5281		

* Attach Additional Sheets If Necessary Google Photo for reference


Untitled Map
Write a description for your map.
Legend
Navajo Refining Co LP
Untitled Placemark
Navajo Rd
Untitled Placemark
AREA of Release
N
100 ft
Google earth
© 2016 Google

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 sols 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-emplace 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 discreet 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.

			Well:	MW-114				MW-115					MW-116						MW-117				MW-118				MW-119				RO Discharge						
			Date:	2/3/2013	#####	9/5/2013	11/21/2013	2/3/2013	5/15/2013	5/15/2013	9/4/2013	######	2/3/2013	5/16/2013	9/4/2013	9/4/2013	######	######	2/3/2013	#####	9/4/2013	#####	2/5/2013	5/15/2013	9/4/2013	######	2/5/2013	#####	9/4/2013	#####	2/3/2013	5/16/2013	9/5/2013	#####			
Analyte	CGWSL	CGWSL Source		Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Sampled	Detected	xceedances
Dissolved Metals (mg/L)																																				
Aluminum, Dissolved	5.00E+00	NMED GW Irrigation (20.6.2.3103.C)		0.0265		0.00848	0.00813	0.00888	0.00865	0.00816	0.00648	0.00714		0.349	0.0118	0.0126	0.0073	0.00814	0.0289	0.0184	0.0169	0.0298		0.00796	0.00992	0.0103		0.0296	0.0113	0.0149	0.00668	0.00529	0.00809	0.0567	31	27	0
Arsenic, Dissolved	1.00E-02	EPA MCL		0.00561	0.00437	0.00502	0.00539	0.00499	0.00427	0.00478	0.00467	0.00616	0.00274	0.00502	0.00467	0.00535	0.00526	0.00525	0.00498	0.00367	0.00559	0.00347	***0.011***	***0.0146***	***0.0156***	***0.0125***	0.00294	0.00537	0.00595	0.00438	0.00494	0.0025	0.00244	0.00125	31	31	4
Barium, Dissolved	1.00E+00	NMED GW Human Health (20.6.2.3103.A)		0.0204	0.0129	0.017	0.0112	0.0309	0.011	0.0107	0.0106	0.011	0.0161	0.0111	0.00946	0.00928	0.011	0.00989	0.0235	0.0113	0.0108	0.0108	0.0145	0.00919	0.0099	0.00964	0.00981	0.00625	0.00864	0.00973	0.0628	0.0464	0.0553	0.0533	31	31	0
Boron, Dissolved	7.50E-01	NMED GW Irrigation (20.6.2.3103.C)		0.139	0.101	0.132	***0.816***	***0.865***	0.635	0.605	***0.782***	***0.858***	0.22	0.238	0.281	0.304	0.307	0.312	0.207	0.175	0.202	0.204	0.226	0.23	0.307	0.288	0.0987	0.13	0.183	0.219	0.143	0.104	0.0934	0.109	31	31	4
Cadmium, Dissolved	5.00E-03	EPA MCL																																	31	0	0
Calcium, Dissolved	--			600	576	672	558	518	495	511	622	606	624	578	631	588	616	606	568	524	550	556	563	530	543	532	494	491	635	551	625	397	410	459	31	31	0
Chromium, Dissolved	5.00E-02	NMED GW Human Health (20.6.2.3103.A)					0.00119							0.00119												0.00105				0.00116			0.00114		31	5	0
Cobalt, Dissolved	5.00E-02	NMED GW Irrigation (20.6.2.3103.C)		0.00738	0.00451	0.00718		0.0029											0.00256								0.000871								31	6	0
Copper, Dissolved	1.00E+00	NMED GW Irrigation (20.6.2.3103.C)				0.00197		0.00704	0.00151					0.00176					0.0141			0.00345	0.00156	0.00156		0.00338	0.00309	0.00137		0.00311	0.00177			0.00218	31	14	0
Iron, Dissolved	1.00E+00	NMED GW Irrigation (20.6.2.3103.C)					0.167							0.201			0.132					0.11				0.179				0.185				0.113	31	7	0
Lead, Dissolved	1.50E-02	EPA MCL																				0.00125				0.00107									31	2	0
Manganese, Dissolved	2.00E-01	NMED GW Domestic (20.6.2.3103.B)		***1.51***	***0.844***	***1.42***	0.035	***0.255***	0.023	0.0267	0.0362	0.0249	0.0437	0.0342	0.00366	0.00478	0.00576	0.0092	0.108	0.00978	0.00502	0.00982	0.0232			0.00526	0.0424			0.00459				0.0111	31	24	4
Mercury, Dissolved	2.00E-03	NMED GW Human Health (20.6.2.3103.A)											0.000131	0.000046	0.00006	0.000061							0.000042												31	5	0
Molybdenum, Dissolved	1.00E+00	NMED GW Irrigation (20.6.2.3103.C)		0.0103	0.00978	0.0116	0.00815	0.00877	0.00723	0.0075	0.00663	0.00738	0.00348	0.00308	0.003	0.00304	0.00336	0.0035	0.0112	0.00664	0.014	0.0114	0.0195	0.0179	0.0162	0.0141	0.0083	0.00745	0.00846	0.00861	0.0125	0.00622	0.00604	0.00815	31	31	0
Nickel, Dissolved	2.00E-01	NMED GW Irrigation (20.6.2.3103.C)		0.00651	0.0041	0.00558	0.00369	0.00483	0.00225		0.00208	0.00206	0.0012	0.00204	0.00112	0.00115	0.00144	0.00245	0.00413		0.00189	0.00305	0.00173	0.00184	0.00131	0.00214	0.00174	0.00163	0.0014	0.00222	0.00264		0.00329	0.00127	31	28	0
Potassium, Dissolved	--			2.86	2.76	2.94	0.678	1.78	0.766	0.78	0.782	0.709	1.06	1.38	1.22	1.21	1.37	1.3	6.92	4.37	8.92	7.54	7.95	7.2	7.69	6.92	0.87	0.794	0.993	1.1	4.41	2.91	2.72	3.04	31	31	0
Selenium, Dissolved	5.00E-02	NMED GW Human Health (20.6.2.3103.A)		0.00222	0.00636	0.00245	0.00451	0.0081	0.00734	0.00654	0.00568	0.00506	0.00203	0.00733	0.00558	0.00493	0.00582	0.00611	0.00427	0.00585	0.00316	0.0038	0.00861	0.0127	0.0129	0.00327	0.00246	0.00506	0.0066	0.00144	0.013	0.0075	0.00669	0.00481	31	31	0
Silver, Dissolved	5.00E-02	NMED GW Human Health (20.6.2.3103.A)																																	31	0	0
Sodium, Dissolved	--			146	123	138	250	199	201	206	247	261	206	194	230	235	235	235	176	160	118	115	218	229	215	163	127	120	133	98.8	65.4	40.4	45.7	83.9	31	31	0
Uranium	3.00E-02	NMED GW Human Health (20.6.2.3103.A)		0.0156	0.0108	0.0138	***0.0856***	***0.0843***	***0.0731***	***0.0825***	***0.0936***	***0.0874***	***0.0331***	***0.0343***	***0.0388***	***0.04***	***0.0387***	***0.0391***	0.0263	0.0247	0.0224	0.0182	***0.037***	***0.033***	***0.0395***	***0.0311***	0.0244	0.0222	0.0275	0.0213	0.00601					31	28	16
Zinc, Dissolved	1.00E+01	NMED GW Domestic (20.6.2.3103.B)		0.00343			0.0806	0.00973		0.00821		0.0257					0.0218	0.0311	0.0123		0.00266	0.0343				0.0407				0.0241	0.0132	0.00516	0.00672	0.00909	31	16	0
Anions (mg/L)																																				
Chloride	2.50E+02	NMED GW Domestic (20.6.2.3103.B)		158	150	199	***422***	***422***	***364***	***373***	***530***	***428***	***389***	***330***	***339***	***344***	***331***	***331***	154	137	71	92.4	***296***	***287***	132	90.1	116	118	244	185	67.5	38.2	61.1	134	31	31	14
Fluoride (F-, Anion)	1.60E+00	NMED GW Human Health (20.6.2.3103.A)		***1.76***	***1.91***	***1.82***	1.37	1.1	1.15	1.18	0.845	1.36	1.31	1.19	1.11	1.17	1.51	***1.61***	***2.73***	***2.29***	***2.8***	***3.95***	***5.16***	***5.39***	***4.48***	***6.78***	***2.36***	***2.43***	***2.28***	***3.17***	***3.32***	***2.15***	***2.26***	***2.67***	31	31	20
Nitrate/Nitrite	--																0.487	0.457						2.09					1.91			2.11		1.06	31	6	0
Nitrate-N	1.00E+00	NMED GW Human Health (20.6.2.3103.A)		***1.43***				0.821					***1.37***										***2.39***				***2.35***				***3.22***				31	6	5
Nitrite	--							0.141																											31	1	0
Sulfate	6.00E+02	NMED GW Domestic (20.6.2.3103.B)		***2200***	***1800***	***1950***	***3060***	***2790***	***2420***	***2490***	***2900***	***3090***	***2250***	***2080***	***2140***	***2180***	***2470***	***2470***	***2310***	***2010***	***2020***	***2190***	***2450***	***2250***	***2310***	***2470***	***2090***	***1970***	***1940***	***2210***	***1690***	***1080***	***1030***	***1240***	31	31	31
Cyanide	2.00E-01	EPA MCL			0.00432																										0.00487			31	2	0
Radium (pCi/L)																																				
Radium-226	--			0.43															0.54				0.38												31	3	0
Radium-228	--			0.74															0.89				0.87												31	3	0
Radium-226 & Radium-228	5.00E+00	USEPA MCL		1.17				0					0						1.43				1.25				0								31	6	0
Total Dissolved Solids (mg/L)																																				
Total Dissolved Solids	1.00E+03	NMED GW Domestic (20.6.2.3103.B)		***3760***	***3990***	***3870***	***5390***	***4960***	***4990***	***5510***	***6130***	***5370***	***3650***	***4480***	***4470***	***4440***	***4210***	***4570***	***3910***	***4260***	***3970***	***4150***	***4610***	***5090***	***4550***	***4640***	***3670***	***4030***	***4030***	***4130***	***3150***	***2410***	***2290***	***2770***	31	31	31
TPH (mg/L)																																				
Gasoline Range Organics	--																						0.0436				0.0371								31	2	0
TPH Diesel Range	2.00E-01	NMED TPH																																	31	0	0
Oil	2.00E-01	NMED TPH																													0.17				31	1	0
VOCs (mg/L)																																				
1,1,1-Trichloroethane	6.00E-02	NMED GW Human Health (20.6.2.3103.A)																																	31	0	0
1,1,2,2-Tetrachloroethane	1.00E-02	NMED GW Human Health (20.6.2.3103.A)																																	31	0	0
1,1,2-Trichloroethane	5.00E-03	EPA MCL																																	31	0	0
1,1-Dichloroethane	2.50E-02	NMED GW Human Health (20.6.2.3103.A)																																	31	0	0
1,1-Dichloroethene	7.00E-03	USEPA MCL																																	31	0	0
1,2-Dibromoethane	5.00E-05	EPA MCL																																	31	0	0
1,2-Dichloroethane	5.00E-03	EPA MCL																																	31	0	0
Benzene	5.00E-03	EPA MCL																					0.0042				0.0036								31	2	0
Carbon Tetrachloride	5.00E-03	EPA MCL																																	31	0	0
Chloroform	8.00E-02	NMED GW Human Health (20.6.2.3103.A)																																	31	0	0
Dichloromethane	5.00E-03	EPA MCL																																	31	0	0
Ethylbenzene	7.00E-01	EPA MCL																					0.0024				0.0021								31	2	0
Tetrachloroethene	5.00E-03	EPA MCL																																	31	0	0
Toluene	7.50E-01	NMED GW Human Health (20.6.2.3103.A)																					0.0033				0.0027								31	2	0
Total Xylenes	6.20E-01	NMED GW Human Health (20.6.2.3103.A)																					0.0047				0.0037								31	2	0
Trichloroethene	5.00E-03	EPA MCL																																	31	0	0
Vinyl Chloride	1.00E-03	NMED GW Human Health (20.6.2.3103.A)																																	31	0	0
SVOCs (mg/L)																																				
1-Methylnaphthalene	--																																			
2-Methylnaphthalene	--																																			
Naphthalene	3.00E-02	NMED GW Human Health (20.6.2.3103.A)																																	31	0	0
Benzo(a)Pyrene	2.00E-04	EPA MCL																																	31	0	0
pH	6 to 9	NMED GW Domestic (20.6.2.3103.B)				7.07	6.73				7.07	6.73			7.19	7.2	6.86	6.81			7.1	6.75			7.1	6.5			7.3	6.87			7.82	7.54	31	16	0

Analyte
Dissolved Metals (
Aluminum, Dissolve
Arsenic, Dissolved
Barium, Dissolved
Boron, Dissolved
Cadmium, Dissolvec
Calcium, Dissolved
Chromium, Dissolve
Cobalt, Dissolved
Copper, Dissolved
Iron, Dissolved
Lead, Dissolved
Manganese, Dissolv
Mercury, Dissolved
Molybdenum, Disso
Nickel, Dissolved
Potassium, Dissolve
Selenium, Dissolved
Silver, Dissolved
Sodium, Dissolved
Uranium
Zinc, Dissolved
Anions (mg/L)
Chloride
Fluoride (F-, Anion)
Nitrate/Nitrite
Nitrate-N
Nitrite
Sulfate
Cyanide
Radium (pCi/L)
Radium-226
Radium-228
Radium-226 & Radi
Total Dissolved Sc
Total Dissolved Soli
TPH (mg/L)
Gasoline Range Org
TPH Diesel Range
Oil
VOCs (mg/L)
1,1,1-Trichloroethar
1,1,2,2-Tetrachloroe
1,1,2-Trichloroethar
1,1-Dichloroethane
1,1-Dichloroethene
1,2-Dibromoethane
1,2-Dichloroethane
Benzene
Carbon Tetrachlorid
Chloroform
Dichloromethane
Ethylbenzene
Tetrachloroethene
Toluene
Total Xylenes
Trichloroethene
Vinyl Chloride
SVOCs (mg/L)
1-Methylnaphthalen
2-Methylnaphthalen
Naphthalene
Benzo(a)Pyrene
pH

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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

This e-mail may contain information that is privileged and confidential. If you received this message in error, please advise the sender immediately and delete this email. Unless expressly stated, this message is not a digital or electronic signature or a commitment to a binding agreement.

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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 qualifers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

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

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

Sincerely,



Andy Freeman

Laboratory Manager

4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: 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.

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

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Qualifiers:

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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.

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

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Qualifiers:

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Hall Environmental Analysis Laboratory, Inc.

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

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Qualifiers:

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Hall Environmental Analysis Laboratory, Inc.

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

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Qualifiers:

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Hall Environmental Analysis Laboratory, Inc.

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

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Qualifiers:

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Hall Environmental Analysis Laboratory, Inc.

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:

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D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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.

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

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Qualifiers:

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S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: TRIP BLANK
Project: 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

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Qualifiers:

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Hall Environmental Analysis Laboratory, Inc.

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:

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S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **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:

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D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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: **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.	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: **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.	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: **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.	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: **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.	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: **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.	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	**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.	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-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.	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-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
Mercury	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.	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-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.	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 **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.	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 **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.	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	**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.	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 **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.	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	**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.	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	**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.	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	**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.	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:	**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	**lcs-1**	SampType:	**lcs**	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.	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-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

HALL ENVIRONMENTAL ANALYSIS LABORATORY

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

Sample Log-In Check List

Client Name: **NAVAJO REFINING COM** Work Order Number: **1608660** RcptNo: **1**

Received by/date: AD 08/11/16

Logged By: **Lindsay Mangin** **8/11/2016 9:05:00 AM**

Completed By: **Lindsay Mangin** **8/11/2016 10:45:24 AM**

Reviewed By: aJ 08/11/16

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?	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 ☐	# of preserved bottles checked for pH: 3 2 (<2 or >12 unless noted)
13. Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	Adjusted? 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 ☐	Checked by: aJ

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			

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:

☐ Standard ☐ Level 4 (Full Validation)

☐ Other _____

☐ EDD (Type) _____

☐ Standar X Rush

Project Name:

Waste Water Effluent 8-10-16

Project #: P.O. # 167796

Project Manager: Robert Combs

Sampler: Brady Hubbard

On Ice: ☒ Yes ☐ No

Sample Temperature: 1.5°C

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1608460	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,I/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
8/10/16	10:55	Liquid	Waste Water Effluent 8-10-16	3	Neat/H2SO4	-001	X						X
8/10/16	10:55	Liquid	Waste Water Effluent 8-10-16	1	HNO3	-001					X	X	
8/10/16	10:55	Liquid	Waste Water Effluent 8-10-16	3	HCL	-001		X					
8/10/16	10:55	Liquid	Waste Water Effluent 8-10-16	2	Neat	-001			X				
8/10/16	10:55	Liquid	Waste Water Effluent 8-10-16	2	Neat	-001				X			
8/10/16	10:55	Liquid	Waste Water Effluent 8-10-16	2	Neat	-001		X					
8/10/16	10:55	Liquid	Waste Water Effluent 8-10-16	1	Neat	-001							

Date:	Time:	Relinquished by:	Received by:	Date	Time
8-10-16	4:00	Brady Hubbard			
Date:	Time:	Relinquished by:	Received by:	08/11/16	0905

Remarks: Send results to Robert Combs

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.

			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)		

'-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***

7.07	6.73				7.07	6.73		

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		
339	***344***	***331***	***331***	154	137	71	92.4	***296***	***287***
1.11	1.17	1.51	***1.61***	***2.73***	***2.29***	***2.8***	***3.95***	***5.16***	***5.39***
		0.487	0.457						2.09
								2.39	
2140	***2180***	***2470***	***2470***	***2310***	***2010***	***2020***	***2190***	***2450***	***2250***
				0.54				0.38	
				0.89				0.87	
				1.43				1.25	
4470	***4440***	***4210***	***4570***	***3910***	***4260***	***3970***	***4150***	***4610***	***5090***
								0.0436	

								0.0042	
								0.0024	
								0.0033	
								0.0047	

7.19	7.2	6.86	6.81			7.1	6.75		

·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

132	90.1	116	118	244	185	67.5	38.2	61.1	134
4.48	***6.78***	***2.36***	***2.43***	***2.28***	***3.17***	***3.32***	***2.15***	***2.26***	***2.67***
			1.91				2.11		1.06
		2.35				***3.22***			
2310	***2470***	***2090***	***1970***	***1940***	***2210***	***1690***	***1080***	***1030***	***1240***
							0.00487		

		0							

4550	***4640***	***3670***	***4030***	***4030***	***4130***	***3150***	***2410***	***2290***	***2770***

		0.0371							
						0.17			

		0.0036							
		0.0021							
		0.0027							
		0.0037							

7.1	6.5			7.3	6.87			7.82	7.54

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

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-138
Revised August 1, 2011

*Surface Waste Management Facility Operator and Generator shall maintain and make this documentation available for Division inspection.

REQUEST FOR APPROVAL TO ACCEPT SOLID WASTE

1. Generator Name and Address:

HOLLYFRONTIER NAVAJO REFINING LLC

2. Originating Site:
NAVAJO REFINERY

3. Location of Material (Street Address, City, State or ULSTR):
501 E. MAIN, ARTESIA,NM., 88210

Source and Description of Waste: Two rail cars had been overtopped. **Release of less than 10 bbls of Asphalt.** Spilled material hardened quickly which limited the extent of the spill area. The loading area is covered by gravel, which collected much of the asphalt and limited contact to soil. Sand was spread on top of the release.

4.
Material was Asphalt from the loading rack. Was mixed with gravel and sand when picked up.

Estimated Volume 17 yd^3 / bbls Known Volume (to be entered by the operator at the end of the haul) _____ yd^3 / bbls

5. GENERATOR CERTIFICATION STATEMENT OF WASTE STATUS

I, _____, representative or authorized agent for _____ do hereby certify that according to the Resource Conservation and Recovery Act (RCRA) and the US Environmental Protection Agency's July 1988 regulatory determination, the above described waste is: (Check the appropriate classification)

☒ RCRA Exempt: Oil field wastes generated from oil and gas exploration and production operations and are not mixed with non-exempt waste. *Operator Use Only: Waste Acceptance Frequency* ☐ *Monthly* ☐ *Weekly* ☐ *Per Load*

☐ RCRA Non-Exempt: Oil field waste which is non-hazardous that does not exceed the minimum standards for waste hazardous by characteristics established in RCRA regulations, 40 CFR 261.21-261.24, or listed hazardous waste as defined in 40 CFR, part 261, subpart D, as amended. The following documentation is attached to demonstrate the above-described waste is non-hazardous. (Check the appropriate items)

☐ MSDS Information ☐ RCRA Hazardous Waste Analysis ☐ Process Knowledge ☐ Other (Provide description in Box 4)

GENERATOR 19.15.36.15 WASTE TESTING CERTIFICATION STATEMENT FOR LANDFARMS

I, _____, representative for _____ do hereby certify that representative samples of the oil field waste have been subjected to the paint filter test and tested for chloride content and that the samples have been found to conform to the specific requirements applicable to landfarms pursuant to Section 15 of 19.15.36 NMAC. The results of the representative samples are attached to demonstrate the above-described waste conform to the requirements of Section 15 of 19.15.36 NMAC.

5. Transporter: S. Brothers; Unit 3

OCD Permitted Surface Waste Management Facility

Name and Facility Permit #:Gandy Marley, Inc.

Address of Facility: P.O. Box 1658 Roswell, NM., 88202

Method of Treatment and/or Disposal:

☐ Evaporation ☐ Injection ☐ Treating Plant ☒ Landfarm ☐ Landfill ☐ Other

Waste Acceptance Status:

☒ **APPROVED** ☐ **DENIED** (Must Be Maintained As Permanent Record)

PRINT NAME: _____ TITLE: _____ DATE: _____

SIGNATURE: _____ TELEPHONE NO.: _____

Surface Waste Management Facility Authorized Agent

See attached Soil Shipment Manifest; # 20162535

COMMERCIAL LAND FARMS
A New Mexico Enterprise
Serving New Mexico's Needs

CERTIFICATE OF WASTE STATUS
OIL FIELD NON-EXEMPT WASTE MATERIAL

Originating Location: NAVAJO REFINING CO., L.L.C.
501 E. MAIN ST. ARTESIA, NM 88210

Source: ASPHALT, ASPHALT IN SOIL/GRAVEL

Disposal Location: 34 Miles West of Tatum, NM on Hwy 380

"As a condition of acceptance for disposal, I hereby certify that this waste as defined by the Environmental Agency's (EPA) July 1988 Regulatory Determination. To my knowledge, this waste will be analyzed pursuant to the provisions of 40 CFR Part 261 to verify the nature as non-hazardous. I further certify that, to my knowledge, no "hazardous or listed waste" pursuant to the provisions of 40 CRF, Part 261, Subparts C and D, has been added or mixed with the waste so as to make the resultant mixture a " hazardous waste" pursuant to the provisions of 40 CFR, section 261.3(b)."

In addition, Generator certifies that nothing has been added to the exempt or non-exempt non-hazardous waste and that this waste does not contain Naturally Occurring Radioactive Material (NORM) regulated pursuant to 20 NMAC 3.1 Subpart 1403.

I, the undersigned as the agent for NAVAJO REFINING CO., L.L.C. concur with the status of the waste from the subject site.

Name MICKI SCHULTZ
Title/Agency ENVIRONMENTAL SPECIALIST
Address (above)
Signature Micki Schultz Date 7/6/15

Contaminated Soils Shipment Manifest

1. Manifest Document No. 20162535

2. Page ___ of ___

3. Generator's Name and Mailing Address
HFC Navajo Refining Co. LLC
PO Box 159
Artesia, NM 88211-0159

4. Generator Phone No.
575-748-3311

5. Generator Contact
Richard L Orosco

6. Transporter 1 Company Name
S Brothers Waste Services Truck

7. ID No.
13

8. Transporter 2 Company Name

9. ID No.

10. Designated Disposal Facility Name and Site Address
Gandy Marley, Inc. Contaminated Soils Landfarm
7200 East Second Street
PO Box 1658
Roswell, NM 88201

11. Facility Permit Number
DP-1041

12. Facility Phone No.
(575) 398-0107

GENERATOR

13. Description of Waste	14. Containers No	14. Containers Type	15. Total Quantity	16. Unit Wt.Vol.
a. Ashpalt	1	CM	17	Yds
b. Weight 19260				
c.				

17. Special Handling Instructions and Additional Information
Unit West Rack
Bin# 60

18. Generator's Certification: *I hereby declare that the contents of the consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable federal, state, and international laws.*

FURTHER. I represent and warrant that the waste material as described on this manifest is either exempt from the Resource Conservation and Recovery Act of 1976, OR has been characterized as non-hazardous material by virtue of appropriate laboratory analysis done in accordance with EPA-approved testing methods.

Printed/Typed Name	Signature	Date
Richard L Orosco	Richard L Orosco	

TRANSPORTER

19. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date
Cy	Cy	04/11/16

20. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date

GM1

21. Discrepancy Information

22. Facility Owner or Operator Certification of receipt of materials described on this manifest except as noted in item 21. 1:67 PM

Printed/Typed Name	Signature	Date
J. TOLTON	J Tolton	04/11/16

N.M.E.D. - DP-1041	**Gandy Marley, Inc.** P.O. BOX 1658 · ROSWELL, NM 88202	LOAD INSPECTION FORM	No. 16248

Date of Receipt: 04-11-16 Time of Receipt: 1:07 AM (PM) Cell Placement: UST-N-1

Quantity: 17 T/CY: YARDS Description: ASPHALT

Name/Address of Generator: NAVAJO REFINING CO

Origin of Materials (if different): ARTESIA FIELD YARD

Transporter Name: S BROTHERS UNIT #03 SCC ID No. _____

Name of Laboratory Performing Sample Analysis: _____

TCLP (EPA Method 1311) _____ BTEX _____ MTBE _____ TPH _____ Non-Hazardous ✓ Exempt ✓

Verification of No Free Liquids _____ Paint Filter Liquids Test Performed _____

Verification of Property Completed Manifest ✓ Generator Manifest Number 2016 2535

As a condition to Gandy Marley, Inc's acceptance of the materials shipped as represented on this Load Inspection Form, Generator represents and warrants that the waste materia shipped herewith is exempt from the Resource Conservation and Recovery Act of 1976, as amended from time to time, 40 U.S.C Section 6901, et seq., The New Mexico Health and Safety Code, section 391.001, et seq., and regulations related thereto, OR has been characterized as non-hazardous material by virtue of appropriate laboratory analysis done in accordance with EPA-approved testing methods.

Further, as a condition to Gandy Marley, Inc's acceptance of the materials shipped as represented on this Load Inspection Form, Transporter represents and warrants that only the material delivered by Generator to Transporter to Gandy Marley, Inc.'s facility for disposal.

THIS WILL CERTIFY that the above Transporter loaded the material as represented on this Load Inspection Form at the above described location, and that it was tendered by the above described Generator. THIS WILL CERTIFY that no additional materials were added to this load, and that the material was delivered without incident.

Transporter: _____ (Print Name) _____ (Signature)

GMI Employee: D TOLTON (Print Name) D Tolton (Signature)

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

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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1625 N. French Dr., Hobbs, NM 88240
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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 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	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
	18	17S	27E					

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? ☒ Yes ☐ No ☒ 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? ☐ Yes ☒ 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: Richard L Orosco	OIL CONSERVATION DIVISION	
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 ☐
Date: 8/12/16 Phone: 575-746-3311		

* Attach Additional Sheets If Necessary

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Energy Minerals and Natural Resources

Oil Conservation Division
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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 X☐X Final Report

Name of Company HollyFrontier Navajo Refining LLC	Contact Randy Dade
Address 501 E. Main St, Artesia, NM 88210	Telephone No. 575-746-5381
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°50'37.19"N **Longitude** 104°23'46.50"W

NATURE OF RELEASE

Type of Release Asphalt	Volume of Release < 10 bbl	Volume Recovered 0 bbl
Source of Release Rail loading area – West loading rack	Date and Hour of Occurrence 04/04/2016 at approx. 10:00 pm	Date and Hour of Discovery 04/04/2016 at approx. 10:10 pm
Was Immediate Notice Given? ☐ Yes ☐ No ☒ Not Required	If YES, To Whom?	
By Whom?	Date and Hour	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.*

On April 4, 2016, it was reported that two rail cars had been overtopped and caused the release of less than 10 bbls of asphalt. Operator error was the cause of the spill. When the operator noticed the spill, he immediately shut down the transfer pump and closed the valve to the railcar. The impacted area is located along the rail loading racks in two areas on either side of the loading rack.

Describe Area Affected and Cleanup Action Taken.*

The spill was contained in the rail loading area. The spilled material hardened quickly which limited the extent of the spill area. The loading area is covered by gravel, which collected much of the asphalt and limited contact to soil.
Material was covered with sand and picked up. Waste was then put in a roll off bin and disposed of at a non-hazardous disposal facility. Photos show what the material looked like, how the sand was spread on top of the release and what the ground looked like after the material was picked up and disposed of.

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: Lewis R Dade	OIL CONSERVATION DIVISION	
Printed Name: Randy Dade	Approved by Environmental Specialist:	
Title: Environmental Specialist	Approval Date:	Expiration Date:
E-mail Address: Lewis.Dade@hollyfrontier.com	Conditions of Approval:	Attached ☐
Date: 07/25/2016 Phone: 575-746-5281		

* Attach Additional Sheets If Necessary


GATX 72487
800-424-9300
3257
2 INCH. TREAD COND. SHOES






HX23518

HOLLYFRONTIER.

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

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Oil Conservation Division
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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	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? ☒ Yes ☐ No ☐ 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? ☐ Yes ☒ 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:	OIL CONSERVATION DIVISION	
Printed Name: Robert Combs	Approved by Environmental Specialist:	
Title: Environmental Specialist	Approval Date:	Expiration Date:
E-mail Address:	Conditions of Approval:	Attached ☐
Date: 7/28/16 Phone: 575-746-5382		

* 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 plan[1] 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.

Amec Foster Wheeler Environment & Infrastructure, Inc.
585 North Dairy Ashford
Houston, Texas 77079
Tel: 713-929-5000
amecfw.com

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 document[2]
- 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 ponds[4]

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 – Revised[4] 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 report[5]. 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.

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[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 groundwater[3], 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.

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

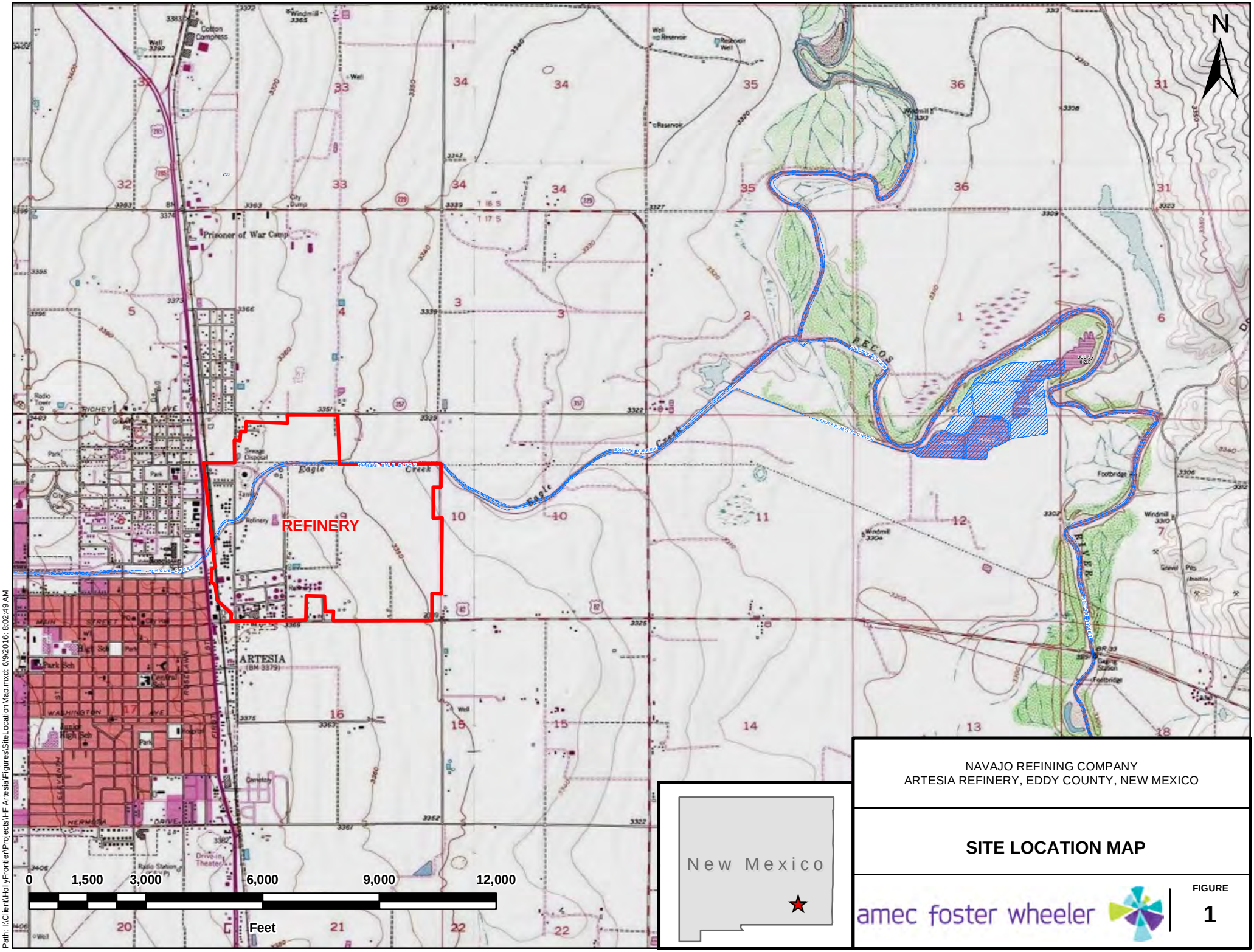
c: David R. Hoffman, PE, Amec Foster Wheeler

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



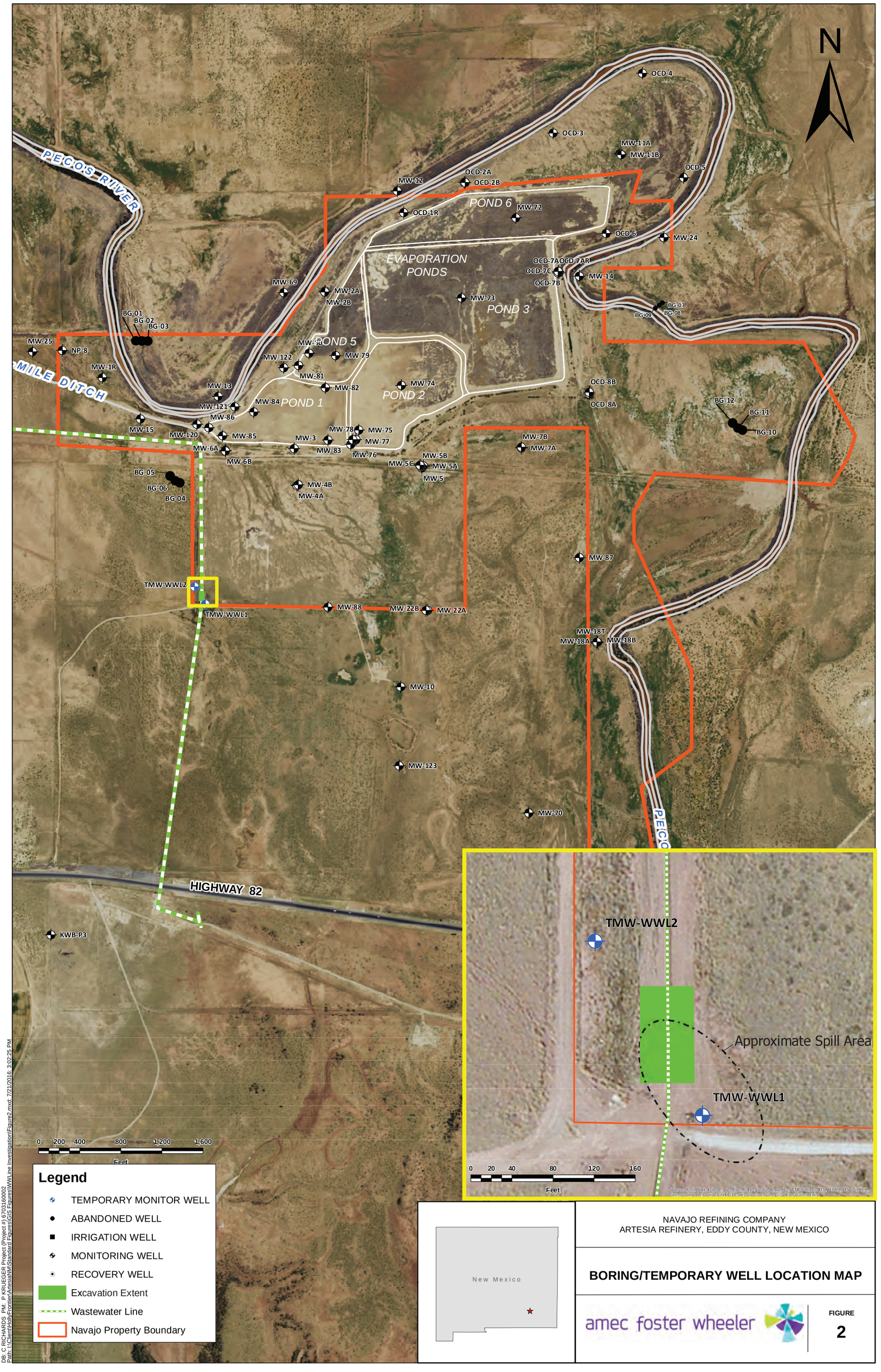
NAVAJO REFINING COMPANY
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

SITE LOCATION MAP

amec foster wheeler

FIGURE
1

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

BORING/TEMPORARY WELL LOCATION MAP

amec foster wheeler

FIGURE
2

DB: C RICHARDS PM: P KRUEGER Project (Project #) 6703160002
Path: \\Client\HSW\Frontier\Artesia\MA\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:	**TMW-WWL1**			**TMW-WWL2**			
					Depth (ft bgs):	**1**	**5**	**12**	**1**	**5**	**12**	**12 (Duplicate)**
					Date:	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

				Wastewater	TMW-WWL1	TMW-WWL2	
				2/23/2105	5/12/2016	5/12/2016	5/12/2016 (Duplicate)
Analyte	**Units**	**NMED TPH**	**WQCC**				
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 lavendar 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 Comission

amec foster wheeler

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: Scott Denton check here if Agent ☐	Contact or Agent: check here if Agent ☐
Mailing Address: 501 East Main Street	Mailing Address:
City: Artesia	City:
State: NM Zip Code: 88210	State: Zip Code:
Phone: ■ Home ☐ Cell Phone (Work): 575-746-5487	Phone: ☐ Home ☐ 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)
☐ NM West Zone
☐ NM East Zone
☐ NM Central Zone

☐ UTM (NAD83) (Meters)
☐ Zone 12N
☐ Zone 13N

■ Lat/Long (WGS84) (to the nearest 1/10th of second)

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.: 581987

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:	**Pollution Control and/or Recovery:**	**Construction Dewatering:**	**Mine De-Watering:**
☐ Include a description of any proposed pump test, if applicable.	☐ Include a plan for pollution control/recovery, that includes the following: ☐ A description of the need for the pollution control or recovery operation. ☐ The estimated maximum period of time for completion of the operation. ☐ The annual diversion amount. ☐ The annual consumptive use amount. ☐ The maximum amount of water to be diverted and injected for the duration of the operation. ☐ The method and place of discharge.	☐ Include a description of the proposed dewatering operation, ☐ The estimated duration of the operation, ☐ The maximum amount of water to be diverted, ☐ A description of the need for the dewatering operation, and, ☐ A description of how the diverted water will be disposed of.	☐ Include a plan for pollution control/recovery, that includes the following: ☐ A description of the need for mine dewatering. ☐ The estimated maximum period of time for completion of the operation. ☐ The source(s) of the water to be diverted. ☐ The geohydrologic characteristics of the aquifer(s). ☐ The maximum amount of water to be diverted per annum. ☐ The maximum amount of water to be diverted for the duration of the operation. ☐ The quality of the water. ☐ The method of measurement of water diverted. ☐ The recharge of water to the aquifer. ☐ Description of the estimated area of hydrologic effect of the project. ☐ The method and place of discharge. ☐ An estimation of the effects on surface water rights and underground water rights from the mine dewatering project. ☐ A description of the methods employed to estimate effects on surface water rights and underground water rights. ☐ Information on existing wells, rivers, springs, and wetlands within the area of hydrologic effect.
Monitoring: ■ Include the reason for the monitoring well, and, ■ The duration of the planned monitoring.	☐ The method of measurement of water produced and discharged. ☐ The source of water to be injected. ☐ The method of measurement of water injected. ☐ The characteristics of the aquifer. ☐ The method of determining the resulting annual consumptive use of water and depletion from any related stream system. ☐ Proof of any permit required from the New Mexico Environment Department. ☐ 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:** ☐ Include a description of the geothermal heat exchange project, ☐ The amount of water to be diverted and re-injected for the project, ☐ The time frame for constructing the geothermal heat exchange project, and, ☐ The duration of the project. ☐ 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

2016 MAY -2 PM 4:20

FOR OSE 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.

Trn Desc: RA 12403 POD1,2

File Number: RA 12403
Trn Number: 586987

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 REFING 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

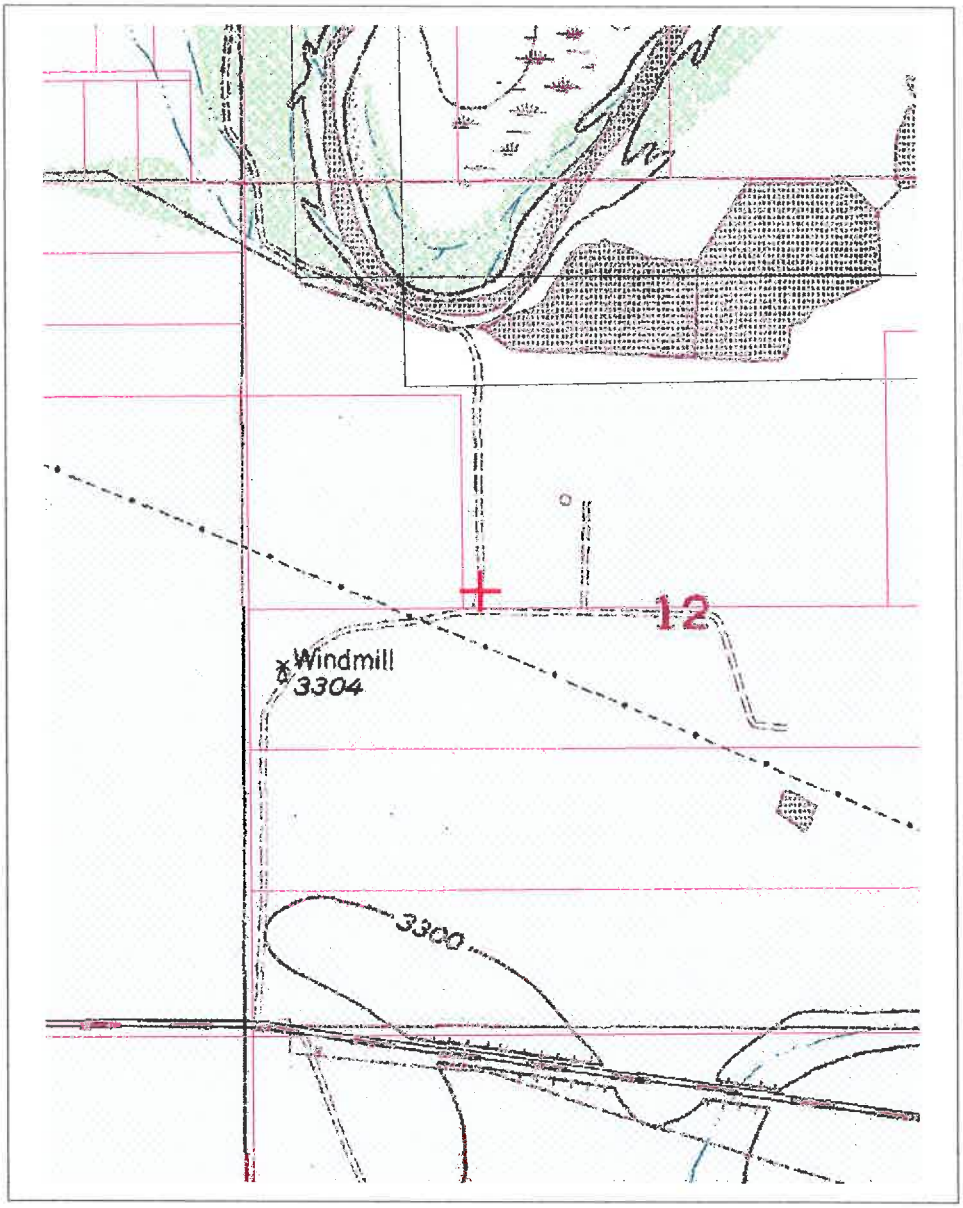
NAD 1983(92) (Meters)	N: 3,634,873	E: 561,855
NAD 1983(92) (Survey Feet)	N: 11,925,413	E: 1,843,353
NAD 1927 (Meters)	N: 3,634,670	E: 561,905
NAD 1927 (Survey Feet)	N: 11,924,748	E: 1,843,516

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

Print Date: 05/10/2016

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 REFING 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

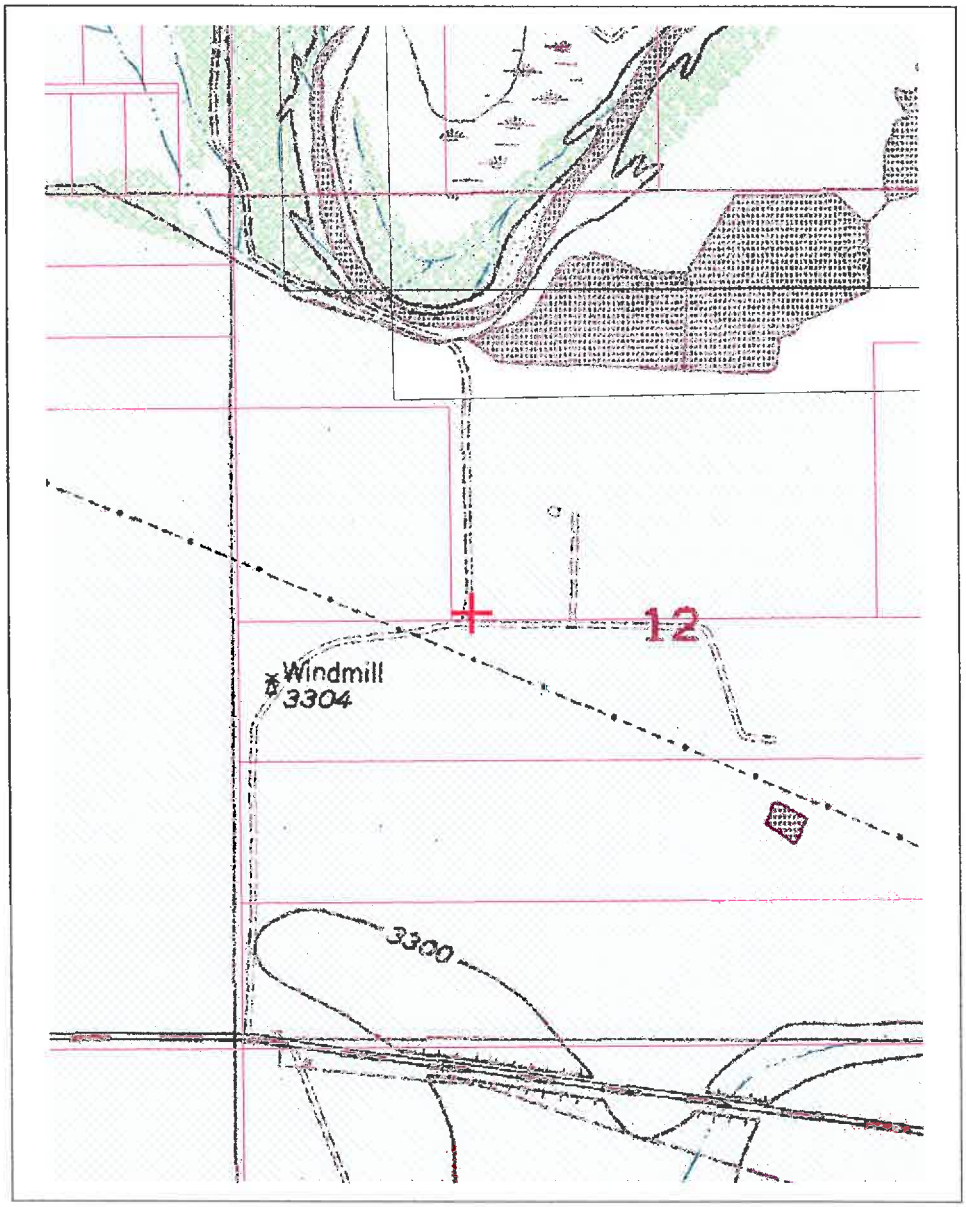
NAD 1983(92) (Meters)	N: 3,634,855	E: 561,860
NAD 1983(92) (Survey Feet)	N: 11,925,353	E: 1,843,371
NAD 1927 (Meters)	N: 3,634,652	E: 561,910
NAD 1927 (Survey Feet)	N: 11,924,687	E: 1,843,534

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

Print Date: 05/10/2016

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

2016 MAY -2 PM 4:20

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 Combs 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 10th day of May, 2016

Tom Blaine P.E., New Mexico State Engineer

By: Greg Crabtree

For Andy Morley
District II Manager

2016 MAY -2 PM 4:20

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

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 of 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

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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: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0	- 01 -			0	SANDY CLAY (CL): reddish-brown, dry, low carbonate induration, low-medium plasticity, no odor, no staining	Open 2" Diameter Casing Bentonite
					SANDY CLAY (CL): reddish-brown, low carbonate induration, medium-high plasticity, no odor, no staining	20/40 Grade Silica Sand
5	- 05 -			0	SANDY CLAY (CL): light brown, low plasticity, no odor, no staining	
					SANDY CLAY (CL):brown, low plasticity, gypsum crystals, no odor, no staining	
				0	SANDY CLAY (CL): light reddish-brown, low carbonate induration, low-medium plasticity, damp, containes some gypsum crystals, no odor, no staining	
10						Sch 40 0.010 Slot PVC Screen
▽	- 12 -				Gypsiferrous SANDY CLAY (CL): whitish-green, low plasticity, moist, no odor, no staining	
				0		
15					Total Depth = 15.5'	
					Sampler Stopped at 16' Auger Stopped at 15' TMW-WWL-1 Set to 15.5'	
20						

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: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0	- 01 -			0	SILTY SAND (SM): light brown, damp, non-plastic, no odor, no stain	Open 2" Diameter Casing Bentonite
					SANDY CLAY (CL): brown, damp, medium plasticity, contains some gypsum crystals, no odor, no stain,	
5	- 05 -			0	SANDY CLAY (CL): light reddish-brown, damp, medium to high plasticity, contains some gymsum crystals, no odor, no stain,	20/40 Grade Silica Sand
				0		
10						Sch 40 0.010 Slot PVC Screen
▽	- 12 -			0	SANDY CLAY (CL): reddish-brown, moist, low plasticity, low-moderate carbonate induration becomes more gymsiferous with depth, no odor, organic, no stain	
15					TOTAL DEPTH = 16' Sampler Stopped at 16' Auger Stopped at 15' TMW-WWL-1 Set to 15'	
20						

amec foster wheeler

ATTACHMENT C

ANALYTICAL REPORT

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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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

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

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

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
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

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

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

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

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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

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	
(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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

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	
(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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 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 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	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(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

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	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
(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

Method Blank (MB)

(MB) R3137464-1 05/16/16 20:07

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL 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

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
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

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	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

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	559	13.1	595	564	104	99	1	80-120			5	15

Method Blank (MB)

(MB) R3138282-1 05/18/16 23:05

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL 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

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
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

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
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

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 %
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

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 %
Fluoride	50.0	5.27	36.6	33.9	63	57	1	80-120	J6	J6	7	15

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	

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 %	MS Qualifier	MSD Qualifier	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

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	J	1.41	10.0
Manganese	U		0.12	1.00

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

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	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	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*

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	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
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	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
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*

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*

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*

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*

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*				

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*

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	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	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	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
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*				

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*

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*

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*

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*				

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*

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 %	LCS Qualifier	LCSD Qualifier	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*				

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.

ACCREDITATIONS & LOCATIONS

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
Conneticut	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 [1 4]	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		

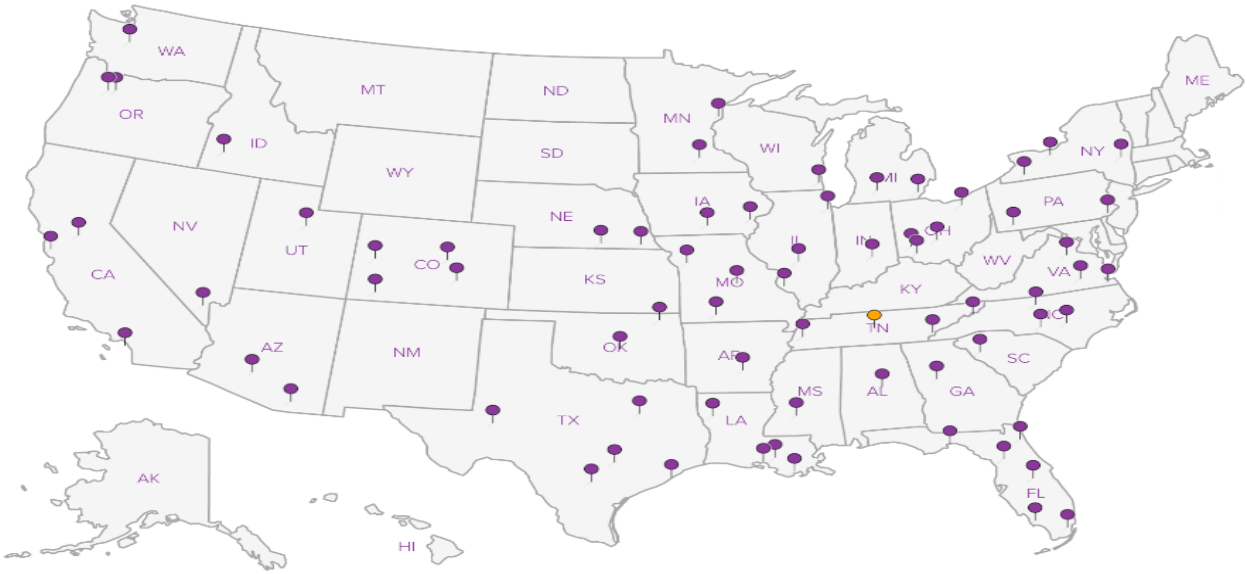
Third Party & Federal Accreditations

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

Collected by (signature): William R Smith

Immediately Packed on Ice N ___ Y X

Site/Facility ID # Holly Frontier NMNM

P.O. #

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X_Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8270ACID 100ml Amb NoPres	Cl, Fl, SO4 125mlHDPE-NoPres	Cl, Fl, SO4 4ozClr-NoPres	DROOROLVI 40mlAmb-HCl-BT	DRORLA,SV8270ACID 4ozClr-NoPres	FEICP,MNICP 250mlHDPE-HNO3 V	FEICP,MNICP 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
~~TMW-WWL2-12D~~		~~SS~~				~~4~~			~~X~~		~~X~~		~~X~~		~~X~~			
TMW-WWL2-EQ		GW	—	5/10/16	18:00	11	X	X		X		X		X		X		-08
~~TMW-WWL2-EQ~~		~~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

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
William R Smith	5/11/16	15:00	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 3.2 °C Bottles Received: 39 TB

Date: 5.12.16 Time: 900

Hold #

Condition: (lab use only) GOOD

COC Seal Intact: ✓Y ___N ___NA

pH Checked: ___ NCF: ___

Chain of Custody Page ___ of ___

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L# L8 35078

K079

Acctnum: **AMECFWHTX**
Template: **T112078**
Prelogin: **P552541**
TSR: **526 - Chris McCord**
PB: 5.4.16 KM
Shipped Via: **FedEx Ground**

ANALYTICAL REPORT

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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TMW-WWL1 L835353-01 GW

Collected by | Collected date/time 05/12/16 08:30 | Received date/time 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

TMW-WWL2 L835353-02 GW

Collected by | Collected date/time 05/12/16 09:00 | Received date/time 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

TMW-WWL2D L835353-03 GW

Collected by | Collected date/time 05/12/16 09:05 | Received date/time 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 05/12/16 00:00 | Received date/time 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 05/12/16 00:00 | Received date/time 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

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

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

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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 mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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 mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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 mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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 mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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 mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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

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	
(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

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	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
(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

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

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	
(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

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	05/18/2016 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

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	05/18/2016 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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	U		0.00280	0.0200	1	05/19/2016 09:44	WG873476

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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

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	J3	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

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

Method Blank (MB)

(MB) R3139346-1 05/24/16 08:33

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

L836606-01 Original Sample (OS) • Duplicate (DUP)

(OS) L836606-01 05/24/16 16:53 • (DUP) R3139346-5 05/24/16 17:07

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
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

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	39.0	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

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
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

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 %
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

Method Blank (MB)

(MB) R3140117-1 05/26/16 09:06

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL 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

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
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

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	39.4	39.3	99	98	80-120			0	15
Sulfate	40.0	39.8	39.8	100	100	80-120			0	15

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

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

Method Blank (MB)

(MB) R3138224-1 05/19/16 09:36

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL 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

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 %
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

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 %
Mercury	0.300	U	0.282	0.276	94	92	1	75-125			2	20

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

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

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

Method Blank (MB)

(MB) R3137306-3 05/16/16 22:25

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
TPH (GC/FID) Low Fraction	U		0.0314	0.100
(S) a,a,a-Trifluorotoluene(FID)	*100*			*62.0-128*

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	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
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	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
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*

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*

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*

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*				

Method Blank (MB)

(MB) R3137334-1 05/17/16 03:42

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	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	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
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*				

Method Blank (MB)

(MB) R3138554-1 05/20/16 10:03

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	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	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
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	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	%	%		%			%	%
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*				

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*

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 %	LCS Qualifier	LCSD Qualifier	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*				

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*

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*				

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.

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* 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
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Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	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 [1 4]	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		

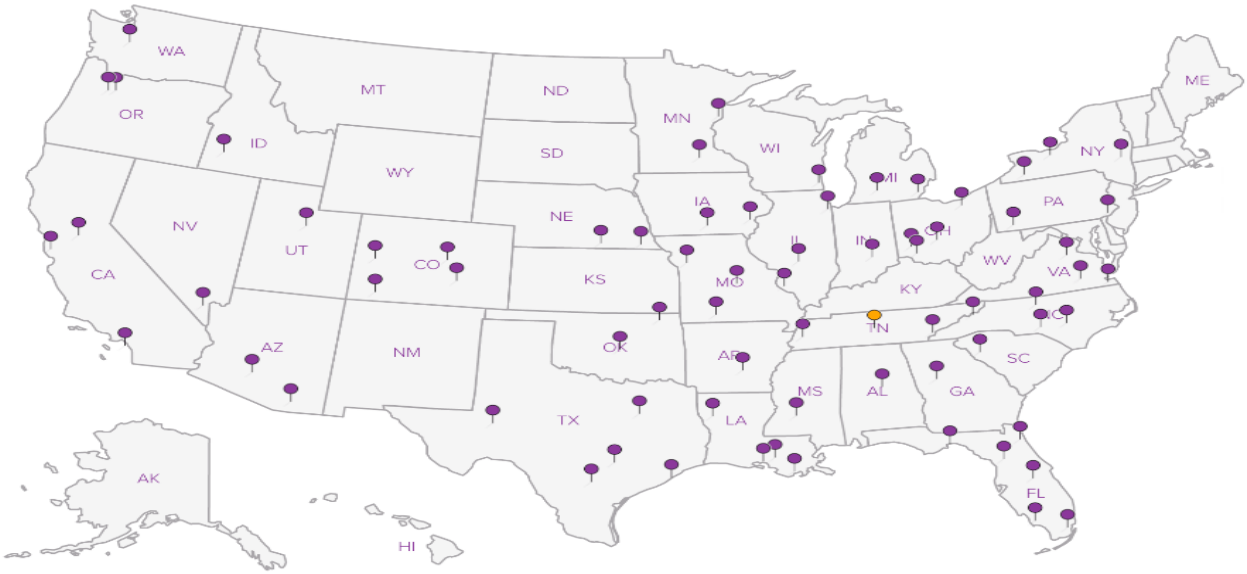
Third Party & Federal Accreditations

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

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AMEC Foster Wheeler - Houston, TX

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Houston, TX 77079

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Report to: Pamela Krueger

Email To: pamela.krueger@amecfw.com

Project Description: WASTE WATER LINE Slurry Slinger Sump Investigation

City/State Collected:

Phone: 713-929-5674
Fax:

Client Project # 6703160012.004

Lab Project # AMECFWHTX-SLURRY

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ____ Y ____

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X__Yes
FAX? ___No ___Yes

Chain of Custody Page ___ of ___

ESC LABORATORIES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L835353

1198

Acctnum: AMECFWHTX
Template: T112081
Prelogin: P552543
TSR: 526 - Chris McCord
PB: 5-4.16 KM
Shipped Via: FedEx Ground

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8270 100ml Amb NoPres	DROOROLVI 40mlAmb-HCl-BT	DRORLA,SV8270 4ozClr-NoPres	GRO 40mlAmb HCl	GRO,V8260 2ozClr-NoPres	Skinner's List Mtls. 250mlHDPE-HNO3	Skinner's list Mtls. 2ozClr-NoPres	V8260 40mlAmb-HCl	V8260- Trip Blank 40mlAmb-HCl-Blk		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
		GW				1									X			
WWL-SPC *																		

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

pH _____ Temp _____

Flow _____ Other _____

6711 0132 9017

5-054

Remarks:
* Pamela Krueger will call in Analysis for WWL1 Soil Pile Composite Sample

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	5/12/16	11:00	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 2.4 °C Bottles Received: 35

Date: 5-12-16 Time: 9:00

Condition: (lab use only) JW7 (OK)

COC Seal Intact: ✓ Y ___N ___NA

pH Checked: NCF:

Jeremy W. Watkins

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 / Courie
	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:

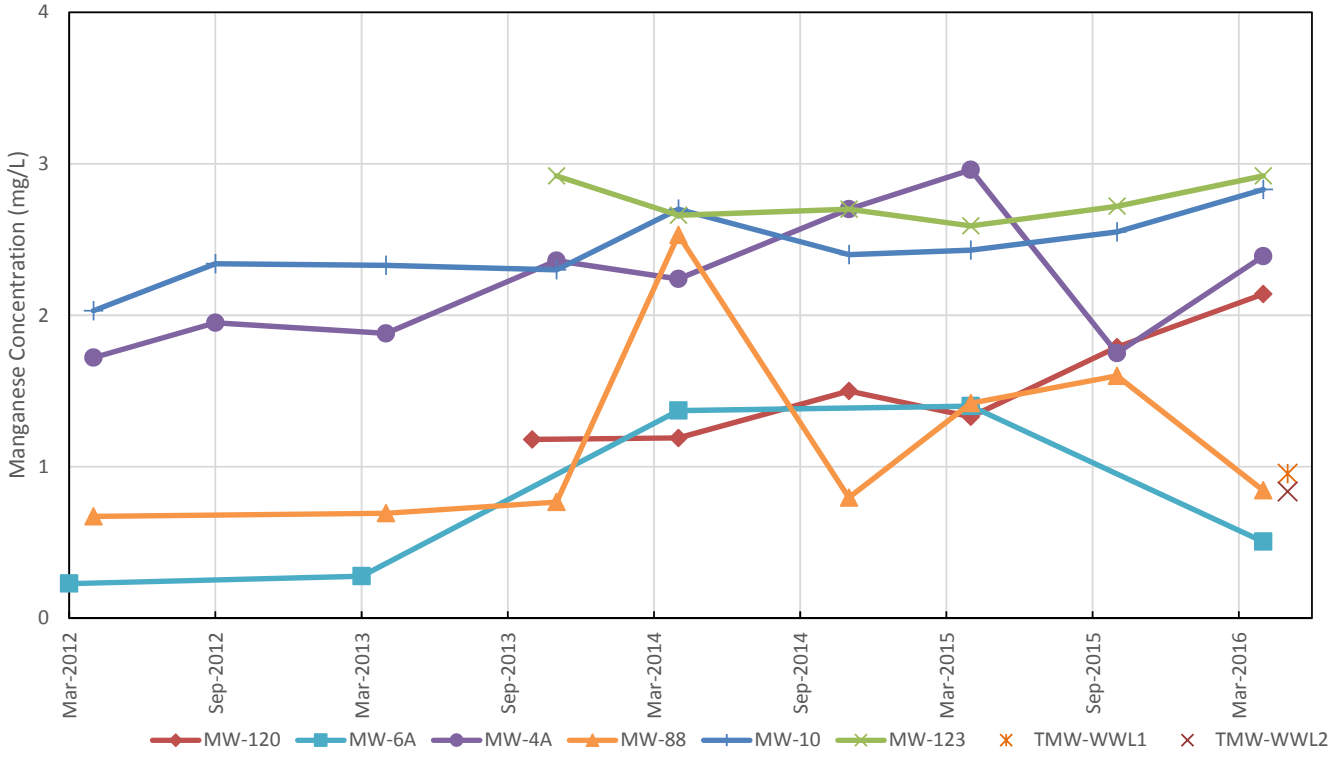
Log 125mL-NP for CHLORIDE, FLUORIDE and SULFATE.
Also, change on all IDs: 8270 to 8270ACID; V8260 to V8260BTEX and only log metals FEICP and MNICP.

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.

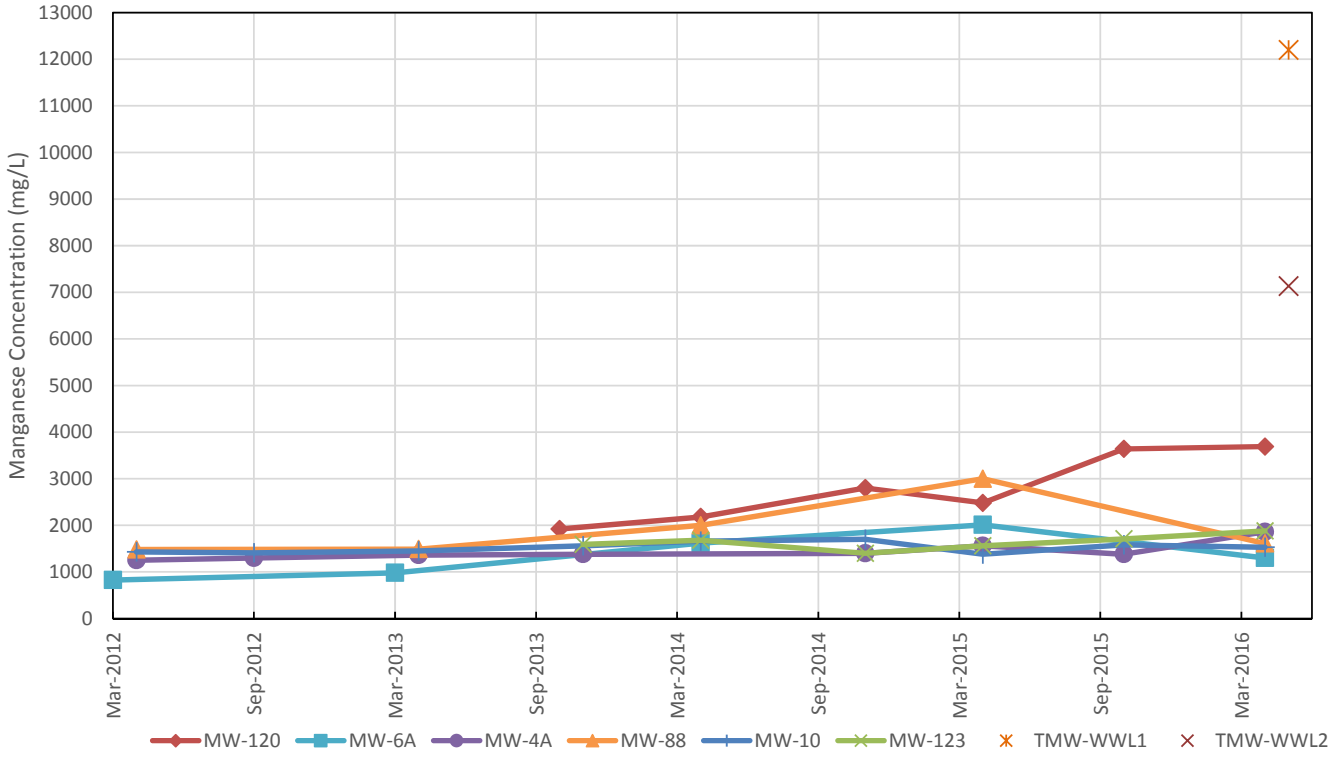
amec foster wheeler

ATTACHMENT D

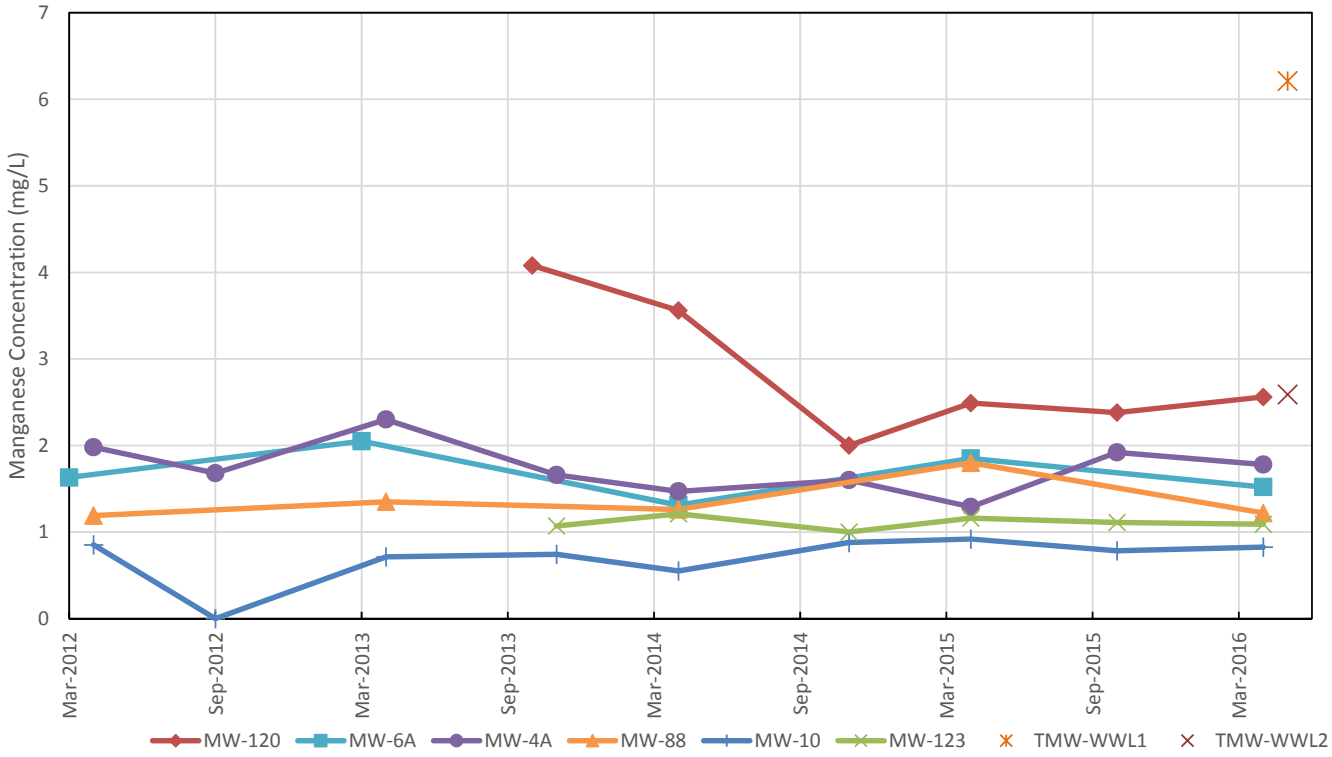
Manganese



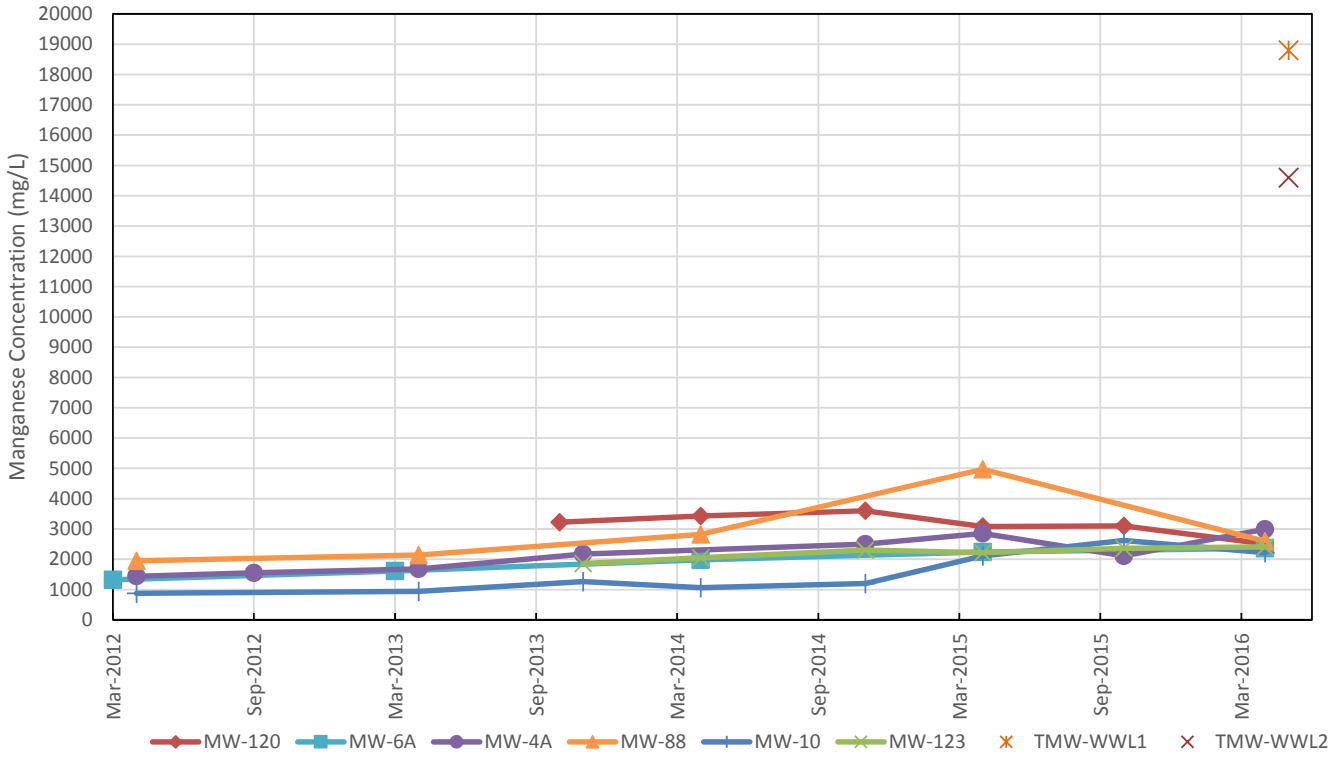
Chloride

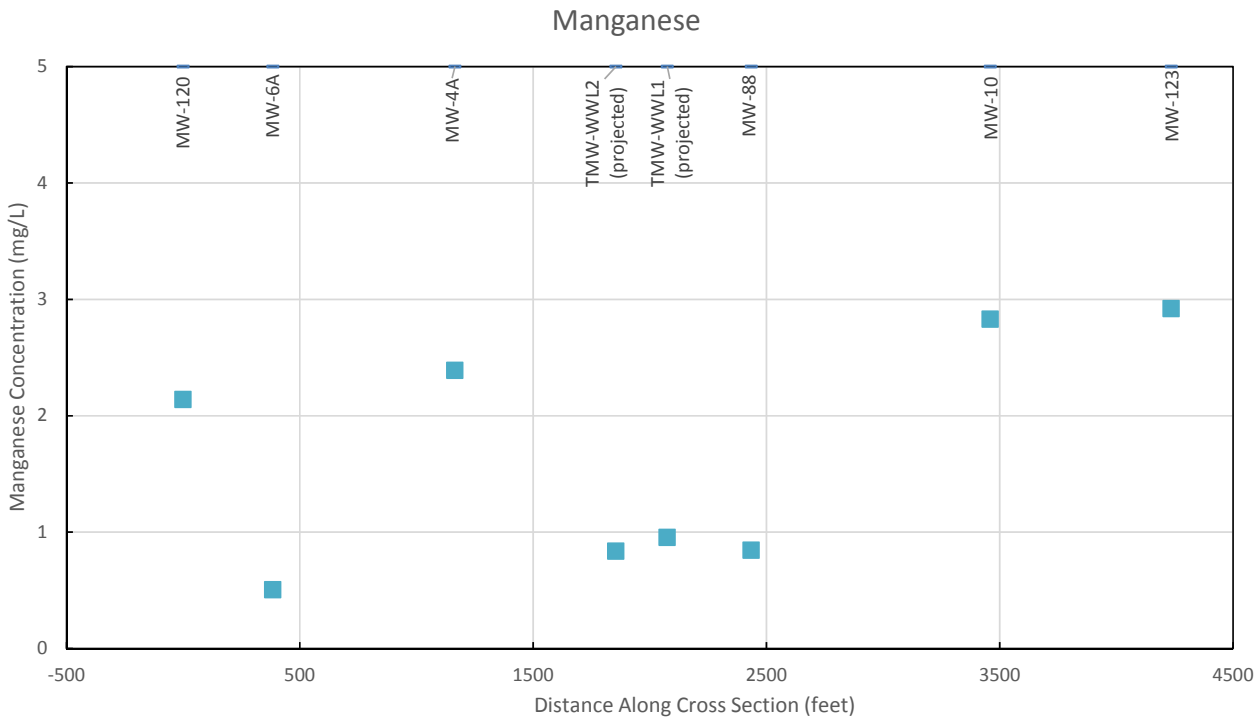


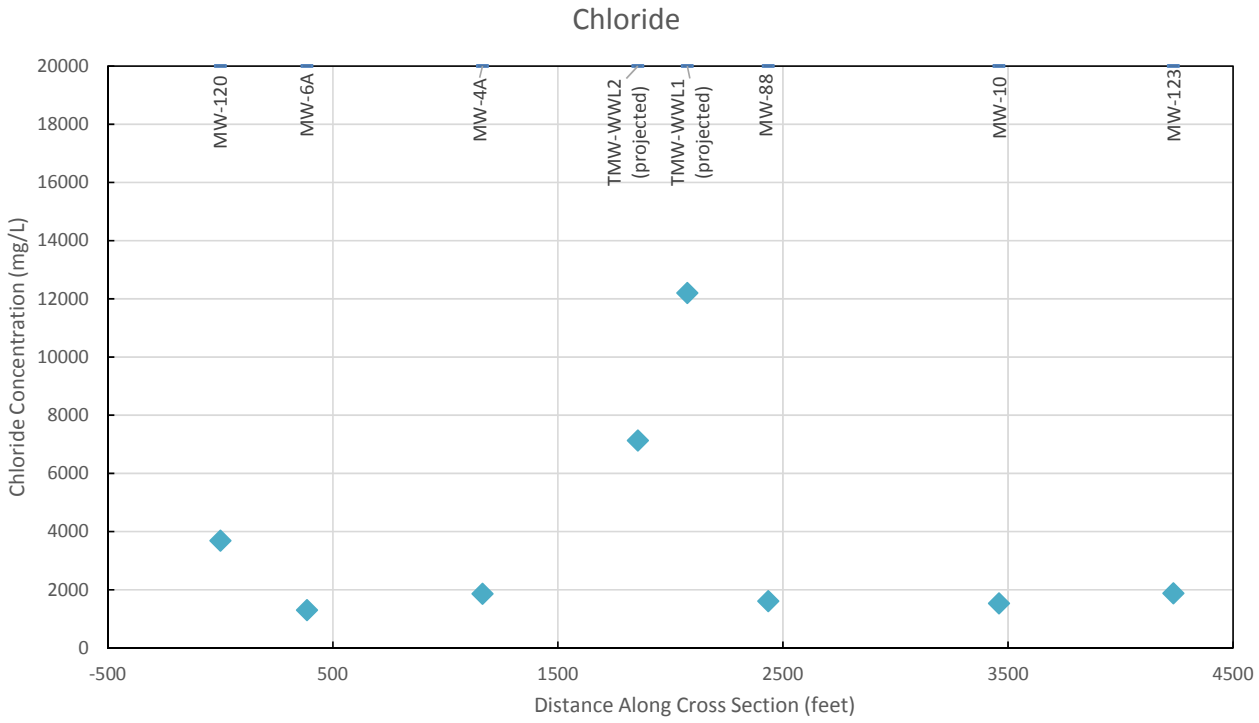
Fluoride

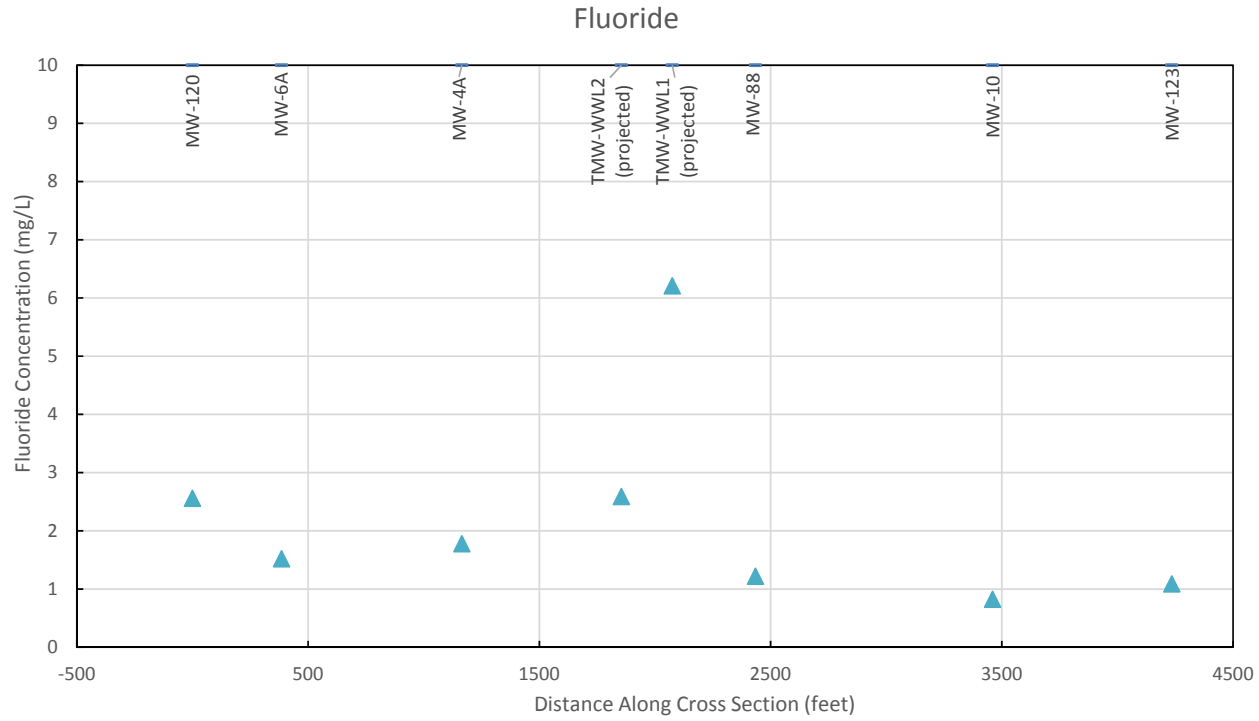


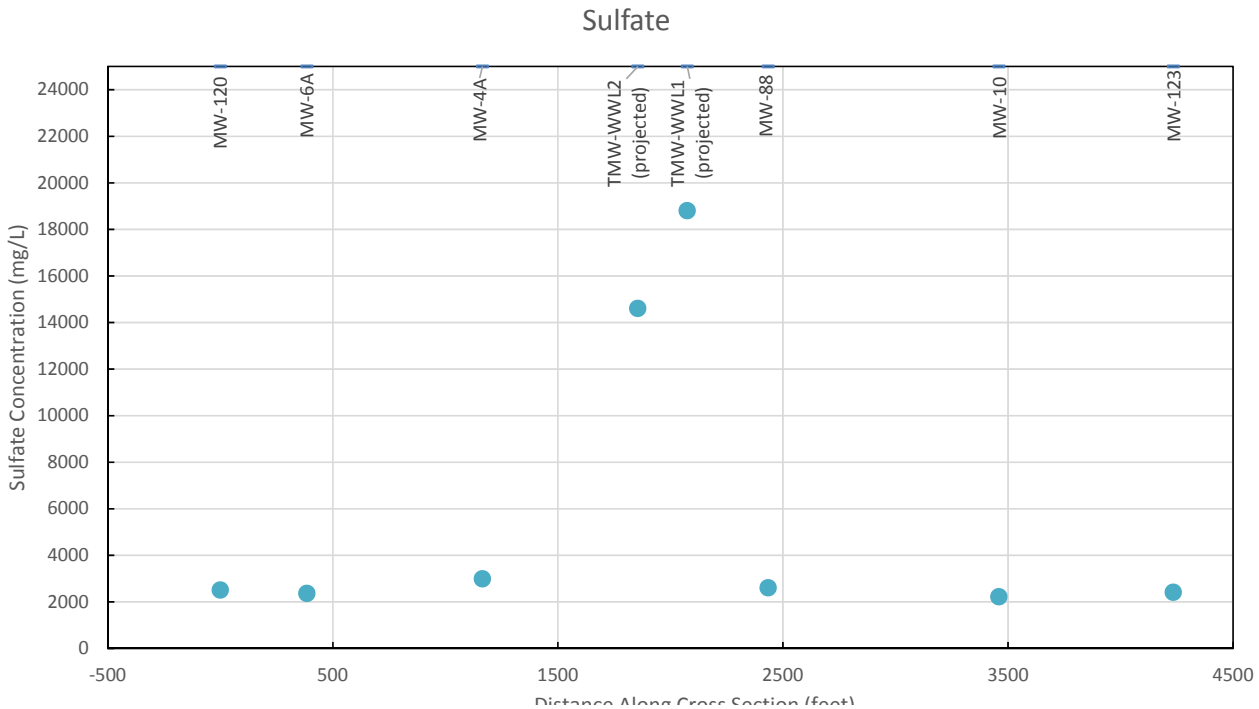
Sulfate




Manganese
Manganese Concentration (mg/L)
0
1
2
3
4
5
-500
500
1500
2500
3500
4500
Distance Along Cross Section (feet)
MW-120
MW-6A
MW-4A
TMW-WWL2 (projected)
TMW-WWL1 (projected)
MW-88
MW-10
MW-123


Chloride
Chloride Concentration (mg/L)
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
-500
500
1500
2500
3500
4500
Distance Along Cross Section (feet)
MW-120
MW-6A
MW-4A
TMW-WWL2 (projected)
TMW-WWL1 (projected)
MW-88
MW-10
MW-123


Fluoride
Fluoride Concentration (mg/L)
Distance Along Cross Section (feet)
MW-120
MW-6A
MW-4A
TMW-WWL2 (projected)
TMW-WWL1 (projected)
MW-88
MW-10
MW-123
0
1
2
3
4
5
6
7
8
9
10
-500
500
1500
2500
3500
4500


Sulfate
Sulfate Concentration (mg/L)
MW-120
MW-6A
MW-4A
TMW-WWL2 (projected)
TMW-WWL1 (projected)
MW-88
MW-10
MW-123
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
22000
24000
-500
500
1500
2500
3500
4500

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: Scott Denton check here if Agent ☐	Contact or Agent: check here if Agent ☐
Mailing Address: 501 East Main Street	Mailing Address:
City: Artesia	City:
State: NM Zip Code: 88210	State: Zip Code:
Phone: ■ Home ☐ Cell Phone (Work): 575-746-5487	Phone: ☐ Home ☐ 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)
☐ NM West Zone
☐ NM East Zone
☐ NM Central Zone

☐ UTM (NAD83) (Meters)
☐ Zone 12N
☐ Zone 13N

■ Lat/Long (WGS84) (to the nearest 1/10th of second)

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.: 581987

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:	**Pollution Control and/or Recovery:**	**Construction Dewatering:**	**Mine De-Watering:**
☐ Include a description of any proposed pump test, if applicable.	☐ Include a plan for pollution control/recovery, that includes the following: ☐ A description of the need for the pollution control or recovery operation. ☐ The estimated maximum period of time for completion of the operation. ☐ The annual diversion amount. ☐ The annual consumptive use amount. ☐ The maximum amount of water to be diverted and injected for the duration of the operation. ☐ The method and place of discharge.	☐ Include a description of the proposed dewatering operation, ☐ The estimated duration of the operation, ☐ The maximum amount of water to be diverted, ☐ A description of the need for the dewatering operation, and, ☐ A description of how the diverted water will be disposed of.	☐ Include a plan for pollution control/recovery, that includes the following: ☐ A description of the need for mine dewatering. ☐ The estimated maximum period of time for completion of the operation. ☐ The source(s) of the water to be diverted. ☐ The geohydrologic characteristics of the aquifer(s). ☐ The maximum amount of water to be diverted per annum. ☐ The maximum amount of water to be diverted for the duration of the operation. ☐ The quality of the water. ☐ The method of measurement of water diverted. ☐ The recharge of water to the aquifer. ☐ Description of the estimated area of hydrologic effect of the project. ☐ The method and place of discharge. ☐ An estimation of the effects on surface water rights and underground water rights from the mine dewatering project. ☐ A description of the methods employed to estimate effects on surface water rights and underground water rights. ☐ Information on existing wells, rivers, springs, and wetlands within the area of hydrologic effect.
Monitoring: ■ Include the reason for the monitoring well, and, ■ The duration of the planned monitoring.	☐ The method of measurement of water produced and discharged. ☐ The source of water to be injected. ☐ The method of measurement of water injected. ☐ The characteristics of the aquifer. ☐ The method of determining the resulting annual consumptive use of water and depletion from any related stream system. ☐ Proof of any permit required from the New Mexico Environment Department. ☐ 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:** ☐ Include a description of the geothermal heat exchange project, ☐ The amount of water to be diverted and re-injected for the project, ☐ The time frame for constructing the geothermal heat exchange project, and, ☐ The duration of the project. ☐ 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

2016 MAY -2 PM 4:20

FOR OSE 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.

Trn Desc: RA 12403 POD1,2

File Number: RA 12403
Trn Number: 586987

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 REFING 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

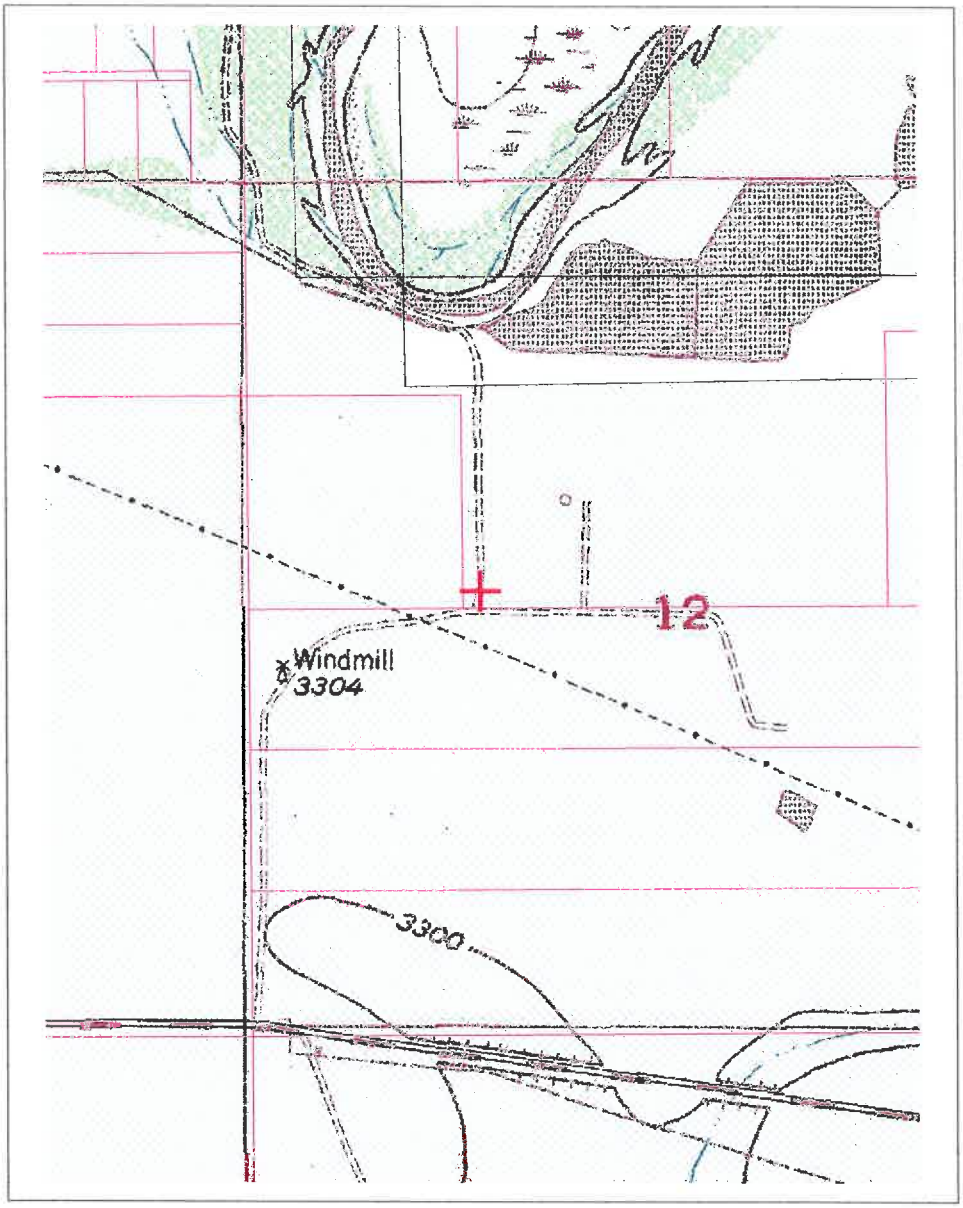
NAD 1983(92) (Meters)	N: 3,634,873	E: 561,855
NAD 1983(92) (Survey Feet)	N: 11,925,413	E: 1,843,353
NAD 1927 (Meters)	N: 3,634,670	E: 561,905
NAD 1927 (Survey Feet)	N: 11,924,748	E: 1,843,516

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

Print Date: 05/10/2016

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 REFING 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

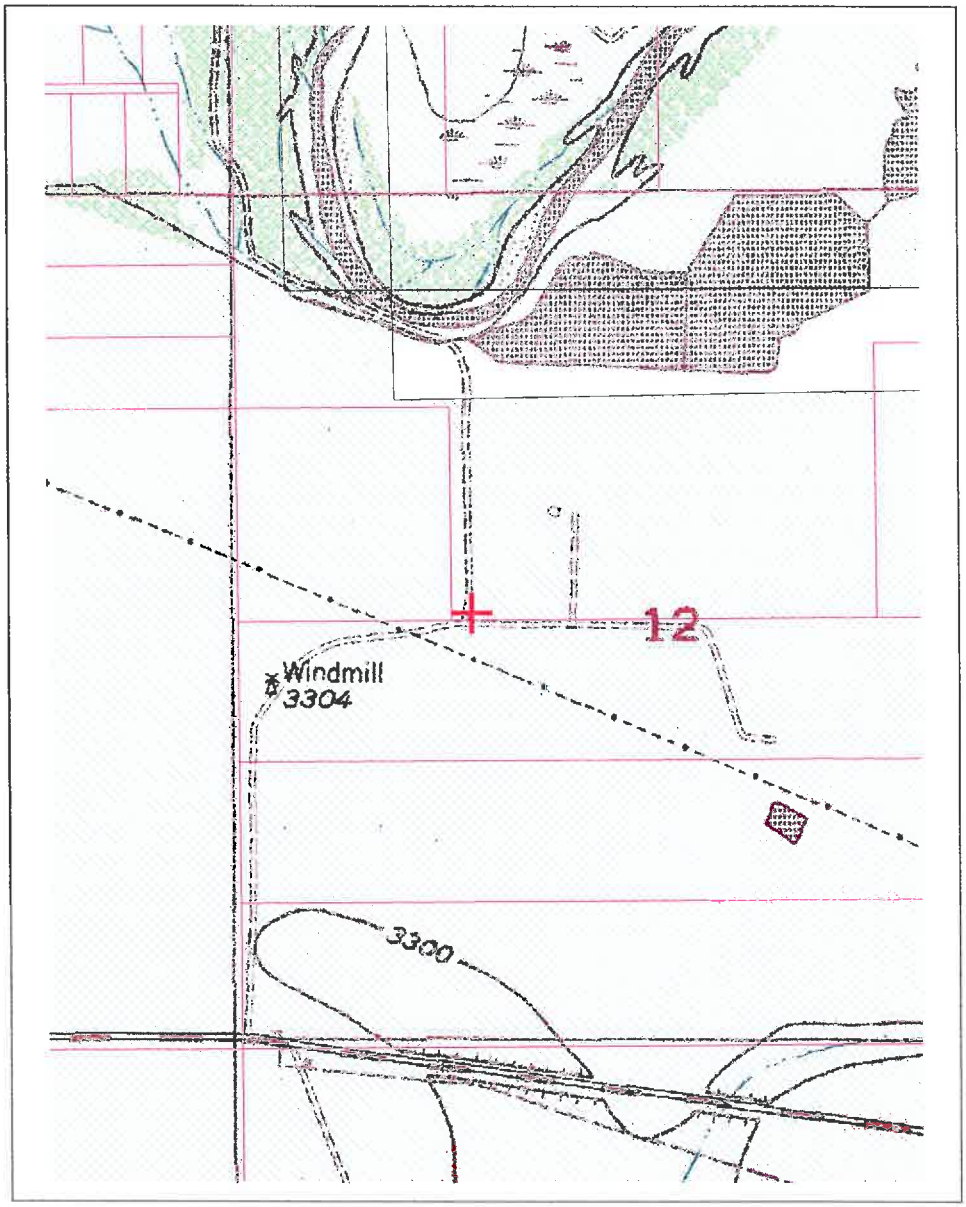
NAD 1983(92) (Meters)	N: 3,634,855	E: 561,860
NAD 1983(92) (Survey Feet)	N: 11,925,353	E: 1,843,371
NAD 1927 (Meters)	N: 3,634,652	E: 561,910
NAD 1927 (Survey Feet)	N: 11,924,687	E: 1,843,534

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

Print Date: 05/10/2016

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

2016 MAY -2 PM 4:20

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 Combs 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 10th day of May, 2016

Tom Blaine P.E., New Mexico State Engineer

By: Greg Crabtree

For Andy Morley
District II Manager

2016 MAY -2 PM 4:20

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			

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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 of grout placement (ft bgl)			
Theoretical volume of sealant required per interval (gallons)			
Proposed abandonment sealant (manufacturer and trade name)			

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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: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0	- 01 -			0	SANDY CLAY (CL): reddish-brown, dry, low carbonate induration, low-medium plasticity, no odor, no staining	Open 2" Diameter Casing Bentonite
					SANDY CLAY (CL): reddish-brown, low carbonate induration, medium-high plasticity, no odor, no staining	20/40 Grade Silica Sand
5	- 05 -			0	SANDY CLAY (CL): light brown, low plasticity, no odor, no staining	
					SANDY CLAY (CL):brown, low plasticity, gypsum crystals, no odor, no staining	
				0	SANDY CLAY (CL): light reddish-brown, low carbonate induration, low-medium plasticity, damp, containes some gypsum crystals, no odor, no staining	
10						Sch 40 0.010 Slot PVC Screen
▽	- 12 -				Gypsiferrous SANDY CLAY (CL): whitish-green, low plasticity, moist, no odor, no staining	
				0		
15					Total Depth = 15.5'	
					Sampler Stopped at 16' Auger Stopped at 15' TMW-WWL-1 Set to 15.5'	
20						

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: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0	- 01 -			0	SILTY SAND (SM): light brown, damp, non-plastic, no odor, no stain	Open 2" Diameter Casing Bentonite
					SANDY CLAY (CL): brown, damp, medium plasticity, contains some gypsum crystals, no odor, no stain,	
5	- 05 -			0	SANDY CLAY (CL): light reddish-brown, damp, medium to high plasticity, contains some gymsum crystals, no odor, no stain,	20/40 Grade Silica Sand
				0		
10						Sch 40 0.010 Slot PVC Screen
▽	- 12 -			0	SANDY CLAY (CL): reddish-brown, moist, low plasticity, low-moderate carbonate induration becomes more gymsiferous with depth, no odor, organic, no stain	
15					TOTAL DEPTH = 16' Sampler Stopped at 16' Auger Stopped at 15' TMW-WWL-1 Set to 15'	
20						

ANALYTICAL REPORT

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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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

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

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

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
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

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

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

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

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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

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	
(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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

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	
(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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 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 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	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(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

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	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
(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

Method Blank (MB)

(MB) R3137464-1 05/16/16 20:07

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL 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

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
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

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	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

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	559	13.1	595	564	104	99	1	80-120			5	15

Method Blank (MB)

(MB) R3138282-1 05/18/16 23:05

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL 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

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
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

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
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

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 %
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

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 %
Fluoride	50.0	5.27	36.6	33.9	63	57	1	80-120	J6	J6	7	15

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	

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 %	MS Qualifier	MSD Qualifier	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

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	J	1.41	10.0
Manganese	U		0.12	1.00

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

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	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	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*

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	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
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	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
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*

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*

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*

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*

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*				

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*

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	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	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	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
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*				

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*

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*

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*

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*				

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*

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 %	LCS Qualifier	LCSD Qualifier	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*				

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.

ACCREDITATIONS & LOCATIONS

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
Conneticut	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 [1 4]	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		

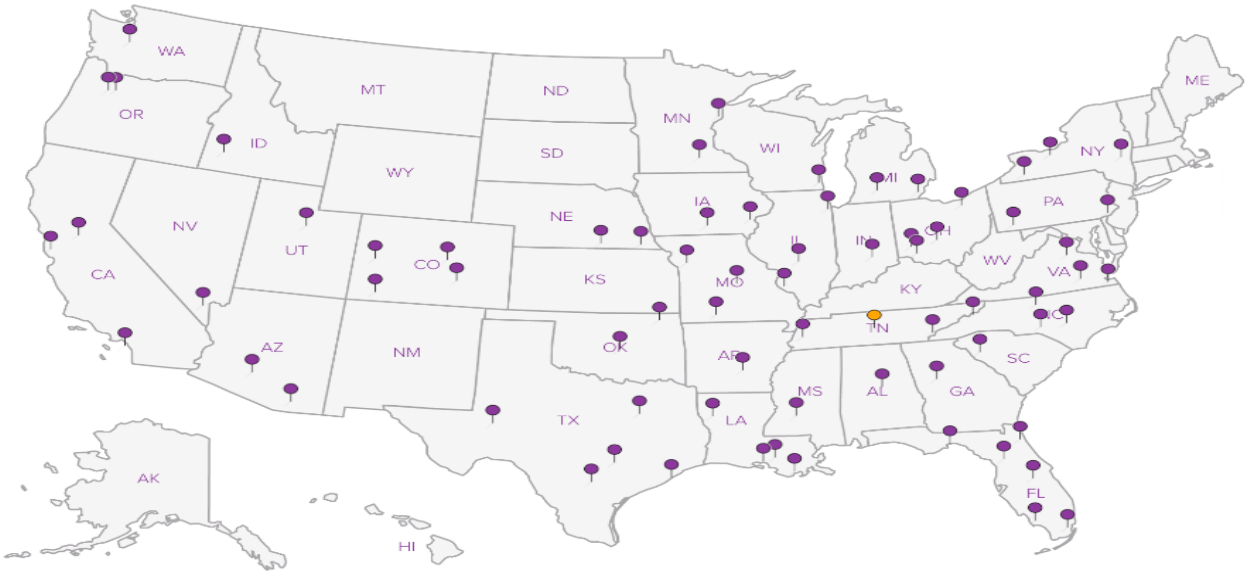
Third Party & Federal Accreditations

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

Collected by (signature): William R Smith

Immediately Packed on Ice N ___ Y X

Site/Facility ID # Holly Frontier NMNM

P.O. #

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X_Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8270ACID 100ml Amb NoPres	Cl, Fl, SO4 125mlHDPE-NoPres	Cl, Fl, SO4 4ozClr-NoPres	DROOROLVI 40mlAmb-HCl-BT	DRORLA,SV8270ACID 4ozClr-NoPres	FEICP,MNICP 250mlHDPE-HNO3 V	FEICP,MNICP 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
~~TMW-WWL2-12D~~		~~SS~~				~~4~~			~~X~~		~~X~~		~~X~~		~~X~~			
TMW-WWL2-EQ		GW	—	5/10/16	18:00	11	X	X		X		X		X		X		-08
~~TMW-WWL2-EQ~~		~~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

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
William R Smith	5/11/16	15:00	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 3.2 °C Bottles Received: 39 TB

Date: 5.12.16 Time: 900

Hold #

Condition: (lab use only) GOOD

COC Seal Intact: ✓Y ___N ___NA

pH Checked: ___ NCF: ___

Chain of Custody Page ___ of ___

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L# L8 35078

K079

Acctnum: **AMECFWHTX**
Template: **T112078**
Prelogin: **P552541**
TSR: **526 - Chris McCord**
PB: 5.4.16 KM
Shipped Via: **FedEx Ground**

ANALYTICAL REPORT

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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TMW-WWL1 L835353-01 GW

Collected by | Collected date/time 05/12/16 08:30 | Received date/time 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

TMW-WWL2 L835353-02 GW

Collected by | Collected date/time 05/12/16 09:00 | Received date/time 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

TMW-WWL2D L835353-03 GW

Collected by | Collected date/time 05/12/16 09:05 | Received date/time 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 05/12/16 00:00 | Received date/time 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 05/12/16 00:00 | Received date/time 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

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

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

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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 mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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 mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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 mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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 mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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 mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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

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	
(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

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	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
(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

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

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	
(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

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	05/18/2016 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

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	05/18/2016 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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	U		0.00280	0.0200	1	05/19/2016 09:44	WG873476

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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

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	J3	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

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

Method Blank (MB)

(MB) R3139346-1 05/24/16 08:33

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

L836606-01 Original Sample (OS) • Duplicate (DUP)

(OS) L836606-01 05/24/16 16:53 • (DUP) R3139346-5 05/24/16 17:07

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
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

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	39.0	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

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
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

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 %
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

Method Blank (MB)

(MB) R3140117-1 05/26/16 09:06

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL 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

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
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

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	39.4	39.3	99	98	80-120			0	15
Sulfate	40.0	39.8	39.8	100	100	80-120			0	15

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

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

Method Blank (MB)

(MB) R3138224-1 05/19/16 09:36

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL 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

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 %
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

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 %
Mercury	0.300	U	0.282	0.276	94	92	1	75-125			2	20

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

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

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

Method Blank (MB)

(MB) R3137306-3 05/16/16 22:25

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
TPH (GC/FID) Low Fraction	U		0.0314	0.100
(S) a,a,a-Trifluorotoluene(FID)	*100*			*62.0-128*

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	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
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	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
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*

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*

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*

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*				

Method Blank (MB)

(MB) R3137334-1 05/17/16 03:42

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	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	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
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*				

Method Blank (MB)

(MB) R3138554-1 05/20/16 10:03

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	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	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
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	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	%	%		%			%	%
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*				

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*

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 %	LCS Qualifier	LCSD Qualifier	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*				

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*

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*				

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.

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* 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
Conneticut	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 [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
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Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

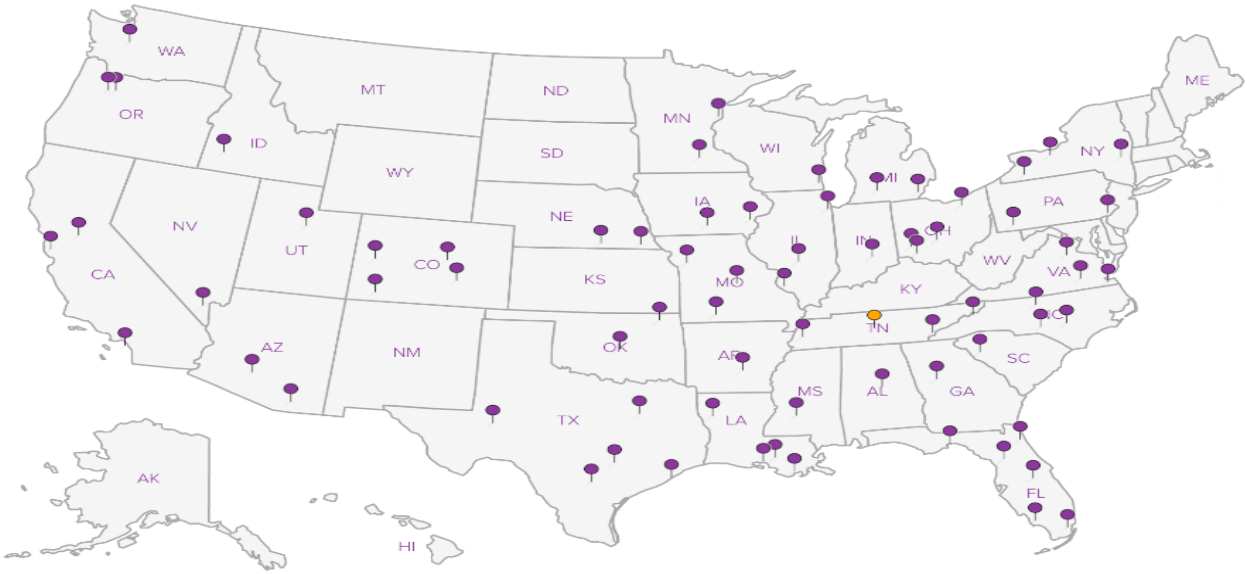
Third Party & Federal Accreditations

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: WASTE WATER LINE Slurry Slinger Sump Investigation

City/State Collected:

Phone: 713-929-5674
Fax:

Client Project # 6703160012.004

Lab Project # AMECFWHTX-SLURRY

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ____ Y ____

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X__Yes
FAX? ___No ___Yes

Chain of Custody Page ___ of ___

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L# L835353

1198

Acctnum: AMECFWHTX
Template: T112081
Prelogin: P552543
TSR: 526 - Chris McCord
PB: 5-4.16 KM
Shipped Via: FedEx Ground

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8270 100ml Amb NoPres	DROOROLVI 40mlAmb-HCl-BT	DRORLA,SV8270 4ozClr-NoPres	GRO 40mlAmb HCl	GRO,V8260 2ozClr-NoPres	Skinner's List Mtls. 250mlHDPE-HNO3	Skinner's list Mtls. 2ozClr-NoPres	V8260 40mlAmb-HCl	V8260- Trip Blank 40mlAmb-HCl-Blk		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
		GW				1									X			
WWL-SPC *																		

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

pH _____ Temp _____

Flow _____ Other _____

6711 0132 9017

5-054

Remarks:
* Pamela Krueger will call in Analysis for WWL1 Soil Pile Composite Sample

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	5/12/16	11:00	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 2.4 °C Bottles Received: 35

Date: 5-12-16 Time: 9:00

Condition: (lab use only) JW7 (OK)

COC Seal Intact: ✓ Y ___N ___NA

pH Checked: NCF:

Jeremy W. Watkins

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 / Courie
	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.

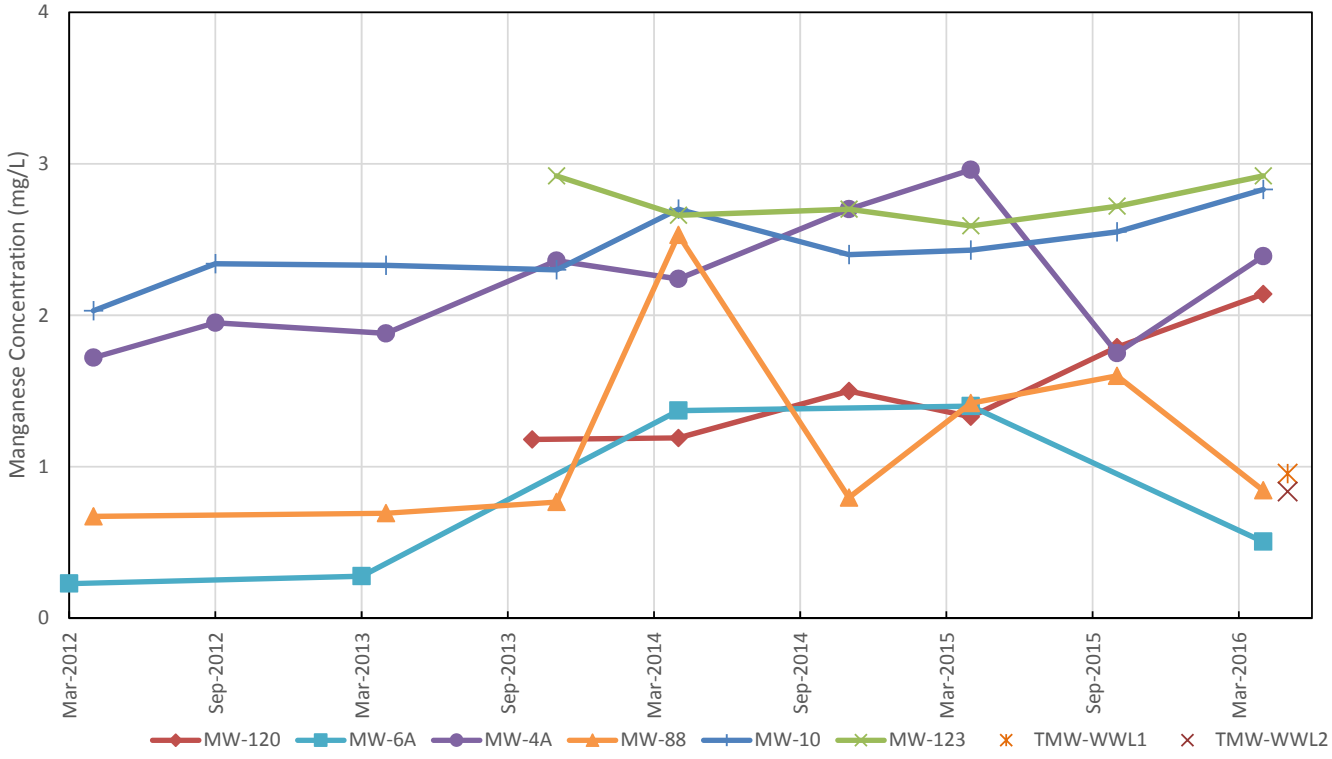
Client informed by:		Call		Email		Voice Mail		Date:	Time:
TSR Initials: CM	Client Contact:								

Login Instructions:

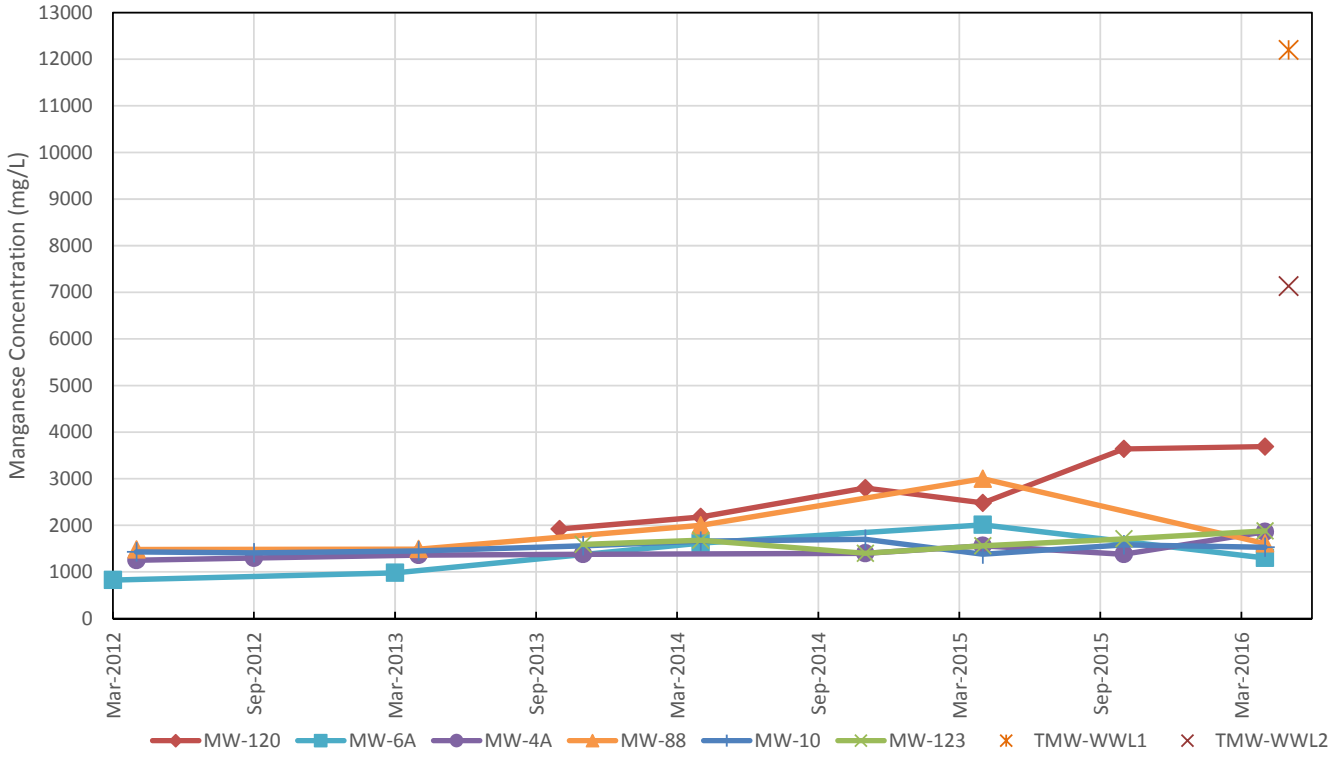
Log 125mL-NP for CHLORIDE, FLUORIDE and SULFATE.
Also, change on all IDs: 8270 to 8270ACID; V8260 to V8260BTEX and only log metals FEICP and MNICP.

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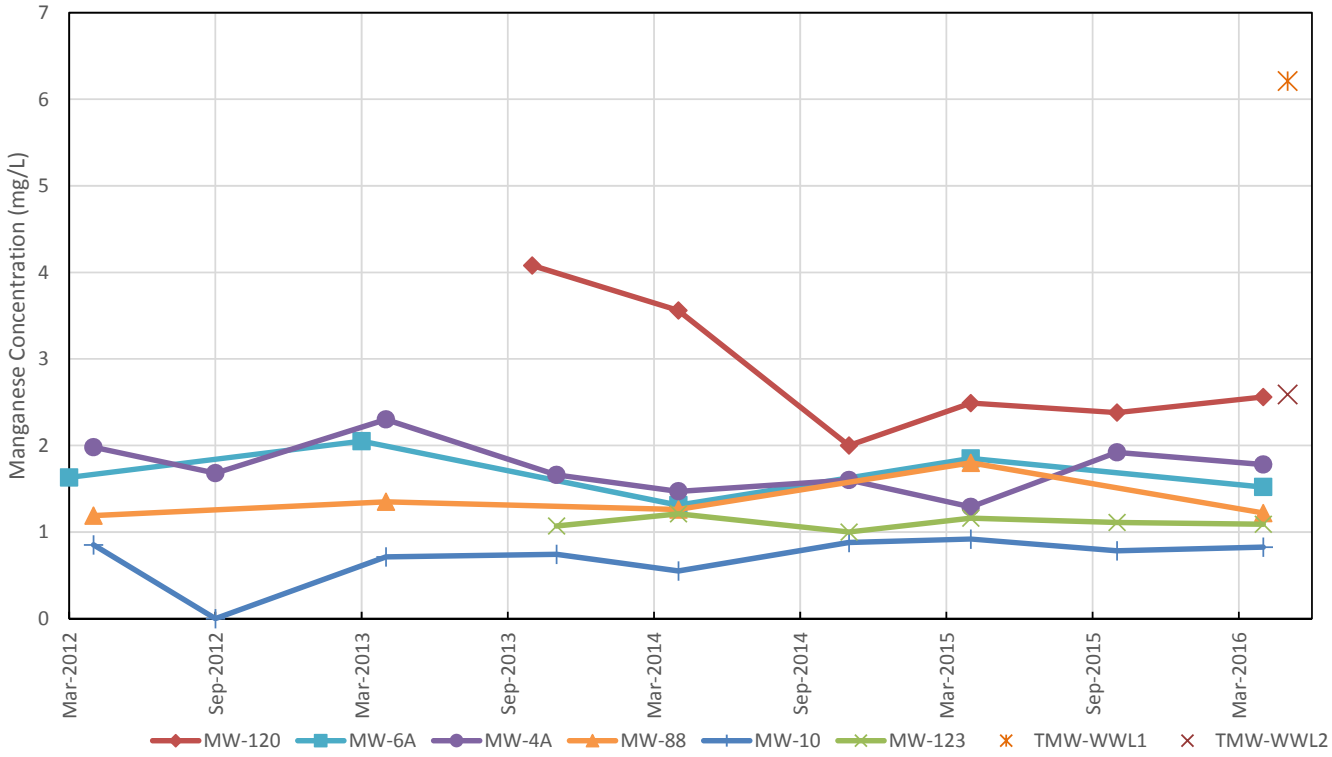
Manganese



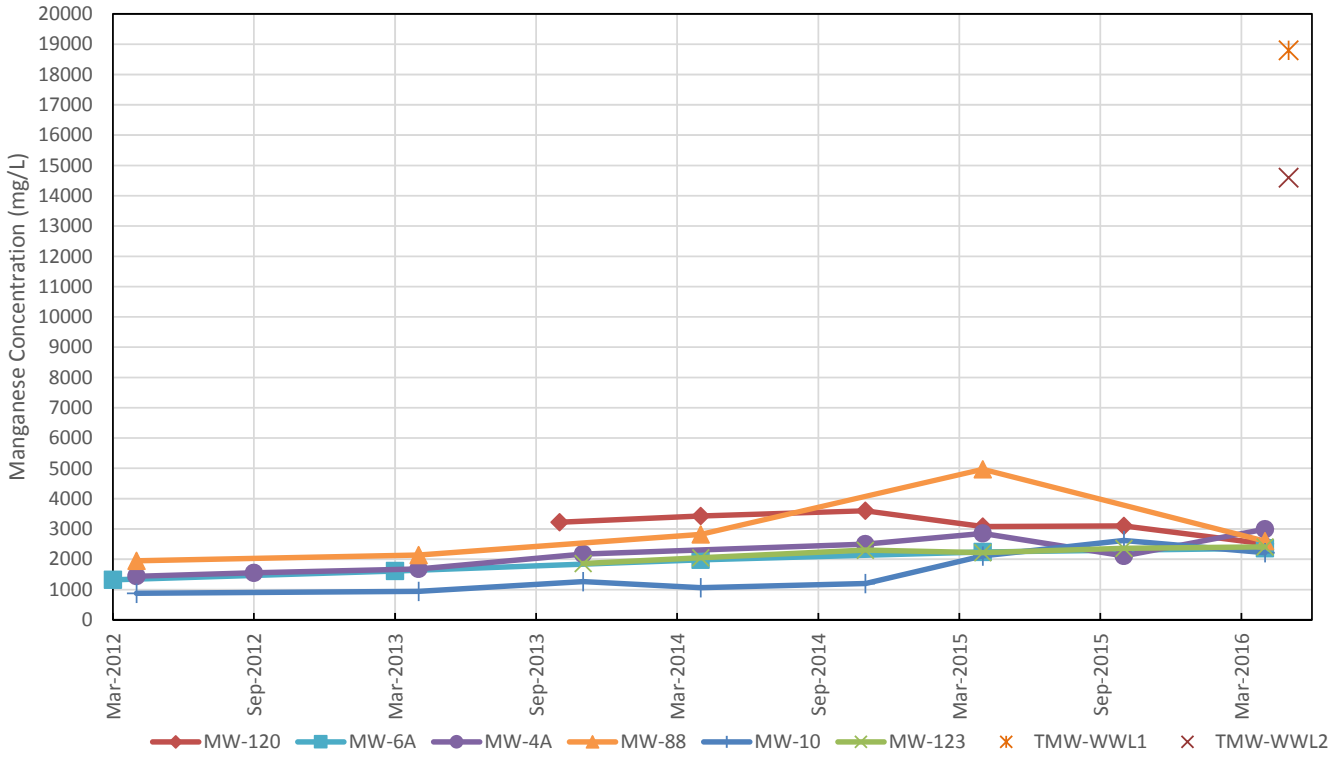
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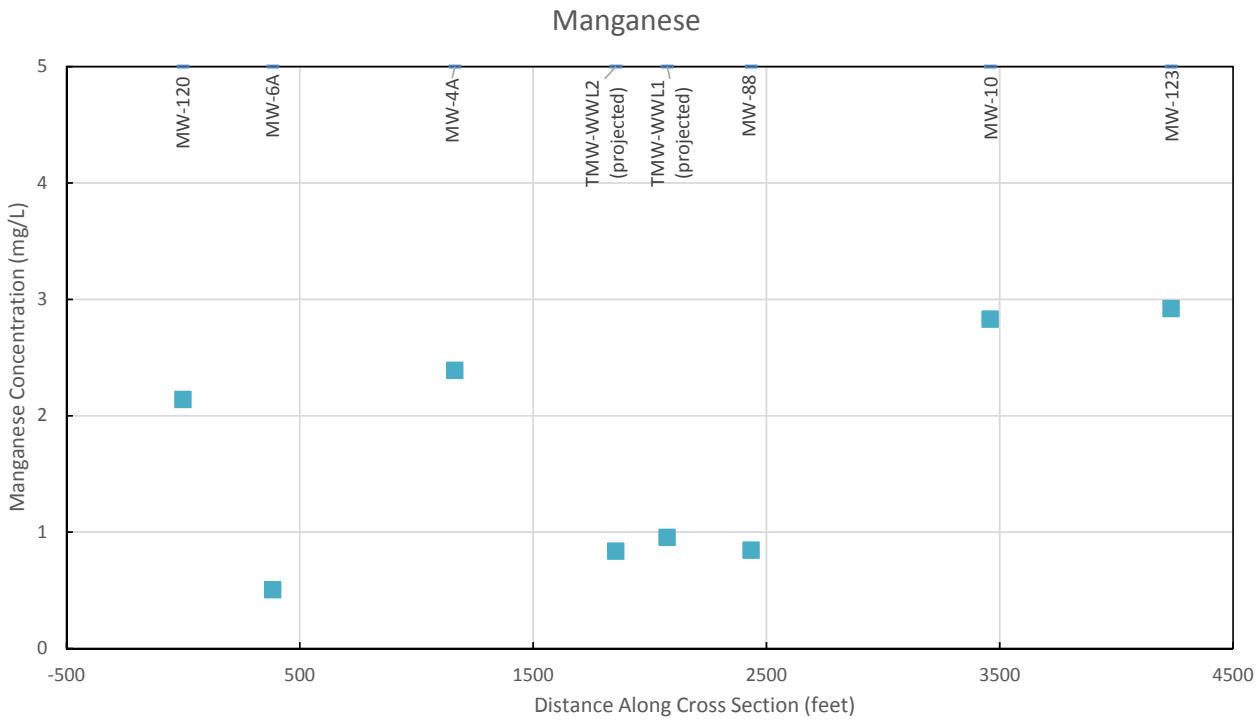


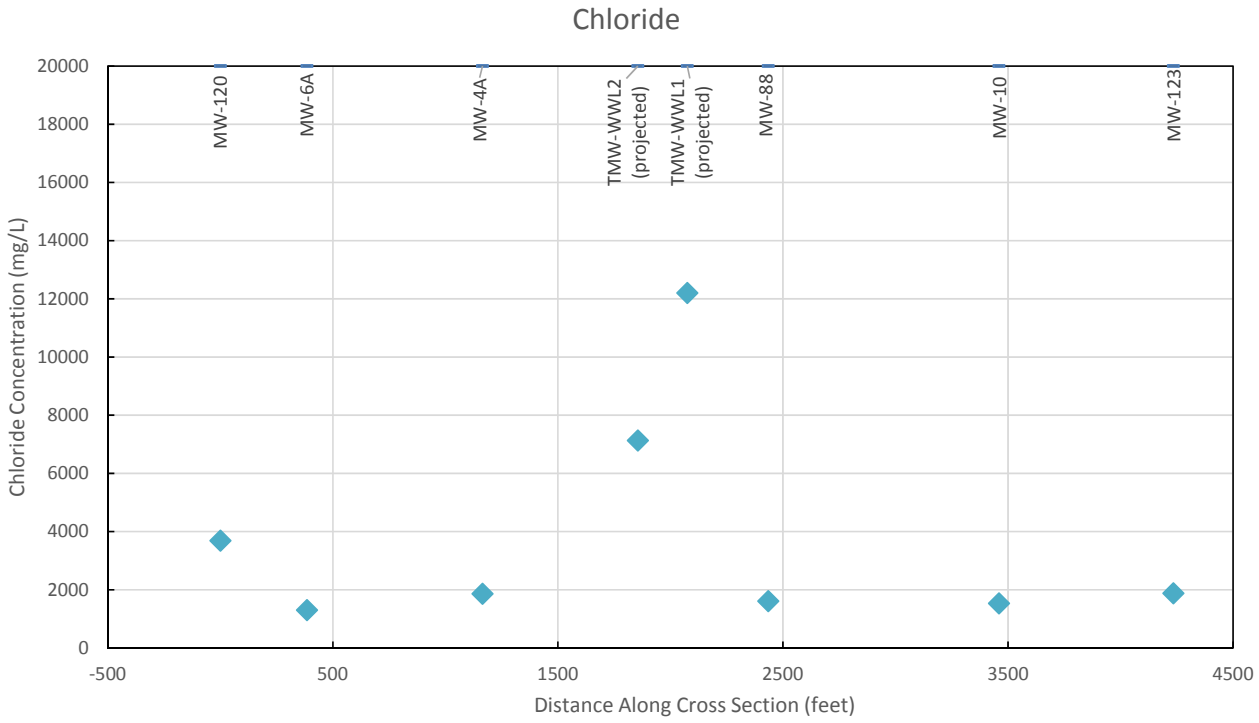
Fluoride

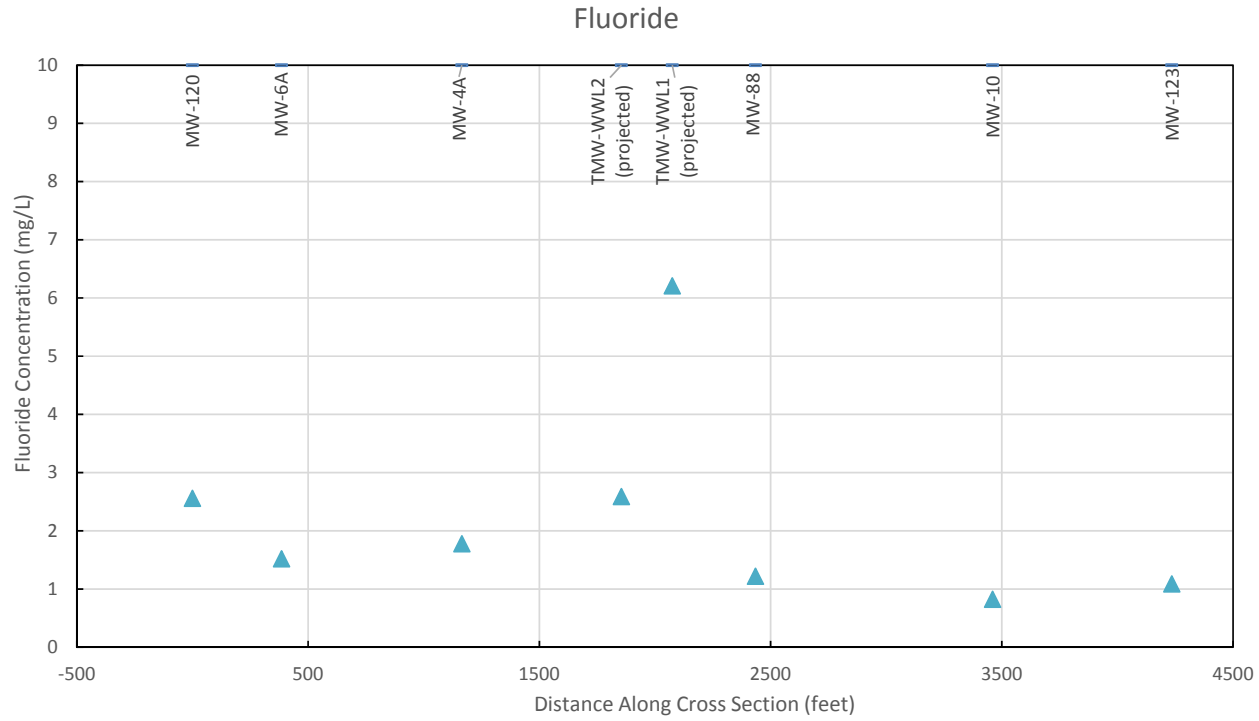


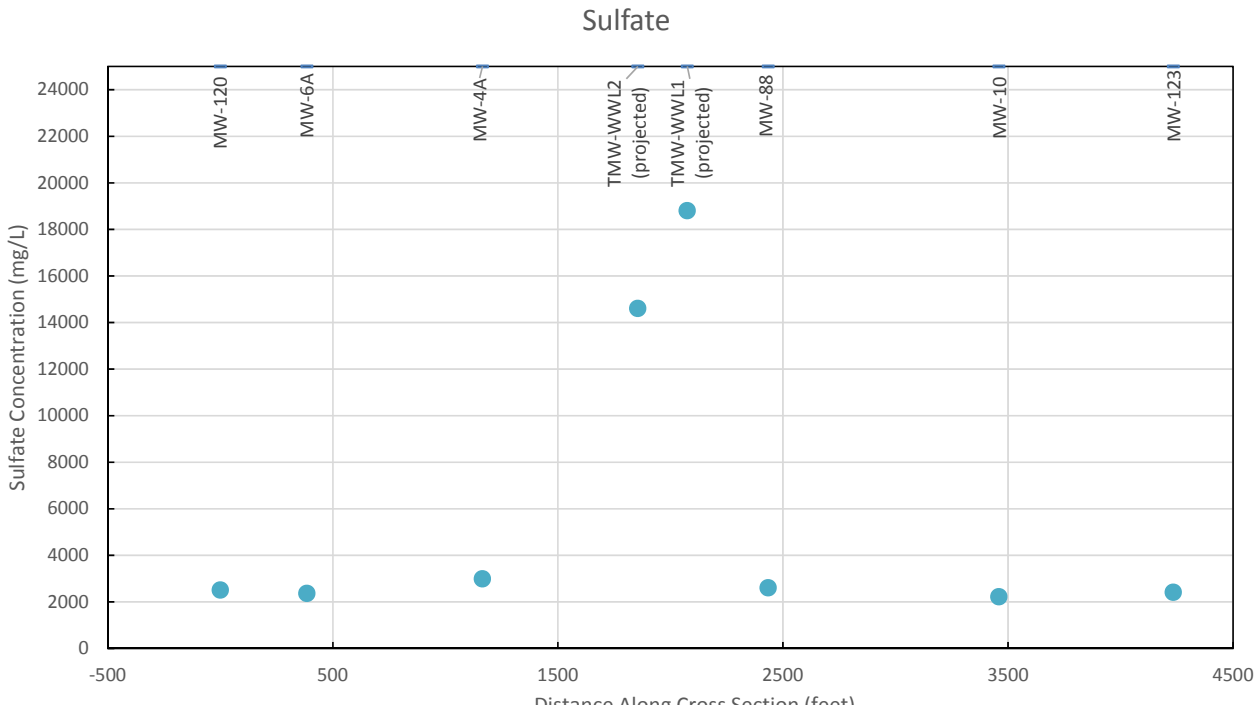
Sulfate




Manganese
Manganese Concentration (mg/L)
0
1
2
3
4
5
-500
500
1500
2500
3500
4500
Distance Along Cross Section (feet)
MW-120
MW-6A
MW-4A
TMW-WWL2 (projected)
TMW-WWL1 (projected)
MW-88
MW-10
MW-123


Chloride
Chloride Concentration (mg/L)
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
-500
500
1500
2500
3500
4500
Distance Along Cross Section (feet)
MW-120
MW-6A
MW-4A
TMW-WWL2 (projected)
TMW-WWL1 (projected)
MW-88
MW-10
MW-123


Fluoride
Fluoride Concentration (mg/L)
Distance Along Cross Section (feet)
MW-120
MW-6A
MW-4A
TMW-WWL2 (projected)
TMW-WWL1 (projected)
MW-88
MW-10
MW-123
0
1
2
3
4
5
6
7
8
9
10
-500
500
1500
2500
3500
4500


Sulfate
Sulfate Concentration (mg/L)
MW-120
MW-6A
MW-4A
TMW-WWL2 (projected)
TMW-WWL1 (projected)
MW-88
MW-10
MW-123
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
22000
24000
-500
500
1500
2500
3500
4500

HOLLYFRONTIER.

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

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	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? ☒ Yes ☐ No ☐ 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? ☐ Yes ☒ 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:	OIL CONSERVATION DIVISION	
Printed Name: Robert Combs	Approved by Environmental Specialist:	
Title: Environmental Specialist	Approval Date:	Expiration Date:
E-mail Address:	Conditions of Approval:	Attached ☐
Date: 7/28/16 Phone: 575-746-5382		

* 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 plan[1] 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.

Amec Foster Wheeler Environment & Infrastructure, Inc.
585 North Dairy Ashford
Houston, Texas 77079
Tel: 713-929-5000
amecfw.com

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 document[2]
- 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 ponds[4]

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 – Revised[4] 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 report[5]. 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 groundwater[3], 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.

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

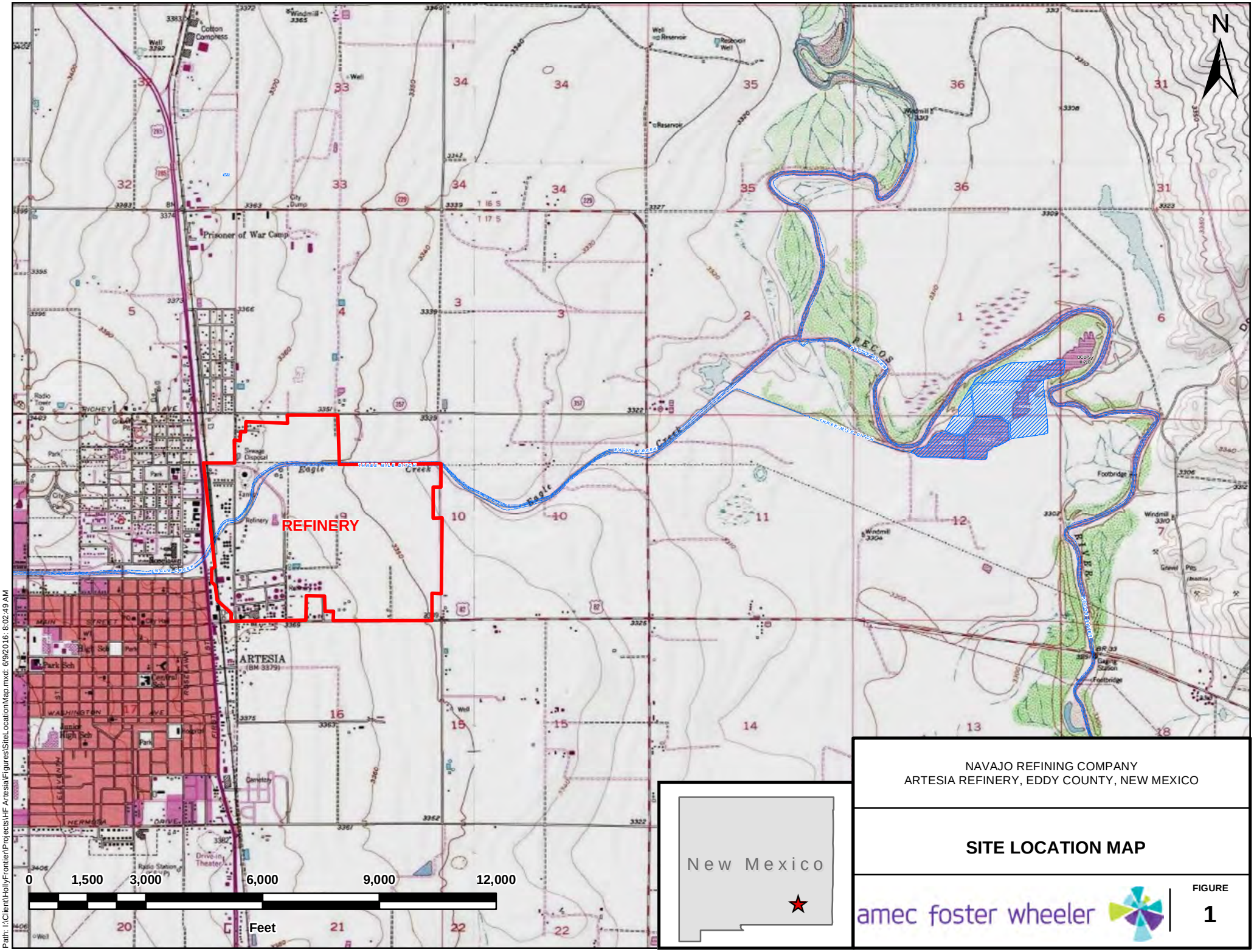
c: David R. Hoffman, PE, Amec Foster Wheeler

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



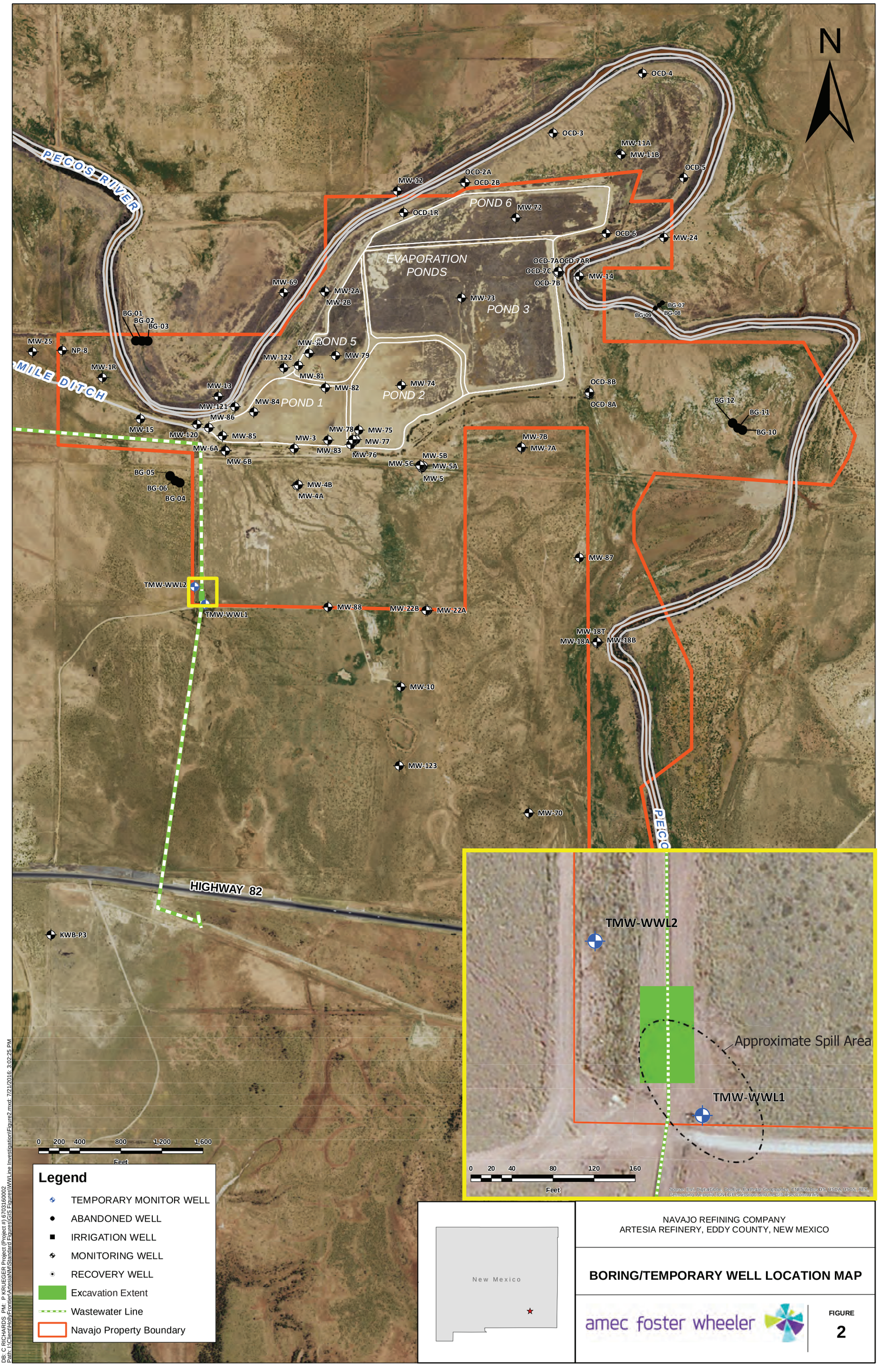
NAVAJO REFINING COMPANY
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

SITE LOCATION MAP

amec foster wheeler

FIGURE
1

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

BORING/TEMPORARY WELL LOCATION MAP

amec foster wheeler

FIGURE
2

DB: C RICHARDS PM: P KRUEGER Project (Project #) 6703160002
Path: \\Client\HSW\Frontier\Artesia\MA\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:	**TMW-WWL1**			**TMW-WWL2**			
					Depth (ft bgs):	**1**	**5**	**12**	**1**	**5**	**12**	**12 (Duplicate)**
					Date:	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

				Wastewater	TMW-WWL1	TMW-WWL2	
				2/23/2105	5/12/2016	5/12/2016	5/12/2016 (Duplicate)
Analyte	**Units**	**NMED TPH**	**WQCC**				
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 lavendar 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 Comission

amec foster wheeler

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: Scott Denton check here if Agent ☐	Contact or Agent: check here if Agent ☐
Mailing Address: 501 East Main Street	Mailing Address:
City: Artesia	City:
State: NM Zip Code: 88210	State: Zip Code:
Phone: ■ Home ☐ Cell Phone (Work): 575-746-5487	Phone: ☐ Home ☐ 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)
☐ NM West Zone
☐ NM East Zone
☐ NM Central Zone

☐ UTM (NAD83) (Meters)
☐ Zone 12N
☐ Zone 13N

■ Lat/Long (WGS84) (to the nearest 1/10th of second)

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.: 581987

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:	**Pollution Control and/or Recovery:**	**Construction Dewatering:**	**Mine De-Watering:**
☐ Include a description of any proposed pump test, if applicable.	☐ Include a plan for pollution control/recovery, that includes the following: ☐ A description of the need for the pollution control or recovery operation. ☐ The estimated maximum period of time for completion of the operation. ☐ The annual diversion amount. ☐ The annual consumptive use amount. ☐ The maximum amount of water to be diverted and injected for the duration of the operation. ☐ The method and place of discharge.	☐ Include a description of the proposed dewatering operation, ☐ The estimated duration of the operation, ☐ The maximum amount of water to be diverted, ☐ A description of the need for the dewatering operation, and, ☐ A description of how the diverted water will be disposed of.	☐ Include a plan for pollution control/recovery, that includes the following: ☐ A description of the need for mine dewatering. ☐ The estimated maximum period of time for completion of the operation. ☐ The source(s) of the water to be diverted. ☐ The geohydrologic characteristics of the aquifer(s). ☐ The maximum amount of water to be diverted per annum. ☐ The maximum amount of water to be diverted for the duration of the operation. ☐ The quality of the water. ☐ The method of measurement of water diverted. ☐ The recharge of water to the aquifer. ☐ Description of the estimated area of hydrologic effect of the project. ☐ The method and place of discharge. ☐ An estimation of the effects on surface water rights and underground water rights from the mine dewatering project. ☐ A description of the methods employed to estimate effects on surface water rights and underground water rights. ☐ Information on existing wells, rivers, springs, and wetlands within the area of hydrologic effect.
Monitoring: ■ Include the reason for the monitoring well, and, ■ The duration of the planned monitoring.	☐ The method of measurement of water produced and discharged. ☐ The source of water to be injected. ☐ The method of measurement of water injected. ☐ The characteristics of the aquifer. ☐ The method of determining the resulting annual consumptive use of water and depletion from any related stream system. ☐ Proof of any permit required from the New Mexico Environment Department. ☐ 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:** ☐ Include a description of the geothermal heat exchange project, ☐ The amount of water to be diverted and re-injected for the project, ☐ The time frame for constructing the geothermal heat exchange project, and, ☐ The duration of the project. ☐ 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

2016 MAY -2 PM 4:20

FOR OSE 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.

Trn Desc: RA 12403 POD1,2

File Number: RA 12403
Trn Number: 586987

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 REFING 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

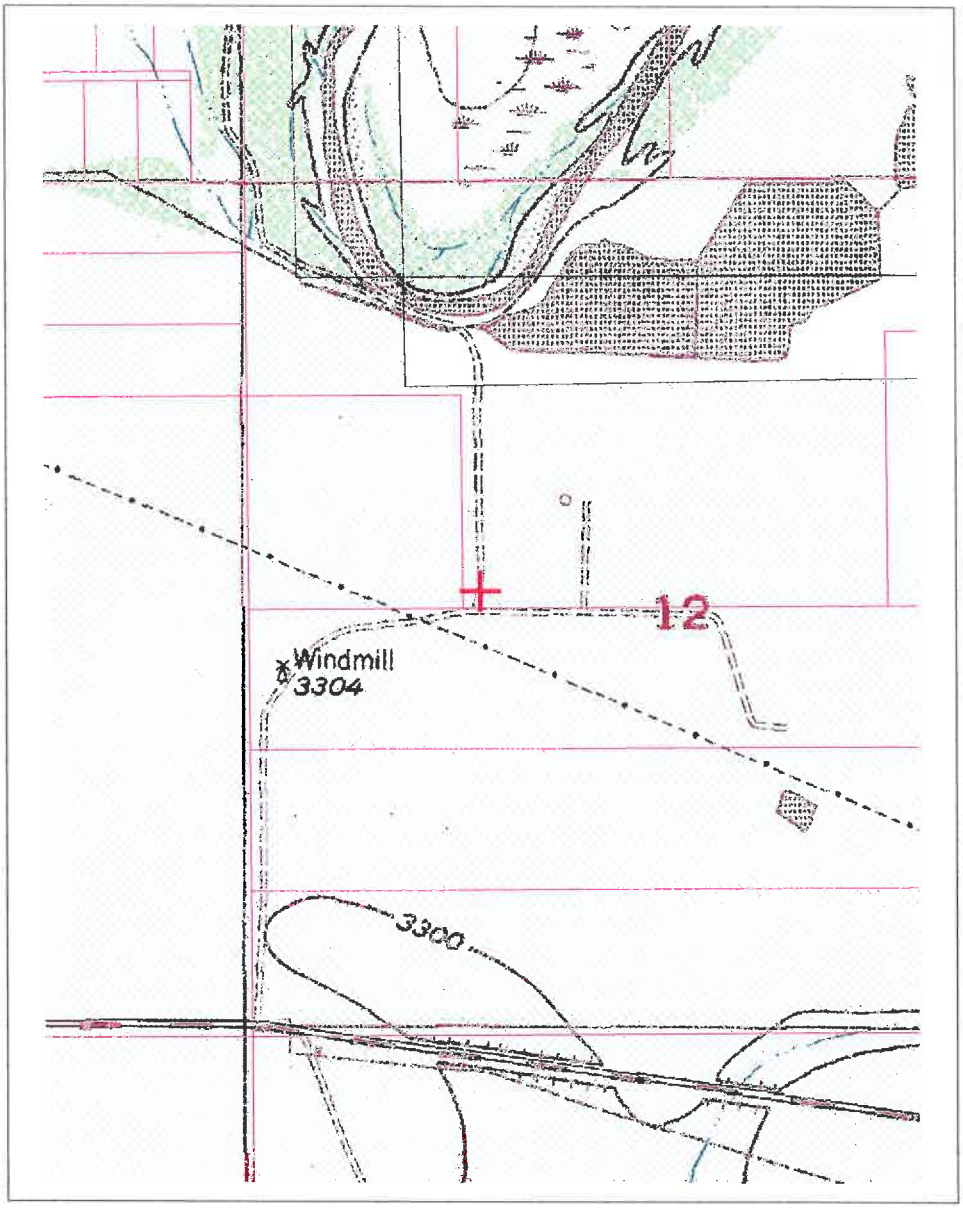
NAD 1983(92) (Meters)	N: 3,634,873	E: 561,855
NAD 1983(92) (Survey Feet)	N: 11,925,413	E: 1,843,353
NAD 1927 (Meters)	N: 3,634,670	E: 561,905
NAD 1927 (Survey Feet)	N: 11,924,748	E: 1,843,516

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

Print Date: 05/10/2016

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 REFING 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

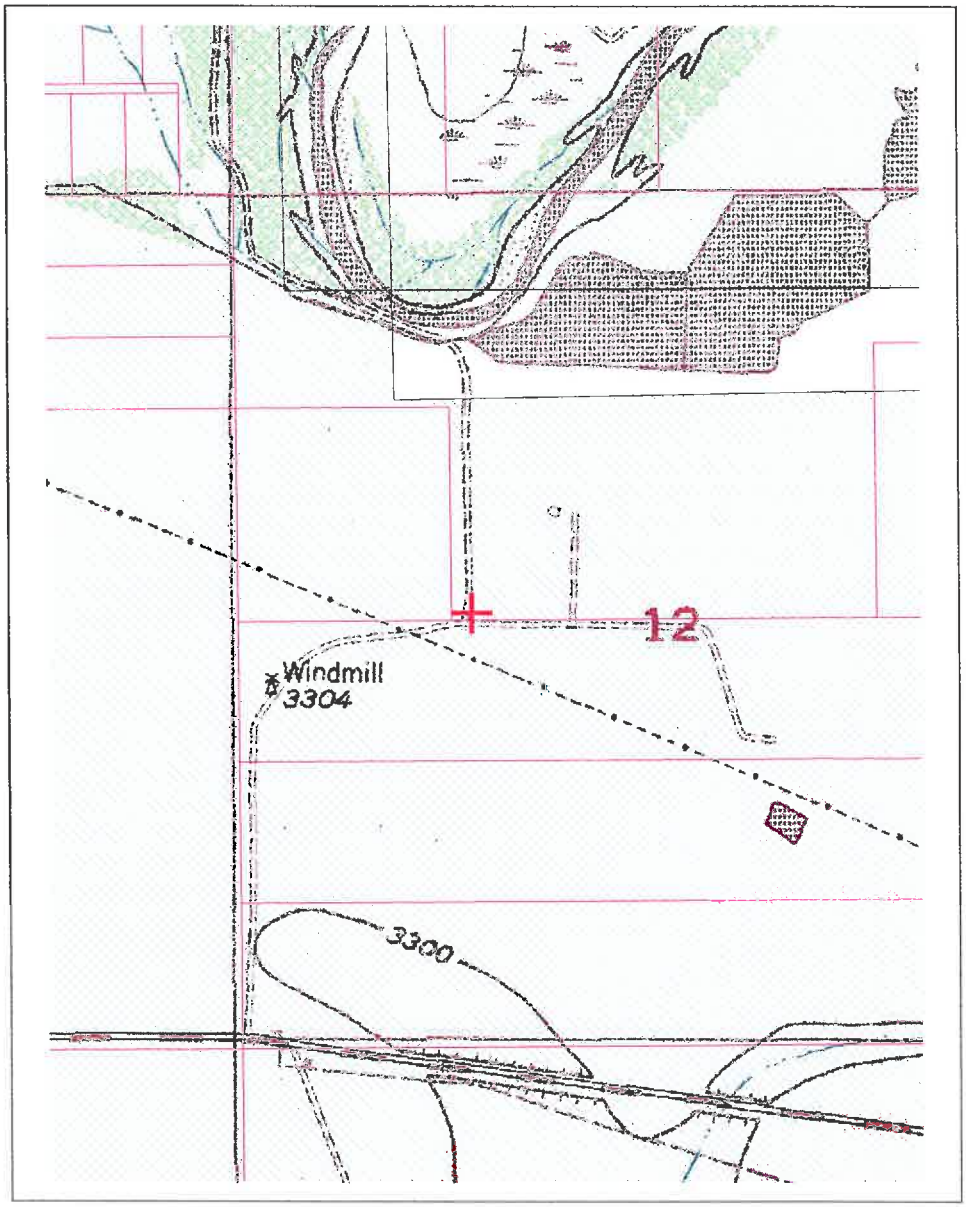
NAD 1983(92) (Meters)	N: 3,634,855	E: 561,860
NAD 1983(92) (Survey Feet)	N: 11,925,353	E: 1,843,371
NAD 1927 (Meters)	N: 3,634,652	E: 561,910
NAD 1927 (Survey Feet)	N: 11,924,687	E: 1,843,534

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

Print Date: 05/10/2016

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

2016 MAY -2 PM 4:20

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 Combs 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 10th day of May, 2016

Tom Blaine P.E., New Mexico State Engineer

By: Greg Crabtree

For Andy Morley
District II Manager

2016 MAY -2 PM 4:20

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

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 of grout placement (ft bgl)			
Theoretical volume of sealant required per interval (gallons)			
Proposed abandonment sealant (manufacturer and trade name)			

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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: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0	- 01 -			0	SANDY CLAY (CL): reddish-brown, dry, low carbonate induration, low-medium plasticity, no odor, no staining	Open 2" Diameter Casing Bentonite
					SANDY CLAY (CL): reddish-brown, low carbonate induration, medium-high plasticity, no odor, no staining	20/40 Grade Silica Sand
5	- 05 -			0	SANDY CLAY (CL): light brown, low plasticity, no odor, no staining	
					SANDY CLAY (CL):brown, low plasticity, gypsum crystals, no odor, no staining	
				0	SANDY CLAY (CL): light reddish-brown, low carbonate induration, low-medium plasticity, damp, containes some gypsum crystals, no odor, no staining	
10						Sch 40 0.010 Slot PVC Screen
▽	- 12 -				Gypsiferrous SANDY CLAY (CL): whitish-green, low plasticity, moist, no odor, no staining	
				0		
15					Total Depth = 15.5'	
					Sampler Stopped at 16' Auger Stopped at 15' TMW-WWL-1 Set to 15.5'	
20						

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: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0	- 01 -			0	SILTY SAND (SM): light brown, damp, non-plastic, no odor, no stain	Open 2" Diameter Casing Bentonite
					SANDY CLAY (CL): brown, damp, medium plasticity, contains some gypsum crystals, no odor, no stain,	
5	- 05 -			0	SANDY CLAY (CL): light reddish-brown, damp, medium to high plasticity, contains some gymsum crystals, no odor, no stain,	20/40 Grade Silica Sand
				0		
10						Sch 40 0.010 Slot PVC Screen
▽	- 12 -			0	SANDY CLAY (CL): reddish-brown, moist, low plasticity, low-moderate carbonate induration becomes more gymsiferous with depth, no odor, organic, no stain	
15					TOTAL DEPTH = 16' Sampler Stopped at 16' Auger Stopped at 15' TMW-WWL-1 Set to 15'	
20						

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ATTACHMENT C

ANALYTICAL REPORT

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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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

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

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

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
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

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

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

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

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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

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	
(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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

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	
(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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 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 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	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(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

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	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
(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

Method Blank (MB)

(MB) R3137464-1 05/16/16 20:07

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL 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

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
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

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	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

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	559	13.1	595	564	104	99	1	80-120			5	15

Method Blank (MB)

(MB) R3138282-1 05/18/16 23:05

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL 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

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
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

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
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

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 %
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

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 %
Fluoride	50.0	5.27	36.6	33.9	63	57	1	80-120	J6	J6	7	15

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	

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 %	MS Qualifier	MSD Qualifier	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

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	J	1.41	10.0
Manganese	U		0.12	1.00

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

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	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	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*

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	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
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	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
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*

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*

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*

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*

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*				

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*

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	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	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	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
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*				

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*

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*

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*

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*				

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*

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 %	LCS Qualifier	LCSD Qualifier	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*				

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.

ACCREDITATIONS & LOCATIONS

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
Conneticut	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 [1 4]	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		

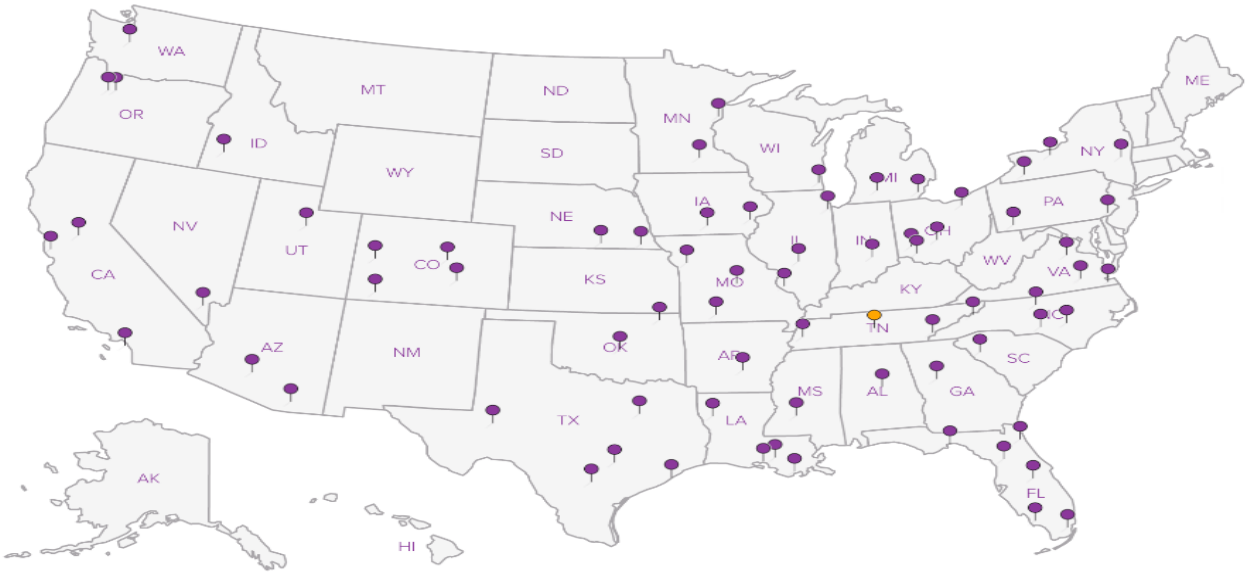
Third Party & Federal Accreditations

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

Collected by (signature): William R Smith

Immediately Packed on Ice N ___ Y X

Site/Facility ID # Holly Frontier NMNM

P.O. #

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X_Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8270ACID 100ml Amb NoPres	Cl, Fl, SO4 125mlHDPE-NoPres	Cl, Fl, SO4 4ozClr-NoPres	DROOROLVI 40mlAmb-HCl-BT	DRORLA,SV8270ACID 4ozClr-NoPres	FEICP,MNICP 250mlHDPE-HNO3 V	FEICP,MNICP 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
~~TMW-WWL2-12D~~		~~SS~~				~~4~~			~~X~~		~~X~~		~~X~~		~~X~~			
TMW-WWL2-EQ		GW	—	5/10/16	18:00	11	X	X		X		X		X		X		-08
~~TMW-WWL2-EQ~~		~~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

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
William R Smith	5/11/16	15:00	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 3.2 °C Bottles Received: 39 TB

Date: 5.12.16 Time: 900

Hold #

Condition: (lab use only) GOOD

COC Seal Intact: ✓Y ___N ___NA

pH Checked: ___ NCF: ___

Chain of Custody Page ___ of ___

ESC LABORATORY SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
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Phone: 800-767-5859
Fax: 615-758-5859

L# L8 35078

K079

Acctnum: **AMECFWHTX**
Template: **T112078**
Prelogin: **P552541**
TSR: **526 - Chris McCord**
PB: 5.4.16 KM
Shipped Via: **FedEx Ground**

ANALYTICAL REPORT

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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TMW-WWL1 L835353-01 GW

Collected by | Collected date/time 05/12/16 08:30 | Received date/time 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

TMW-WWL2 L835353-02 GW

Collected by | Collected date/time 05/12/16 09:00 | Received date/time 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

TMW-WWL2D L835353-03 GW

Collected by | Collected date/time 05/12/16 09:05 | Received date/time 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 05/12/16 00:00 | Received date/time 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 05/12/16 00:00 | Received date/time 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

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

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

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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 mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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 mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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 mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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 mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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 mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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

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	
(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

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	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
(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

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

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	
(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

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	05/18/2016 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

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	05/18/2016 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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	U		0.00280	0.0200	1	05/19/2016 09:44	WG873476

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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

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	J3	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

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

Method Blank (MB)

(MB) R3139346-1 05/24/16 08:33

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

L836606-01 Original Sample (OS) • Duplicate (DUP)

(OS) L836606-01 05/24/16 16:53 • (DUP) R3139346-5 05/24/16 17:07

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
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

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	39.0	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

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
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

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 %
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

Method Blank (MB)

(MB) R3140117-1 05/26/16 09:06

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL 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

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
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

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	39.4	39.3	99	98	80-120			0	15
Sulfate	40.0	39.8	39.8	100	100	80-120			0	15

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

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

Method Blank (MB)

(MB) R3138224-1 05/19/16 09:36

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL 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

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 %
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

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 %
Mercury	0.300	U	0.282	0.276	94	92	1	75-125			2	20

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

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

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

Method Blank (MB)

(MB) R3137306-3 05/16/16 22:25

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
TPH (GC/FID) Low Fraction	U		0.0314	0.100
(S) a,a,a-Trifluorotoluene(FID)	*100*			*62.0-128*

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	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
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	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
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*

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*

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*

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*				

Method Blank (MB)

(MB) R3137334-1 05/17/16 03:42

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	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	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
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*				

Method Blank (MB)

(MB) R3138554-1 05/20/16 10:03

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	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	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
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	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	%	%		%			%	%
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*				

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*

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 %	LCS Qualifier	LCSD Qualifier	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*				

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*

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*				

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.

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
Conneticut	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 [1 4]	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		

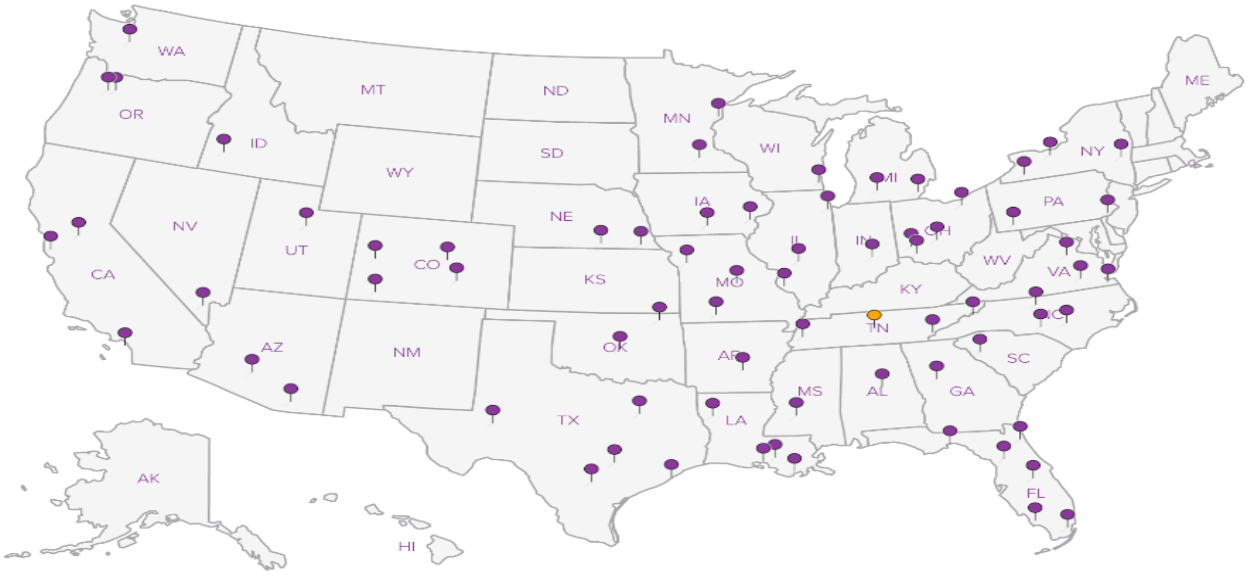
Third Party & Federal Accreditations

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: WASTE WATER LINE Slurry Slinger Sump Investigation

City/State Collected:

Phone: 713-929-5674
Fax:

Client Project # 6703160012.004

Lab Project # AMECFWHTX-SLURRY

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ____ Y ____

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X__Yes
FAX? ___No ___Yes

Chain of Custody Page ___ of ___

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Mount Juliet, TN 37122
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Fax: 615-758-5859

L# L835353

1198

Acctnum: AMECFWHTX
Template: T112081
Prelogin: P552543
TSR: 526 - Chris McCord
PB: 5-4.16 KM
Shipped Via: FedEx Ground

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8270 100ml Amb NoPres	DROOROLVI 40mlAmb-HCl-BT	DRORLA,SV8270 4ozClr-NoPres	GRO 40mlAmb HCl	GRO,V8260 2ozClr-NoPres	Skinner's List Mtls. 250mlHDPE-HNO3	Skinner's list Mtls. 2ozClr-NoPres	V8260 40mlAmb-HCl	V8260- Trip Blank 40mlAmb-HCl-Blk		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
		GW				1									X			
WWL-SPC *																		

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

pH _____ Temp _____

Flow _____ Other _____

6711 0132 9017

5-054

Remarks:
* Pamela Krueger will call in Analysis for WWL1 Soil Pile Composite Sample

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	5/12/16	11:00	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 2.4 °C Bottles Received: 35

Date: 5-12-16 Time: 9:00

Condition: (lab use only) JW7 (OK)

COC Seal Intact: ✓ Y ___N ___NA

pH Checked: NCF:

Jeremy W. Watkins

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 / Courie
	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:

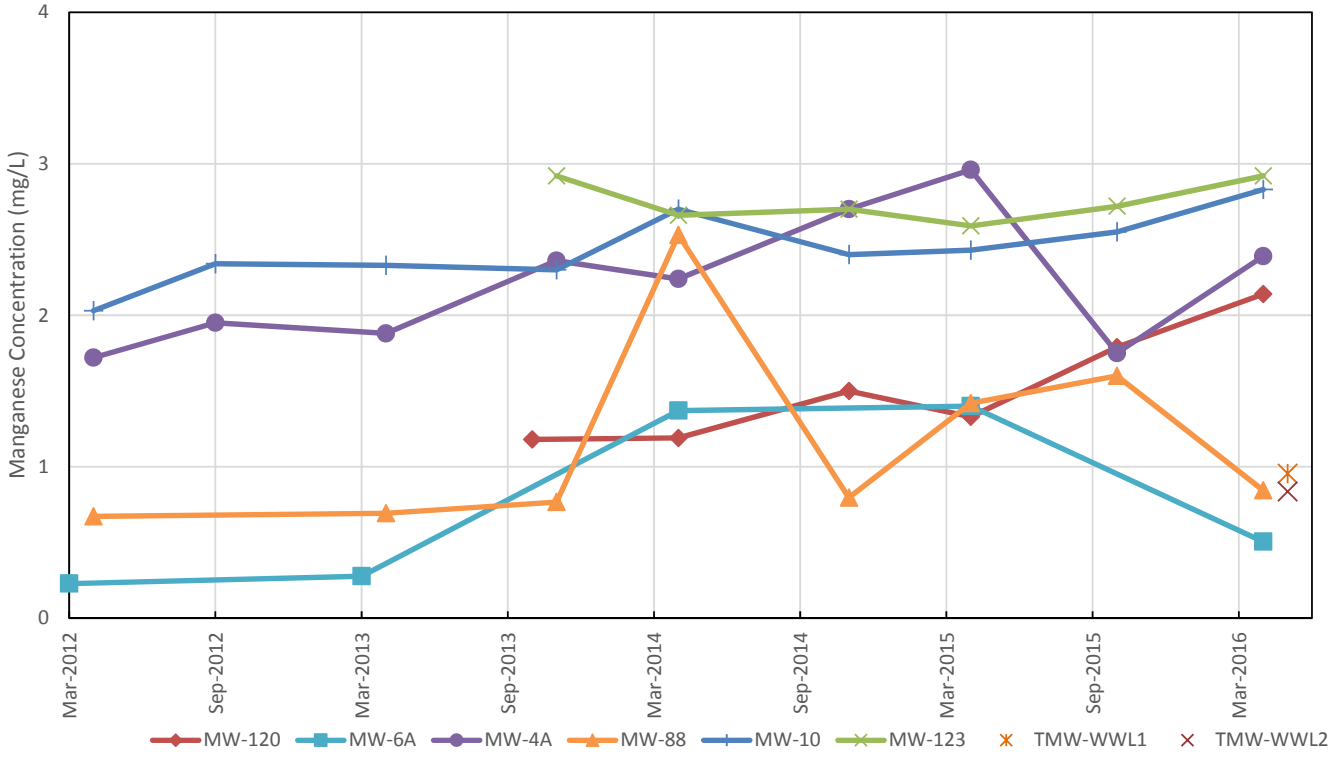
Log 125mL-NP for CHLORIDE, FLUORIDE and SULFATE.
Also, change on all IDs: 8270 to 8270ACID; V8260 to V8260BTEX and only log metals FEICP and MNICP.

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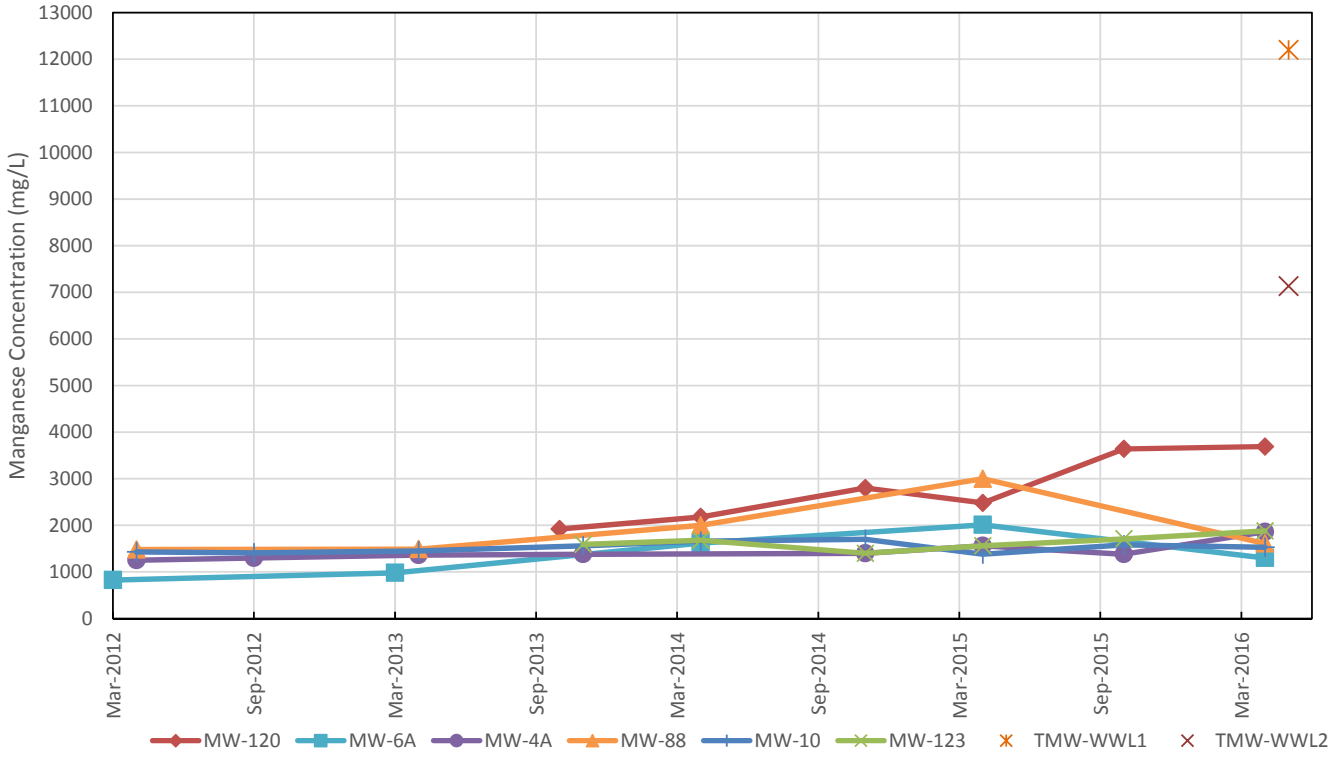
amec foster wheeler

ATTACHMENT D

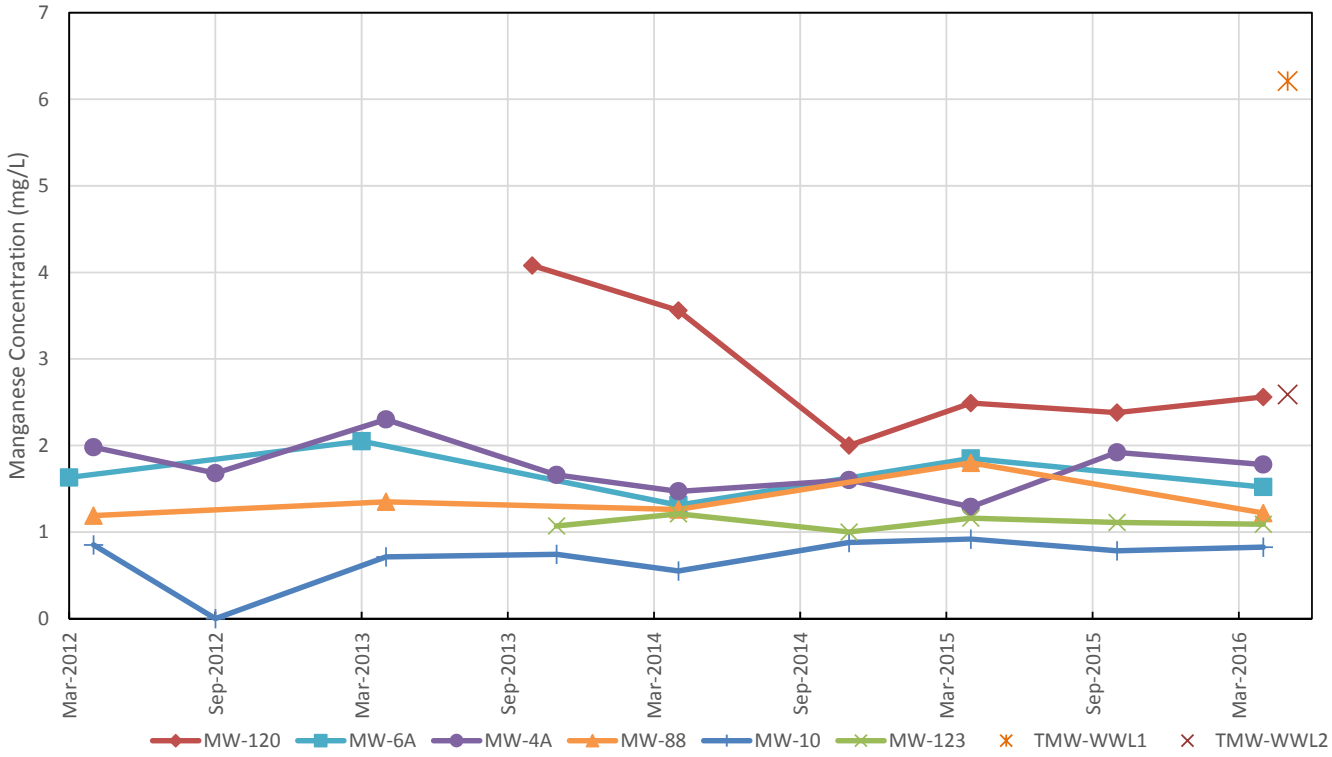
Manganese



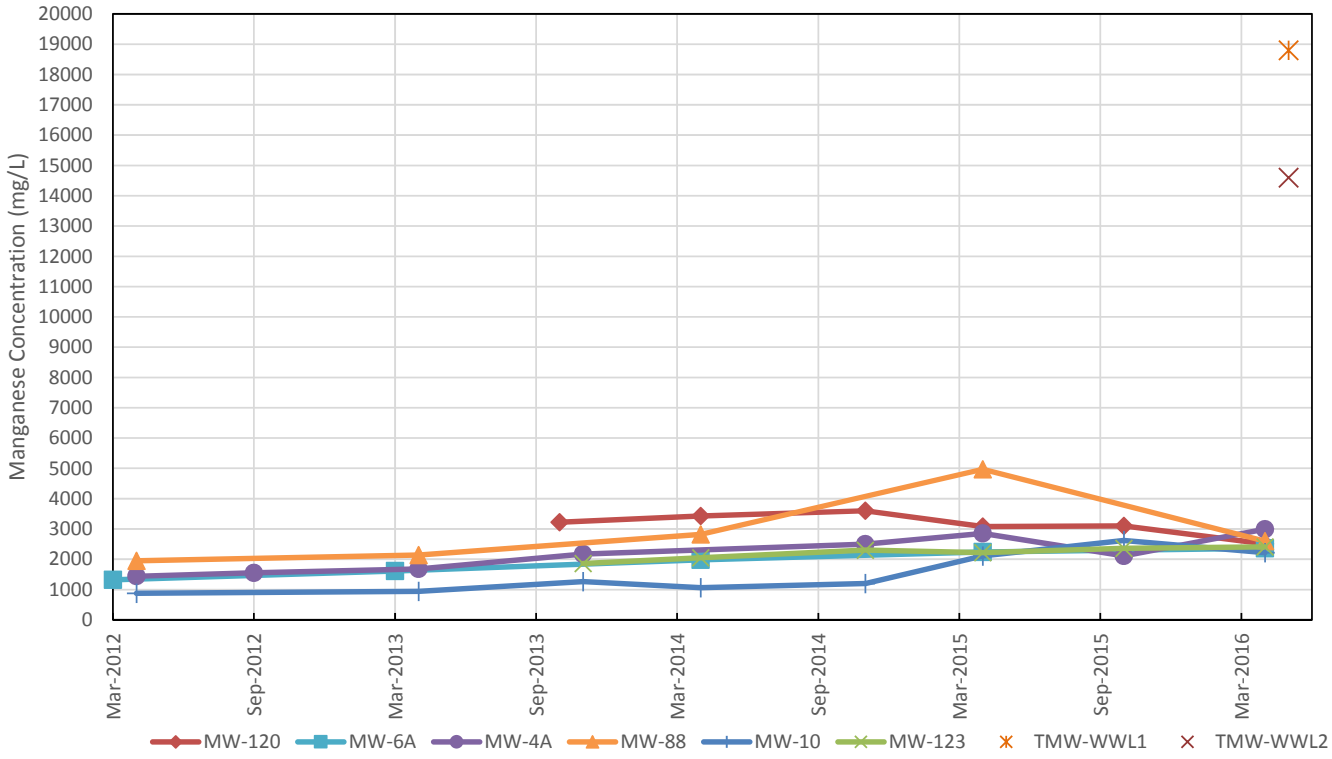
Chloride

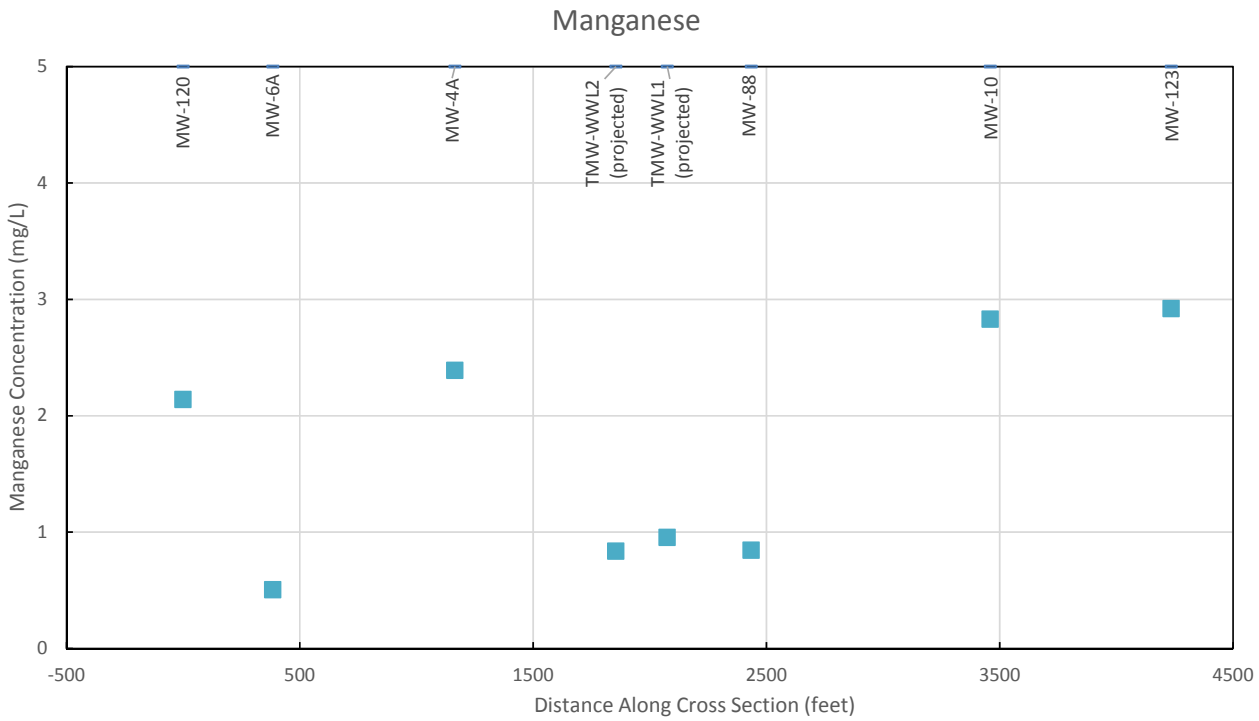


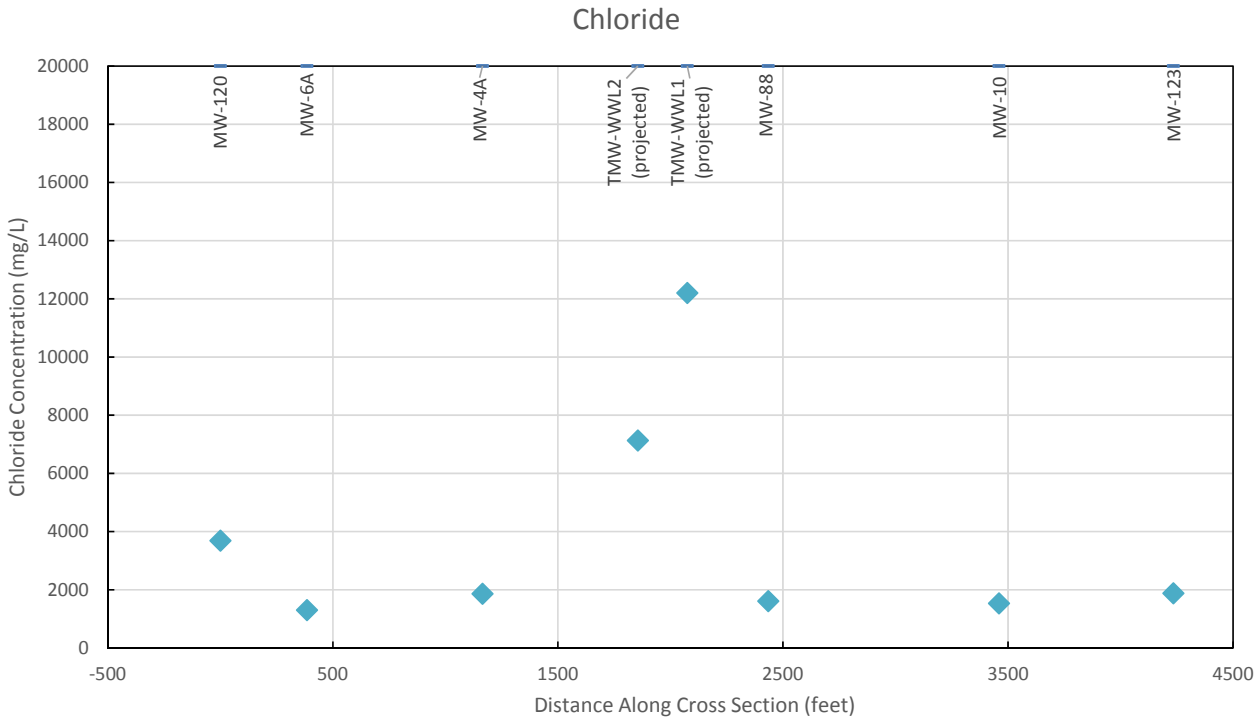
Fluoride

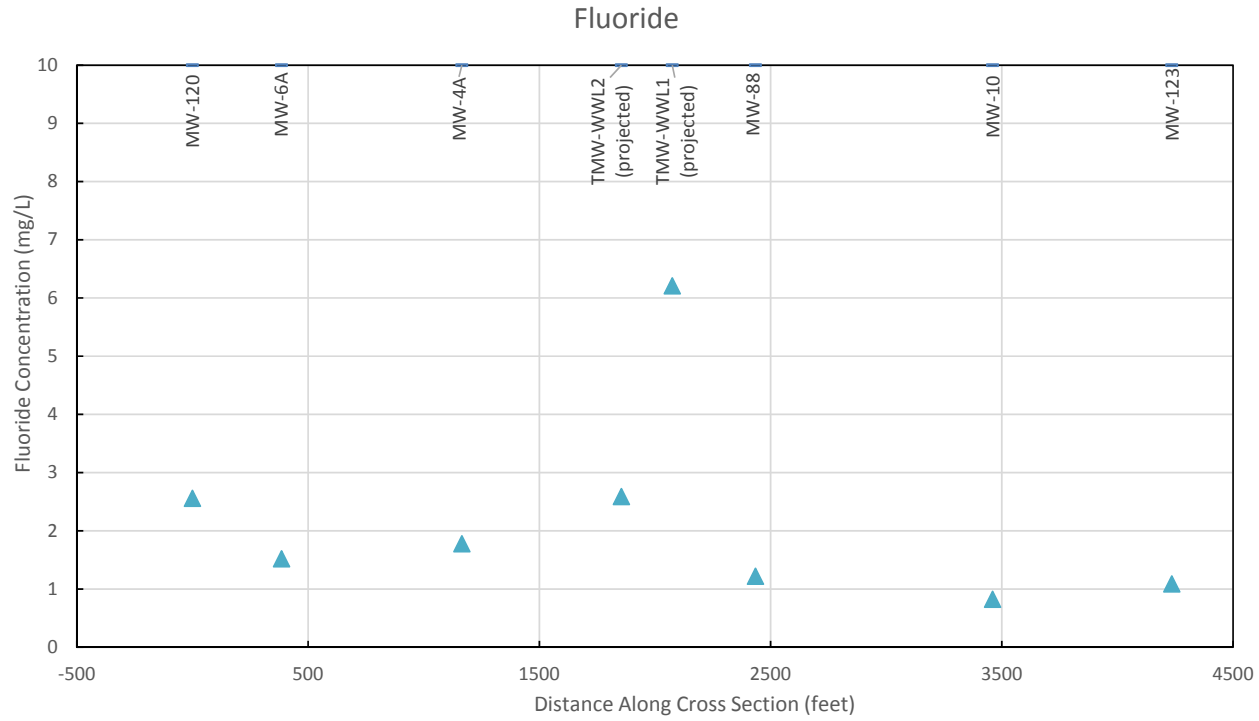


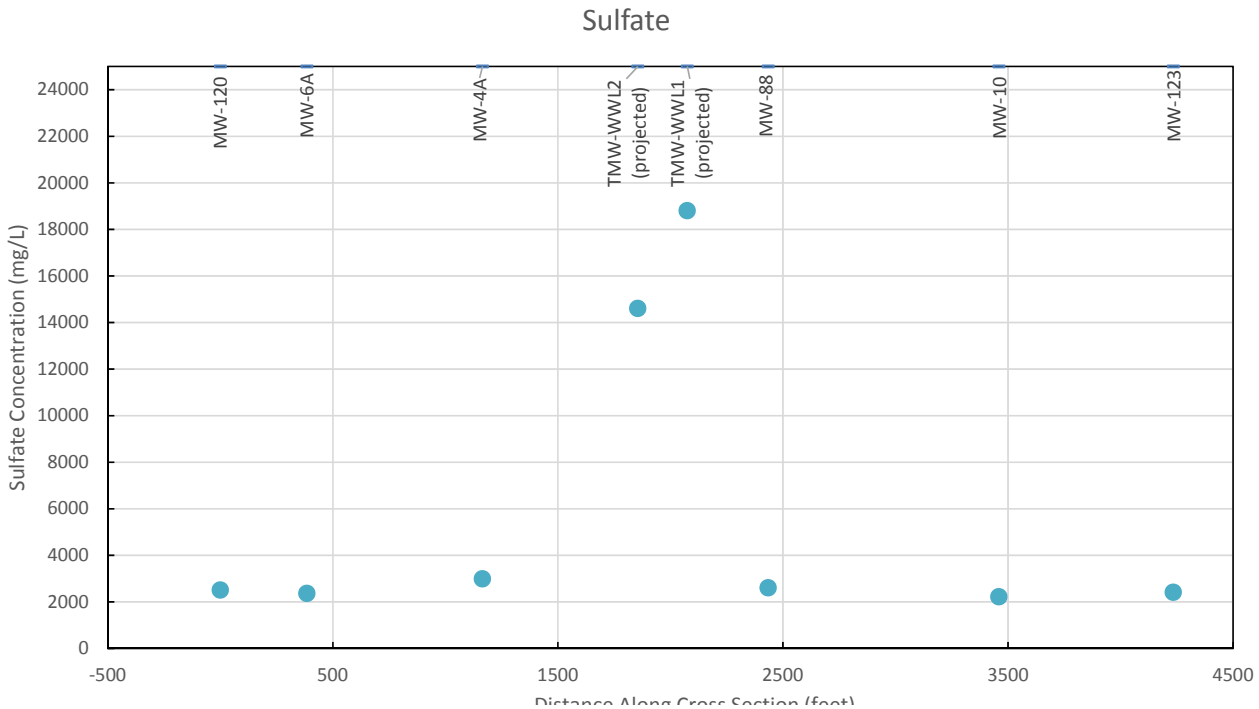
Sulfate




Manganese
Manganese Concentration (mg/L)
0
1
2
3
4
5
-500
500
1500
2500
3500
4500
Distance Along Cross Section (feet)
MW-120
MW-6A
MW-4A
TMW-WWL2 (projected)
TMW-WWL1 (projected)
MW-88
MW-10
MW-123


Chloride
Chloride Concentration (mg/L)
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
-500
500
1500
2500
3500
4500
Distance Along Cross Section (feet)
MW-120
MW-6A
MW-4A
TMW-WWL2 (projected)
TMW-WWL1 (projected)
MW-88
MW-10
MW-123


Fluoride
Fluoride Concentration (mg/L)
Distance Along Cross Section (feet)
MW-120
MW-6A
MW-4A
TMW-WWL2 (projected)
TMW-WWL1 (projected)
MW-88
MW-10
MW-123
0
1
2
3
4
5
6
7
8
9
10
-500
500
1500
2500
3500
4500


Sulfate
Sulfate Concentration (mg/L)
MW-120
MW-6A
MW-4A
TMW-WWL2 (projected)
TMW-WWL1 (projected)
MW-88
MW-10
MW-123
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
22000
24000
-500
500
1500
2500
3500
4500

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: Scott Denton check here if Agent ☐	Contact or Agent: check here if Agent ☐
Mailing Address: 501 East Main Street	Mailing Address:
City: Artesia	City:
State: NM Zip Code: 88210	State: Zip Code:
Phone: ■ Home ☐ Cell Phone (Work): 575-746-5487	Phone: ☐ Home ☐ 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)
☐ NM West Zone
☐ NM East Zone
☐ NM Central Zone

☐ UTM (NAD83) (Meters)
☐ Zone 12N
☐ Zone 13N

■ Lat/Long (WGS84) (to the nearest 1/10th of second)

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.: 581987

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:	**Pollution Control and/or Recovery:**	**Construction Dewatering:**	**Mine De-Watering:**
☐ Include a description of any proposed pump test, if applicable.	☐ Include a plan for pollution control/recovery, that includes the following: ☐ A description of the need for the pollution control or recovery operation. ☐ The estimated maximum period of time for completion of the operation. ☐ The annual diversion amount. ☐ The annual consumptive use amount. ☐ The maximum amount of water to be diverted and injected for the duration of the operation. ☐ The method and place of discharge.	☐ Include a description of the proposed dewatering operation, ☐ The estimated duration of the operation, ☐ The maximum amount of water to be diverted, ☐ A description of the need for the dewatering operation, and, ☐ A description of how the diverted water will be disposed of.	☐ Include a plan for pollution control/recovery, that includes the following: ☐ A description of the need for mine dewatering. ☐ The estimated maximum period of time for completion of the operation. ☐ The source(s) of the water to be diverted. ☐ The geohydrologic characteristics of the aquifer(s). ☐ The maximum amount of water to be diverted per annum. ☐ The maximum amount of water to be diverted for the duration of the operation. ☐ The quality of the water. ☐ The method of measurement of water diverted. ☐ The recharge of water to the aquifer. ☐ Description of the estimated area of hydrologic effect of the project. ☐ The method and place of discharge. ☐ An estimation of the effects on surface water rights and underground water rights from the mine dewatering project. ☐ A description of the methods employed to estimate effects on surface water rights and underground water rights. ☐ Information on existing wells, rivers, springs, and wetlands within the area of hydrologic effect.
Monitoring: ■ Include the reason for the monitoring well, and, ■ The duration of the planned monitoring.	☐ The method of measurement of water produced and discharged. ☐ The source of water to be injected. ☐ The method of measurement of water injected. ☐ The characteristics of the aquifer. ☐ The method of determining the resulting annual consumptive use of water and depletion from any related stream system. ☐ Proof of any permit required from the New Mexico Environment Department. ☐ 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:** ☐ Include a description of the geothermal heat exchange project, ☐ The amount of water to be diverted and re-injected for the project, ☐ The time frame for constructing the geothermal heat exchange project, and, ☐ The duration of the project. ☐ 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

2016 MAY -2 PM 4:20

FOR OSE 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.

Trn Desc: RA 12403 POD1,2

File Number: RA 12403
Trn Number: 586987

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 REFING 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

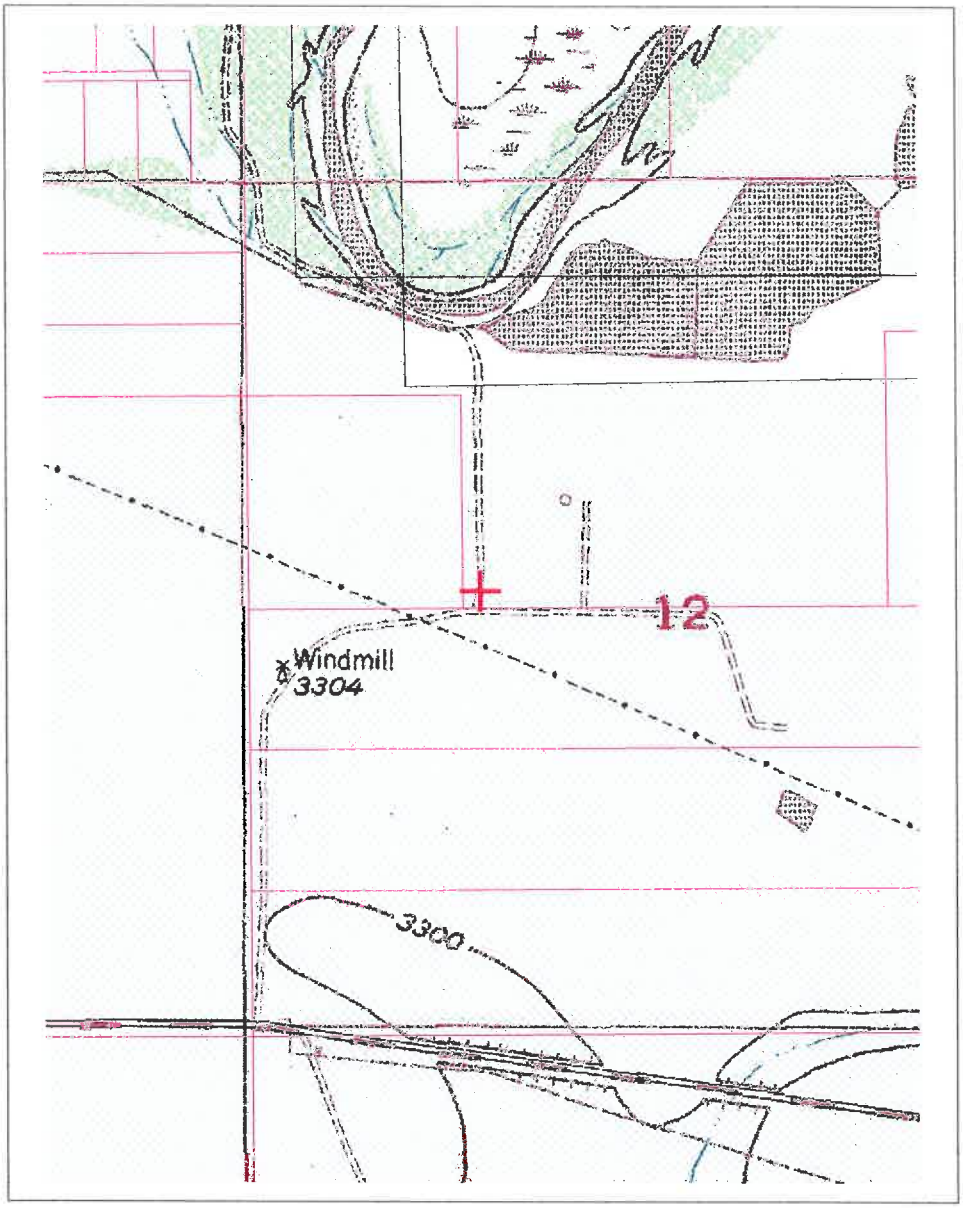
NAD 1983(92) (Meters)	N: 3,634,873	E: 561,855
NAD 1983(92) (Survey Feet)	N: 11,925,413	E: 1,843,353
NAD 1927 (Meters)	N: 3,634,670	E: 561,905
NAD 1927 (Survey Feet)	N: 11,924,748	E: 1,843,516

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

Print Date: 05/10/2016

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 REFING 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

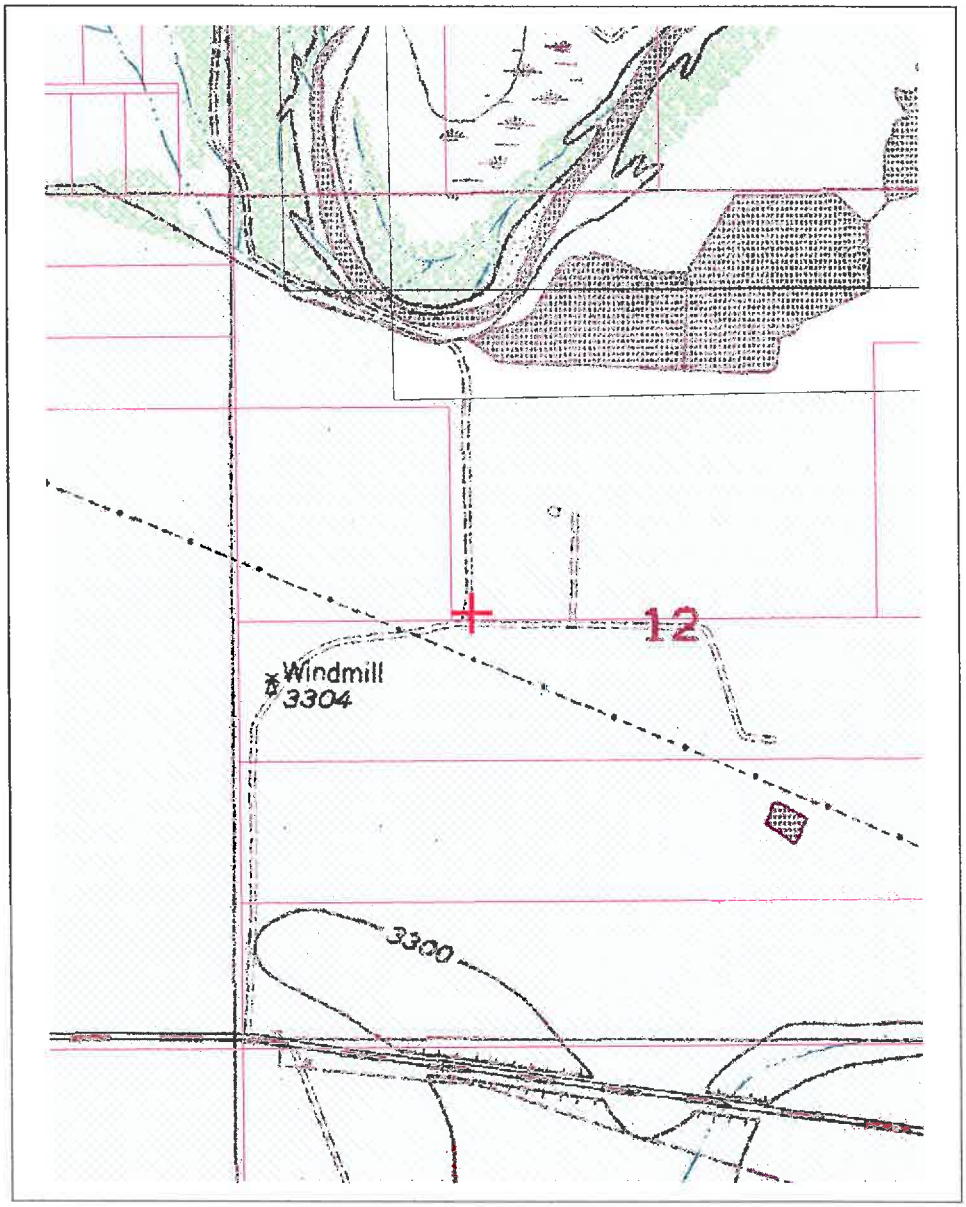
NAD 1983(92) (Meters)	N: 3,634,855	E: 561,860
NAD 1983(92) (Survey Feet)	N: 11,925,353	E: 1,843,371
NAD 1927 (Meters)	N: 3,634,652	E: 561,910
NAD 1927 (Survey Feet)	N: 11,924,687	E: 1,843,534

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

Print Date: 05/10/2016

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

2016 MAY -2 PM 4:20

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 Combs 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 10th day of May, 2016

Tom Blaine P.E., New Mexico State Engineer

By: Greg Crabtree

For Andy Morley
District II Manager

2016 MAY -2 PM 4:20

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

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 of 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

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: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0	- 01 -			0	SANDY CLAY (CL): reddish-brown, dry, low carbonate induration, low-medium plasticity, no odor, no staining	Open 2" Diameter Casing Bentonite
					SANDY CLAY (CL): reddish-brown, low carbonate induration, medium-high plasticity, no odor, no staining	20/40 Grade Silica Sand
5	- 05 -			0	SANDY CLAY (CL): light brown, low plasticity, no odor, no staining	
					SANDY CLAY (CL):brown, low plasticity, gypsum crystals, no odor, no staining	
				0	SANDY CLAY (CL): light reddish-brown, low carbonate induration, low-medium plasticity, damp, containes some gypsum crystals, no odor, no staining	
10						Sch 40 0.010 Slot PVC Screen
▽	- 12 -				Gypsiferrous SANDY CLAY (CL): whitish-green, low plasticity, moist, no odor, no staining	
				0		
15					Total Depth = 15.5'	
					Sampler Stopped at 16' Auger Stopped at 15' TMW-WWL-1 Set to 15.5'	
20						

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: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0	- 01 -			0	SILTY SAND (SM): light brown, damp, non-plastic, no odor, no stain	Open 2" Diameter Casing Bentonite
					SANDY CLAY (CL): brown, damp, medium plasticity, contains some gypsum crystals, no odor, no stain,	
5	- 05 -			0	SANDY CLAY (CL): light reddish-brown, damp, medium to high plasticity, contains some gymsum crystals, no odor, no stain,	20/40 Grade Silica Sand
				0		
10						Sch 40 0.010 Slot PVC Screen
▽	- 12 -			0	SANDY CLAY (CL): reddish-brown, moist, low plasticity, low-moderate carbonate induration becomes more gymsiferous with depth, no odor, organic, no stain	
15					TOTAL DEPTH = 16' Sampler Stopped at 16' Auger Stopped at 15' TMW-WWL-1 Set to 15'	
20						

ANALYTICAL REPORT

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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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

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

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

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
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

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

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

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

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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

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	
(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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

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	
(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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
4-Chloro-3-methylphenol	U		0.00477	0.333	1	05/18/2016 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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 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 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	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
(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

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	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
(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

Method Blank (MB)

(MB) R3137464-1 05/16/16 20:07

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL 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

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
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

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	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

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	559	13.1	595	564	104	99	1	80-120			5	15

Method Blank (MB)

(MB) R3138282-1 05/18/16 23:05

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL 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

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
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

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
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

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 %
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

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 %
Fluoride	50.0	5.27	36.6	33.9	63	57	1	80-120	J6	J6	7	15

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	

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 %	MS Qualifier	MSD Qualifier	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

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	J	1.41	10.0
Manganese	U		0.12	1.00

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

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	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	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*

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	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
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	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
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*

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*

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*

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*

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*				

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*

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	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	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	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
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*				

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*

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*

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*

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*				

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*

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 %	LCS Qualifier	LCSD Qualifier	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*				

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.

ACCREDITATIONS & LOCATIONS

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
Conneticut	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 [1 4]	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		

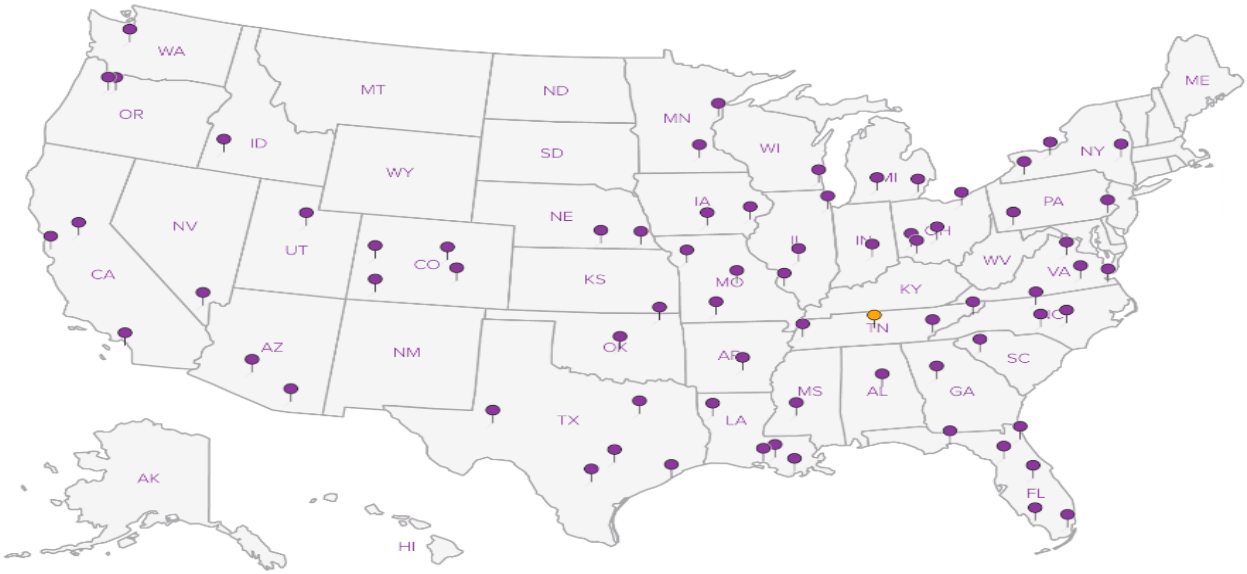
Third Party & Federal Accreditations

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

Collected by (signature): William R Smith

Immediately Packed on Ice N ___ Y X

Site/Facility ID # Holly Frontier NMNM

P.O. #

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X_Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8270ACID 100ml Amb NoPres	Cl, Fl, SO4 125mlHDPE-NoPres	Cl, Fl, SO4 4ozClr-NoPres	DROOROLVI 40mlAmb-HCl-BT	DRORLA,SV8270ACID 4ozClr-NoPres	FEICP,MNICP 250mlHDPE-HNO3 V	FEICP,MNICP 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
~~TMW-WWL2-12D~~		~~SS~~				~~4~~			~~X~~		~~X~~		~~X~~		~~X~~			
TMW-WWL2-EQ		GW	—	5/10/16	18:00	11	X	X		X		X		X		X		-08
~~TMW-WWL2-EQ~~		~~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

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
William R Smith	5/11/16	15:00	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 3.2 °C Bottles Received: 39 TB

Date: 5.12.16 Time: 900

Hold #

Condition: (lab use only) GOOD

COC Seal Intact: ✓Y ___N ___NA

pH Checked: ___ NCF: ___

Chain of Custody Page ___ of ___

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Fax: 615-758-5859

L# L8 35078

K079

Acctnum: **AMECFWHTX**
Template: **T112078**
Prelogin: **P552541**
TSR: **526 - Chris McCord**
PB: 5.4.16 KM
Shipped Via: **FedEx Ground**

ANALYTICAL REPORT

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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TMW-WWL1 L835353-01 GW

Collected by | Collected date/time 05/12/16 08:30 | Received date/time 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

TMW-WWL2 L835353-02 GW

Collected by | Collected date/time 05/12/16 09:00 | Received date/time 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

TMW-WWL2D L835353-03 GW

Collected by | Collected date/time 05/12/16 09:05 | Received date/time 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 05/12/16 00:00 | Received date/time 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 05/12/16 00:00 | Received date/time 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

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

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

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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 mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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 mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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 mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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 mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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 mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
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

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	
(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

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	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
(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

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

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	
(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

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	05/18/2016 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

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	05/18/2016 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

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	U		0.00280	0.0200	1	05/19/2016 09:44	WG873476

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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 mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
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

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	J3	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

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

Method Blank (MB)

(MB) R3139346-1 05/24/16 08:33

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

L836606-01 Original Sample (OS) • Duplicate (DUP)

(OS) L836606-01 05/24/16 16:53 • (DUP) R3139346-5 05/24/16 17:07

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
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

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	39.0	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

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
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

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 %
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

Method Blank (MB)

(MB) R3140117-1 05/26/16 09:06

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL 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

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
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

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	39.4	39.3	99	98	80-120			0	15
Sulfate	40.0	39.8	39.8	100	100	80-120			0	15

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

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

Method Blank (MB)

(MB) R3138224-1 05/19/16 09:36

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL 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

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 %
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

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 %
Mercury	0.300	U	0.282	0.276	94	92	1	75-125			2	20

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

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

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

Method Blank (MB)

(MB) R3137306-3 05/16/16 22:25

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
TPH (GC/FID) Low Fraction	U		0.0314	0.100
(S) a,a,a-Trifluorotoluene(FID)	*100*			*62.0-128*

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	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
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	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
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*

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*

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*

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*				

Method Blank (MB)

(MB) R3137334-1 05/17/16 03:42

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	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	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
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*				

Method Blank (MB)

(MB) R3138554-1 05/20/16 10:03

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	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	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	%	%	%			%	%
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	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	%	%		%			%	%
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*				

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*

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 %	LCS Qualifier	LCSD Qualifier	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*				

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*

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*				

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.

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
Conneticut	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 [1 4]	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		

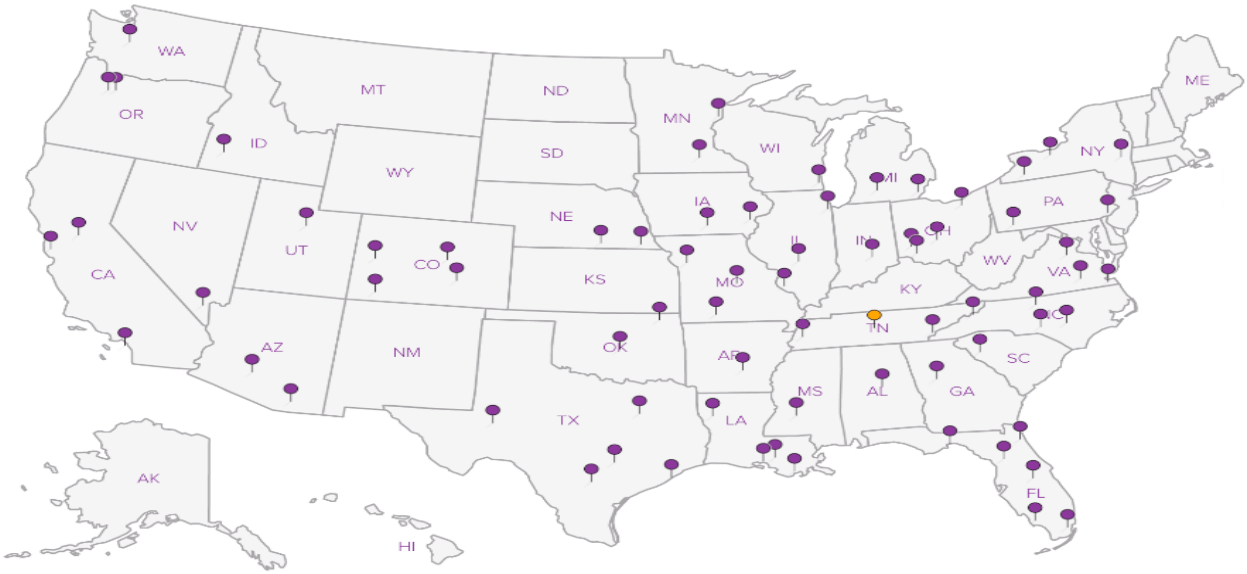
Third Party & Federal Accreditations

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: WASTE WATER LINE Slurry Slinger Sump Investigation

City/State Collected:

Phone: 713-929-5674
Fax:

Client Project # 6703160012.004

Lab Project # AMECFWHTX-SLURRY

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ____ Y ____

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X__Yes
FAX? ___No ___Yes

Chain of Custody Page ___ of ___

ESC LABORATORIES
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Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L835353

1198

Acctnum: AMECFWHTX
Template: T112081
Prelogin: P552543
TSR: 526 - Chris McCord
PB: 5-4.16 KM
Shipped Via: FedEx Ground

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	8270 100ml Amb NoPres	DROOROLVI 40mlAmb-HCl-BT	DRORLA,SV8270 4ozClr-NoPres	GRO 40mlAmb HCl	GRO,V8260 2ozClr-NoPres	Skinner's List Mtls. 250mlHDPE-HNO3	Skinner's list Mtls. 2ozClr-NoPres	V8260 40mlAmb-HCl	V8260- Trip Blank 40mlAmb-HCl-Blk		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
		GW				1									X			
WWL-SPC *																		

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

pH _____ Temp _____

Flow _____ Other _____

6711 0132 9017

5-054

Remarks:
* Pamela Krueger will call in Analysis for WWL1 Soil Pile Composite Sample

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	5/12/16	11:00	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____

Temp: 2.4 °C Bottles Received: 35

Date: 5-12-16 Time: 9:00

Condition: (lab use only) JW7 (OK)

COC Seal Intact: ✓ Y ___N ___NA

pH Checked: NCF:

Jeremy W. Watkins

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 / Courie
	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.

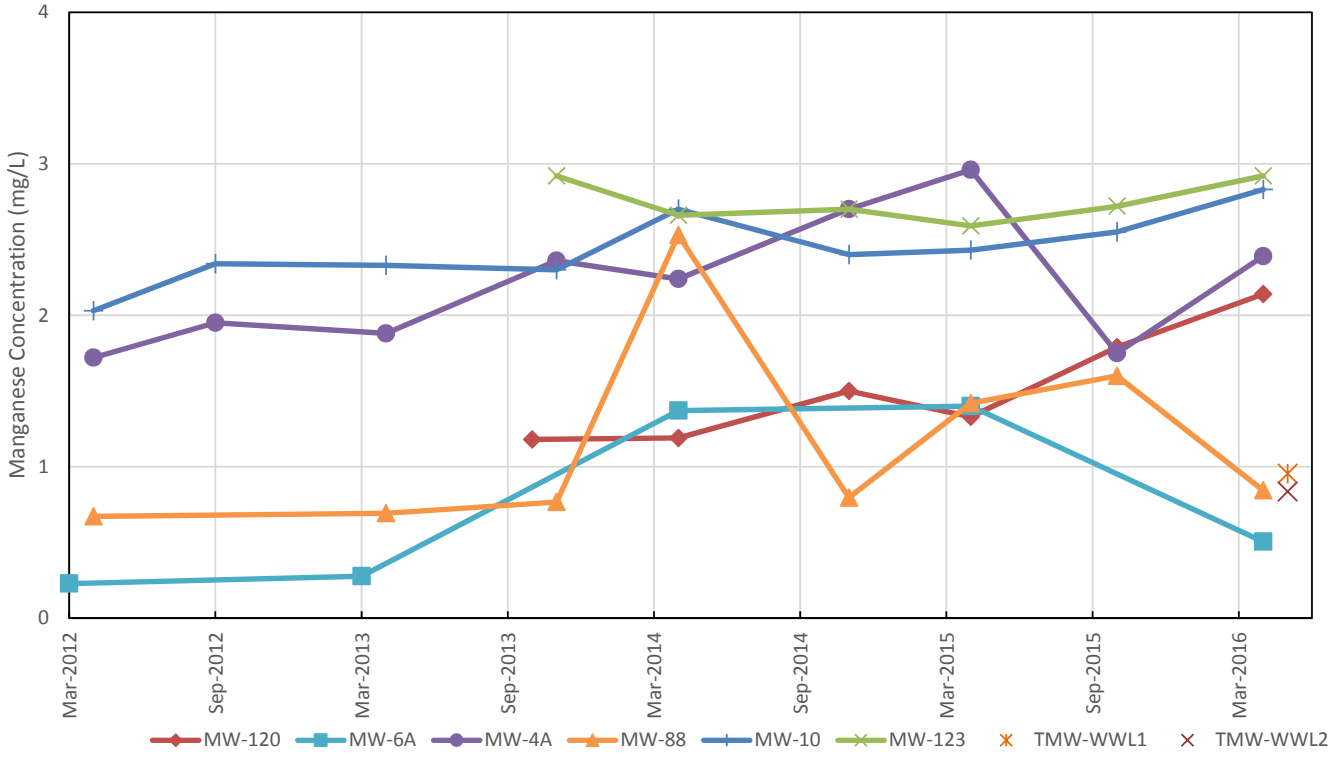
Client informed by:		Call		Email		Voice Mail		Date:	Time:
TSR Initials: CM	Client Contact:								

Login Instructions:

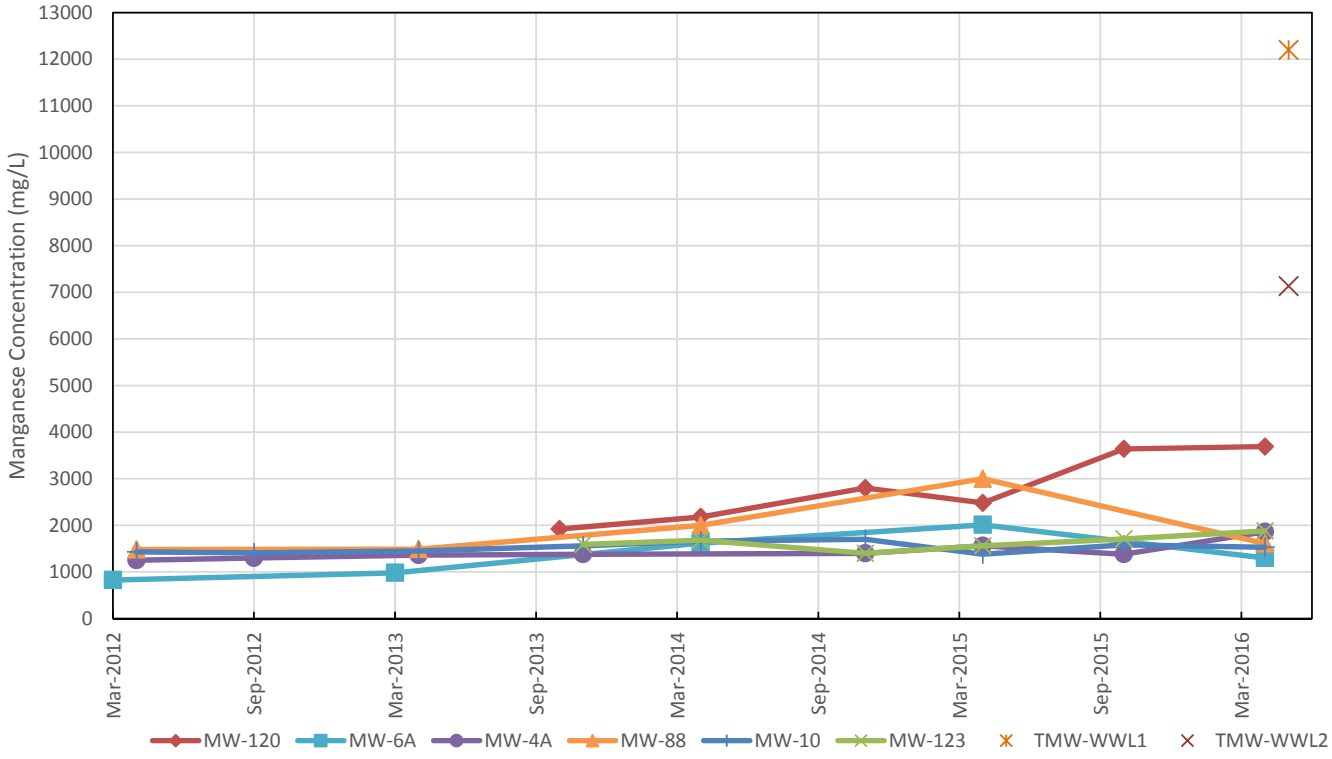
Log 125mL-NP for CHLORIDE, FLUORIDE and SULFATE.
Also, change on all IDs: 8270 to 8270ACID; V8260 to V8260BTEX and only log metals FEICP and MNICP.

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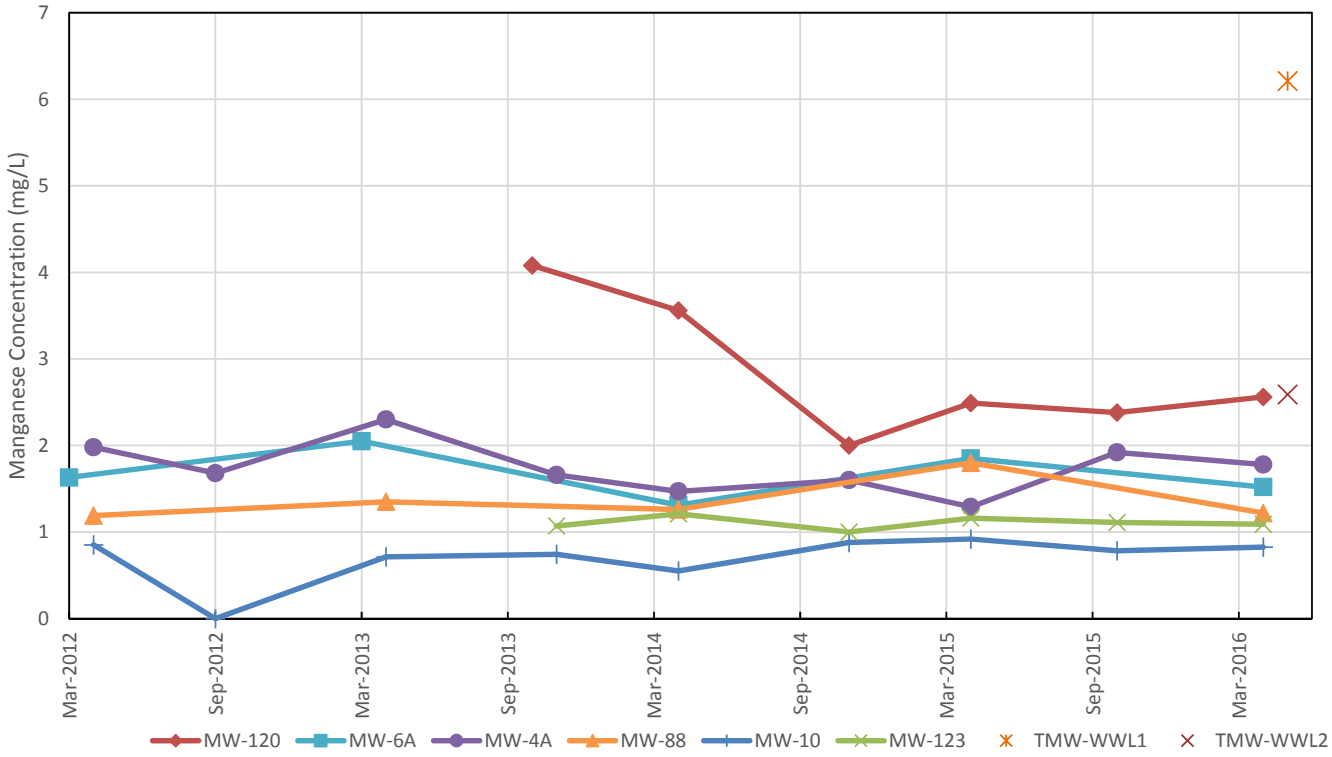
Manganese



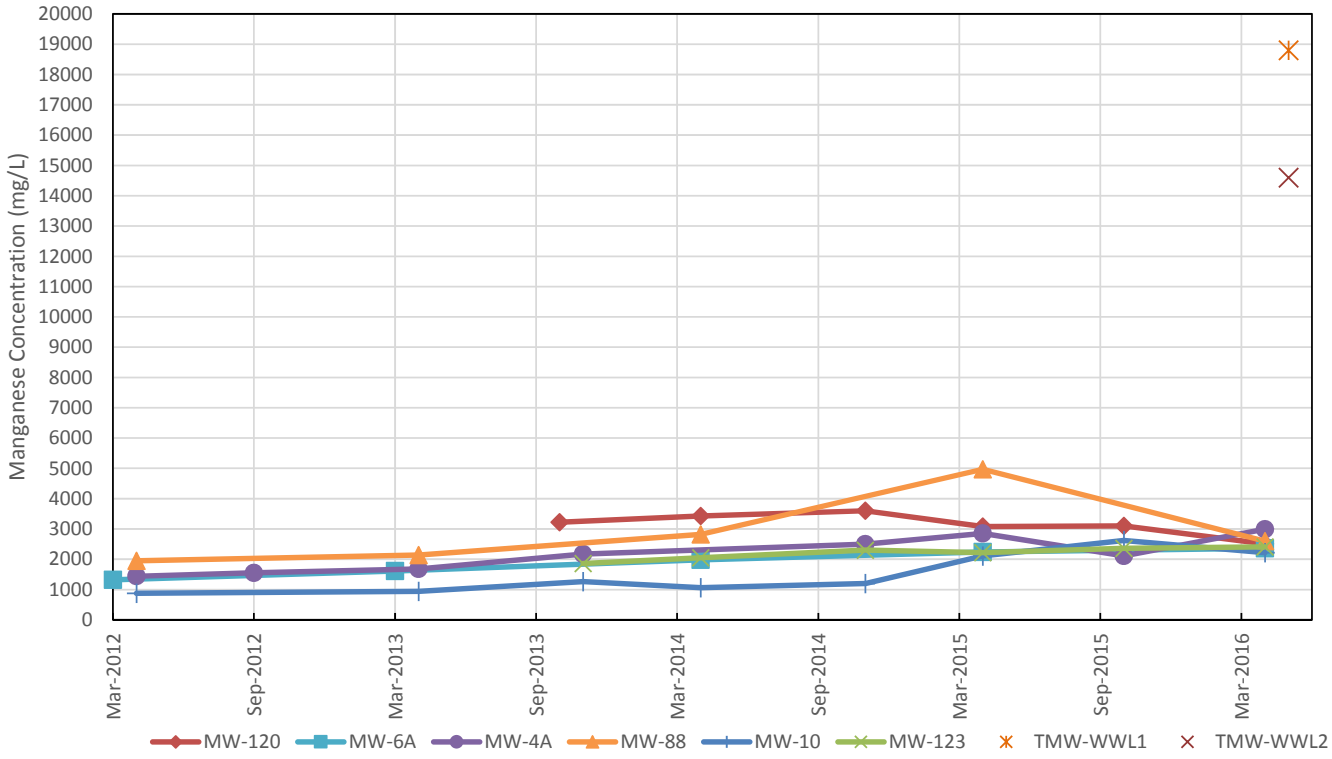
Chloride

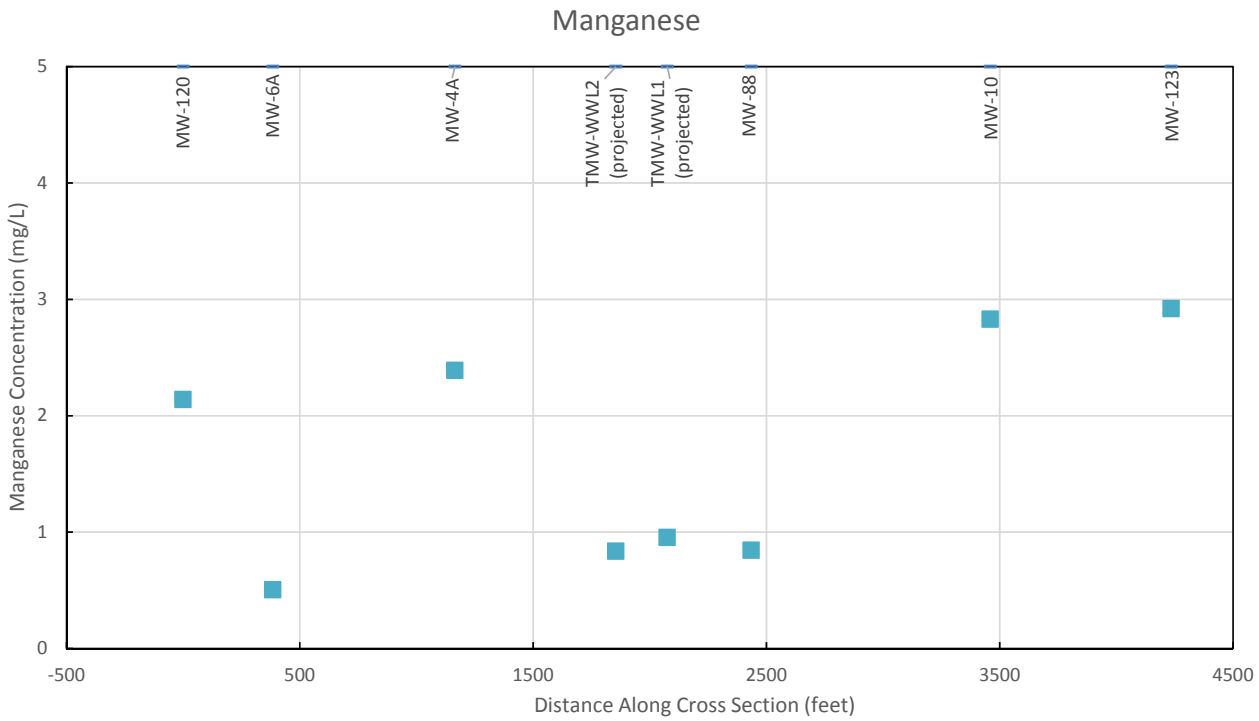


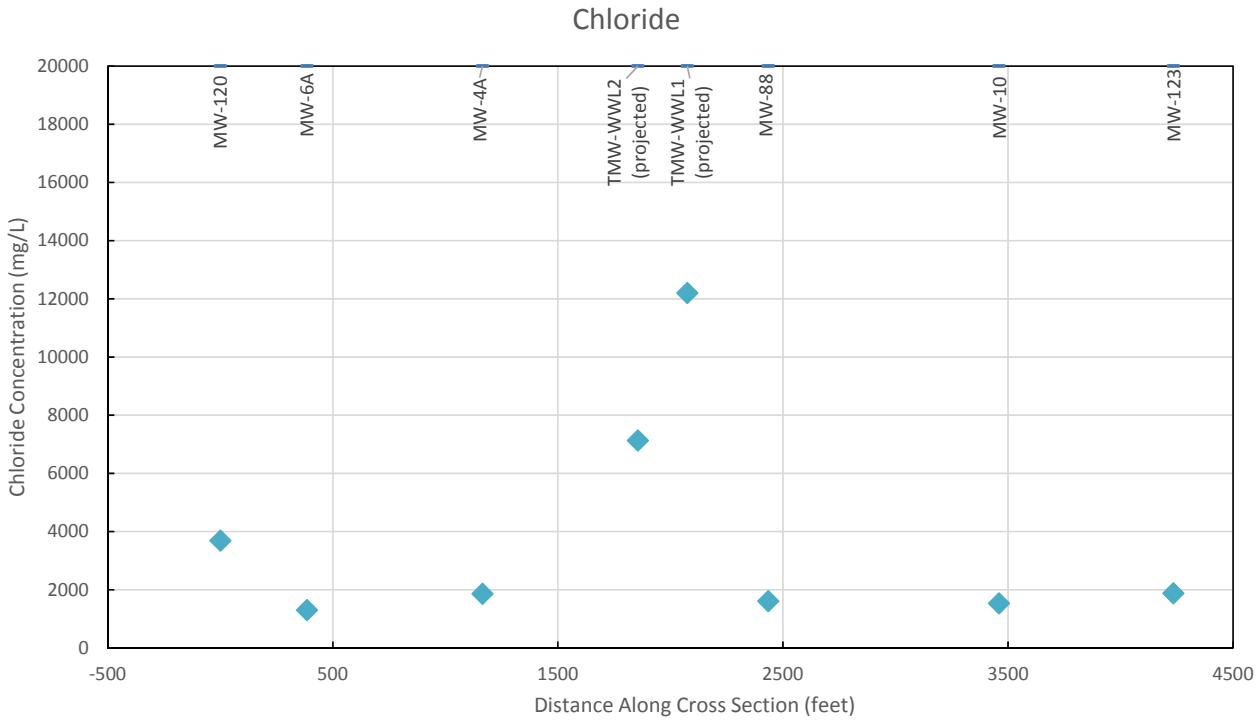
Fluoride

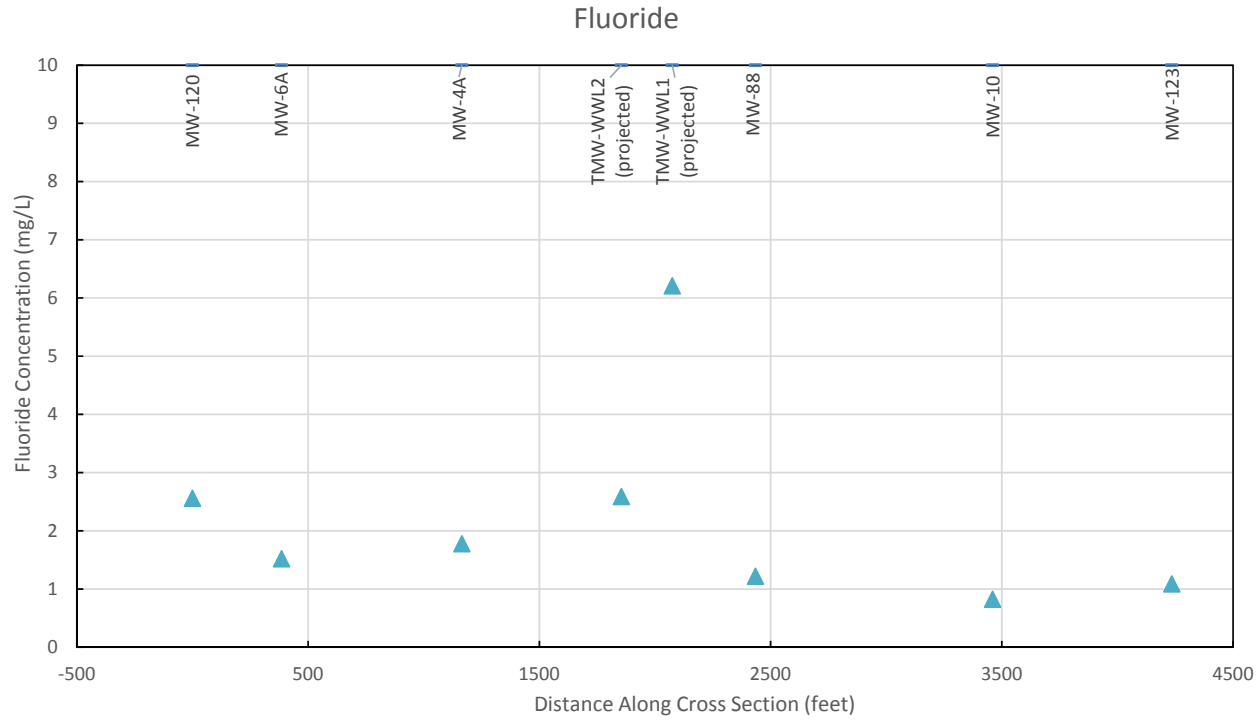


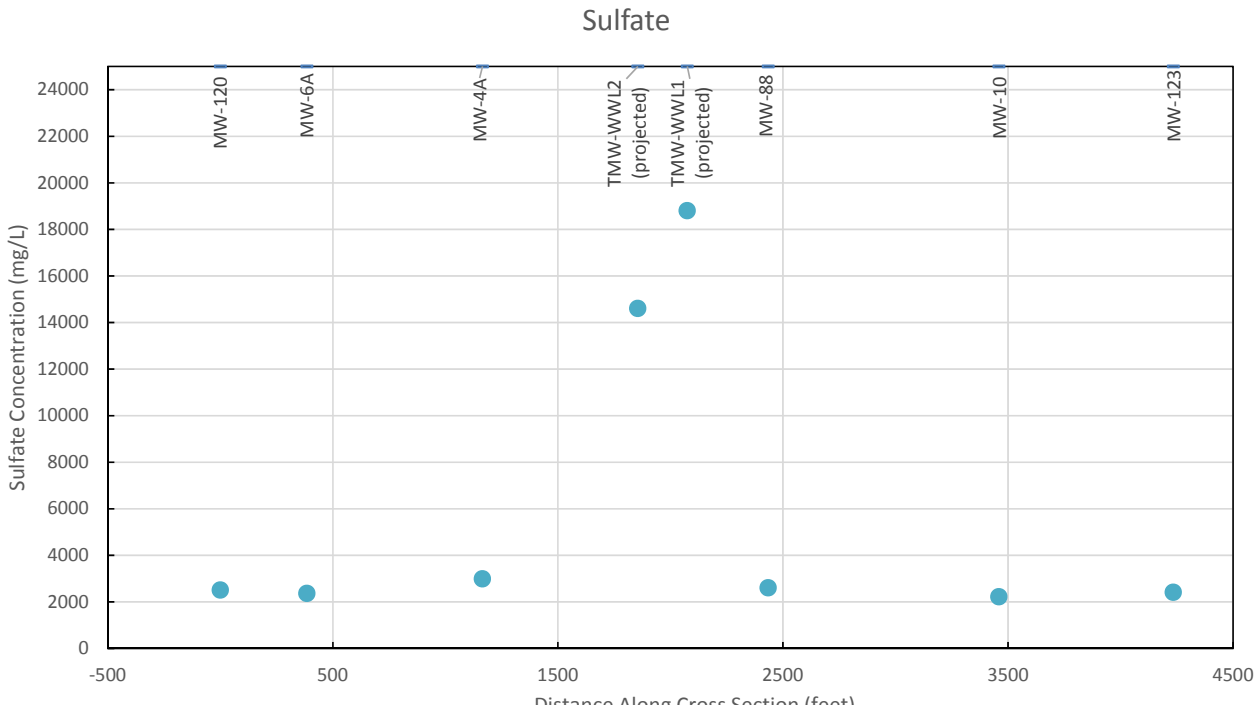
Sulfate




Manganese
Manganese Concentration (mg/L)
0
1
2
3
4
5
-500
500
1500
2500
3500
4500
Distance Along Cross Section (feet)
MW-120
MW-6A
MW-4A
TMW-WWL2 (projected)
TMW-WWL1 (projected)
MW-88
MW-10
MW-123


Chloride
Chloride Concentration (mg/L)
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
-500
500
1500
2500
3500
4500
Distance Along Cross Section (feet)
MW-120
MW-6A
MW-4A
TMW-WWL2 (projected)
TMW-WWL1 (projected)
MW-88
MW-10
MW-123


Fluoride
Fluoride Concentration (mg/L)
Distance Along Cross Section (feet)
MW-120
MW-6A
MW-4A
TMW-WWL2 (projected)
TMW-WWL1 (projected)
MW-88
MW-10
MW-123
0
1
2
3
4
5
6
7
8
9
10
-500
500
1500
2500
3500
4500


Sulfate
Sulfate Concentration (mg/L)
MW-120
MW-6A
MW-4A
TMW-WWL2 (projected)
TMW-WWL1 (projected)
MW-88
MW-10
MW-123
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
22000
24000
-500
500
1500
2500
3500
4500

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Tuesday, July 26, 2016 1:18 PM
To: 'Dade, Lewis (Randy)'; Tsinnajinnie, Leona, NMENV
Cc: Denton, Scott; Combs, Robert; Griswold, Jim, EMNRD
Subject: RE: C-141 Closure for Asphalt Release; 04/04/2016

Randy:

Please submit the C-138 Form documenting the final disposition of material to the facility referenced in the C-141 Form before COB this coming Friday.

Thank you.

Carl J. Chavez, CHMM
Environmental Engineer
Oil Conservation Division- Environmental Bureau
1220 South St. Francis Drive
Santa Fe, New Mexico 87505
Phone: (505) 476-3490
Main Phone: (505) 476-3440
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: www.emnrd.state.nm.us/ocd
Why not prevent pollution, minimize waste, reduce operation costs, and move forward with the rest of the Nation? To see how, go to "Publications" and "Pollution Prevention" on the OCD Website.

From: Dade, Lewis (Randy) [mailto:Lewis.Dade@HollyFrontier.com]
Sent: Tuesday, July 26, 2016 1:04 PM
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>; Tsinnajinnie, Leona, NMENV <Leona.Tsinnajinnie@state.nm.us>
Cc: Denton, Scott <Scott.Denton@HollyFrontier.com>; Combs, Robert <Robert.Combs@HollyFrontier.com>; Dade, Lewis (Randy) <Lewis.Dade@HollyFrontier.com>
Subject: FW: C-141 Closure for Asphalt Release; 04/04/2016

Attached is the C-141 closure for the Asphalt Release on 04/04/2016. If there are any questions, please call Randy Dade at 575-746-5281. Thanks, Randy

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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 X☐X Final Report

Name of Company HollyFrontier Navajo Refining LLC	Contact Randy Dade
Address 501 E. Main St, Artesia, NM 88210	Telephone No. 575-746-5381
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°50'37.19"N **Longitude** 104°23'46.50"W

NATURE OF RELEASE

Type of Release Asphalt	Volume of Release < 10 bbl	Volume Recovered 0 bbl
Source of Release Rail loading area – West loading rack	Date and Hour of Occurrence 04/04/2016 at approx. 10:00 pm	Date and Hour of Discovery 04/04/2016 at approx. 10:10 pm
Was Immediate Notice Given? ☐ Yes ☐ No ☒ Not Required	If YES, To Whom?	
By Whom?	Date and Hour	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.*

On April 4, 2016, it was reported that two rail cars had been overtopped and caused the release of less than 10 bbls of asphalt. Operator error was the cause of the spill. When the operator noticed the spill, he immediately shut down the transfer pump and closed the valve to the railcar. The impacted area is located along the rail loading racks in two areas on either side of the loading rack.

Describe Area Affected and Cleanup Action Taken.*

The spill was contained in the rail loading area. The spilled material hardened quickly which limited the extent of the spill area. The loading area is covered by gravel, which collected much of the asphalt and limited contact to soil.
Material was covered with sand and picked up. Waste was then put in a roll off bin and disposed of at a non-hazardous disposal facility. Photos show what the material looked like, how the sand was spread on top of the release and what the ground looked like after the material was picked up and disposed of.

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: Lewis R Dade	OIL CONSERVATION DIVISION	
Printed Name: Randy Dade	Approved by Environmental Specialist:	
Title: Environmental Specialist	Approval Date:	Expiration Date:
E-mail Address: Lewis.Dade@hollyfrontier.com	Conditions of Approval:	Attached ☐
Date: 07/25/2016 Phone: 575-746-5281		

* Attach Additional Sheets If Necessary


GATX 72487
800-424-9300
3257
2 INCL. TREAD COND. SHOES






HX23518

HOLLYFRONTIER.

June 17, 2016

Mr. John E. Kieling, Chief
New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

RE: Tank 815 Release Response Report, January 28, 2016, Revised June 17, 2016
HollyFrontier Navajo Refining, LLC – Artesia Refinery
EPA ID# NMD048918817
HWB-NRC-MISC

Dear Mr. Kieling:

HollyFrontier Navajo Refining LLC – Artesia Refinery (Navajo) provides the following information as a supplement and revision to the January 28, 2016 report (the "original report") in response to the New Mexico Environment Department's (NMED) letter of April 8, 2016, requesting soil sample analytical data and providing comments on the original report.

NMED Comment 1

In the *Remedial Actions* section, page 2 of the Report, the Permittee describes the saturated soil removal activities. Excavated soil was placed in three roll-off bins and soil from each bin was characterized for disposal. After the excavation activities were completed, the area was backfilled and graded with soil from an off-site source. It is important to note that this release occurred in a HWMU and is therefore subject to the requirements of the December 2010 Post Closure Care Permit. Revise the Report to include the following information:

a. Explain in the Report what caused the sump to overflow and the steps taken to prevent future releases at the sump.
b. The Report stated that 12 inches of soil was removed from the release area, but it was not clear if the soil was saturated to a depth of 12 inches. Provide the depth of saturation and, if the depth of saturation was greater than 12 inches, explain why only 12 inches was removed from the release area.
c. Explain why soil confirmation samples were not collected in the release area and how it was determined that the extent of contamination was defined.

d. Provide dimensions of the release area and the volume of contaminated soil removed from excavation activities.

Response to NMED Comment 1

a. *Causation and Corrective Action*. The internal Incident Report for the April 16, 2015, overflow event states that, following a daily water draw, the single valve at the end of the Tank 815 drain line did not shut off completely, resulting in leakage and overfilling the sump box. The investigation revealed that during the daily draws, the operator opens and closes the valve manually, and sometimes has difficulty doing so. In this case, the valve was manually closed after the tank was drained, but it failed to seal properly and leaked into the sump overnight. Upon discovery of the overflow the following morning, a valve wrench was used to fully close the leaking valve.

   A work order and Management of Change documentation are underway to install a second valve at the end of the drain line to protect against liquid losses from the main shutoff valve. In addition, the draw procedure has been changed from a daily to weekly frequency and is only conducted with a vacuum truck present. Operators will also be required to use a valve wrench on the primary valve to ensure that it is closed and tightly sealed upon completion of the drain event. Following the weekly draw, the operators will also be required to inspect the valve assembly and sump to ensure that there is no additional drain water.

b. Navajo's initial response to the discovery of the release was to immediately remove the source of contamination (the liquids, of which 30 barrels were removed by vacuum truck), followed by source removal of impacted soils, which were visibly outlined on the ground. As stated in the original report, surface soil that was visibly impacted was excavated and placed into roll-off containers. The surficial, visible extent of the release is depicted in Photographs 1 through 6 of the original report. The depth of the excavation was intended to promptly capture the visibly saturated soil and to avoid intrusion into the historically land-applied hazardous waste. Soil was removed to a depth necessary (not more than 12") to remove visibly saturated soil, and was therefore not uniform across the entire release area. Backfill soil was applied and the surface smoothed to contour this part of the North Colony Landfarm (NCL) cover area. As per your letter, Navajo will first contact NMED prior to any future removal activities involving the NCL.

c. The initial soil work focused upon excavation and characterization of the excavated soil in order to meet any temporary accumulation deadline. Soil sampling and analysis have now been conducted and are addressed in Response to NMED Comment 2 below.

d. The figure provided in Attachment A depicts the area of the overflow drainage, which runs from the sump south and to the southwest. The approximate dimensions are 35 feet wide by 140 feet long. The quantity of contaminated soil removed for off-site disposal, according to

the manifests, was approximately 56,340 pounds. As noted in Navajo's letter to NMED dated July 23, 2015, the volume manifested was approximately 36 cubic yards. The soil was not characteristically hazardous, but was RCRA-manifested under the waste codes K048, K049, K051, and K052 (the wastes historically treated at the NCL).

The above text is incorporated into the revised report from January 28, 2016. The revised report is attached. A revised C-141 form is also included.

NMED Comment 2

As stated in Comment 1c, the Permittee did not collect soil confirmation samples at Tank 815 located in the NCL; therefore, the Permittee has not demonstrated that all soils containing ORO at concentrations greater than the soil screening level (SSL) were removed. The Permittee must collect at least four confirmation samples from the soils at the new fill/soil interface in the release area and analyze the samples for DRO (and SVOCs if ORO is greater than 3,000 mg/kg [Industrial/Occupational Exposure for Diesel#2/crankcase oil from December 2014 *Risk Assessment Guidance for Investigations and Remediation]).* Provide the analytical data with the revised Report by June 17, 2016. In addition, during a phone call between NMED and the Permittee on April 4, 2016, the Permittee expressed concerns about coming in contact with or removing the waste beneath the secondary containment cover of the NCL during soil confirmation sampling. At this time, if waste is encountered during soil confirmation sampling activities, the Permittee must segregate the clean fill from the underlying waste. The waste and contaminated cover material can be characterized separately for appropriate disposal. For future removal activities involving the NCL, the Permittee must contact NMED so that appropriate measures can be discussed prior to beginning work at the site.

Response to NMED Comment 2

NMED requested four "soil confirmation samples" and comparison to soil screening levels (SSLs) for Diesel Range Organics (DRO) and, if the results exceeded 3,000 milligrams per kilogram (mg/kg),[1] then analyses and SSL-comparisons [Industrial/Occupational Exposure ("Ind/Occ") for semivolatile organic compounds (SVOC)].

On May 16, 2016, AMEC personnel collected six soil samples (CS-01 through CS-06), by hand auger, from the overflow area for the purpose of assessing impacts to the NCL cover. The sample locations are depicted on the figure provided as Attachment B-1. Boring logs and field notes are provided as Attachment C. Cuttings were separated based on visibly un-impacted soils and

[1]This SSL is from the NMED 2015 Risk Assessment Guidance (RAG). The NMED 2014 DRO SSL of 3,800 mg/kg was also used as a comparison for the data described below, since your letter referenced the 2014 RAG.

impacted soils, with the latter containerized. The impacted soil cuttings will be protectively characterized with the same NCL waste code listings as those assigned to the excavated materials and will be manifested for off-site disposal. Borings were filled with clean soil from a stockpile staged on the site. The surface elevation of each boring was also surveyed.

The analytical results for the May 2016 samples, and related soil samples, are summarized in Table 1 (Attachment D). Four of the six samples (CS-01 through CS-04) were collected from a depth of approximately one foot below ground surface (bgs). All four of these samples exhibited concentrations of DRO constituents above the NMED Ind/Occ SSL of 3,000 mg/kg. However, none of the SVOC concentrations in these four samples exceeded the Ind/Occ SSL with the exception of benzo(a)pyrene in samples CS-03 (13.9 mg/kg) and CS-04 (13.4 mg/kg). The depth of these soils will prevent contact by Refinery workers.

Samples CS-05 and CS-06 were collected from 0.5-foot bgs outside the area believed to be impacted. Sample CS-05 did not exceed the DRO SSL or any SVOC SSL. The CS-06 sample exceeded the DRO SSL, but did not exceed any SVOC SSL. These locations, while in the near-surface area, are covered with clean fill, and thus do not present a contact risk to Refinery employees.

The May 2016 samples are generally consistent in chemical characterization as the waste characterization samples collected from the excavated materials in May 2015 (see Attachment D, Table 1, Samples "Bro 25," "Bro 53," and "Bro 49"). These soils, disposed of off-site, represent the most immediately affected layer of the spill site and are, therefore, useful reference points for the remaining *in situ* soils. All three waste characterization samples exceeded the DRO SSL. However, none of the three exceeded the toxicity characteristic leaching procedure (TCLP) regulatory concentration levels for volatile organic compounds (VOCs), SVOCs, or metals.

The May 2016 soil data were also compared to previous NCL post-closure care soil sampling events conducted during 2007 and 2014 in the treatment zone in the eastern portion of the NCL around Tank 815, and most proximate to the overflow area (see locations in Attachments B-1 and B-2,). With the exception of May 2016 samples CS-03 and CS-04 (one foot bgs), DRO concentrations in the spill area at a depth of one foot bgs are within the same magnitude as the results from routine post-closure care soil sampling in the treatment zone (see Attachment D, Table 1). The May 2016 results are also consistent with SVOC concentrations in the treatment zone.

Navajo has effectively responded to the release from Tank 815 with product recovery, soil removal and backfill, and sampling for the purpose of ensuring the restoration of cover and preventing unacceptable risks to Refinery workers. The following section addresses the regulatory basis for Navajo's request that these activities constitute a completed response at this time.

Objective of the Corrective Action

Section 3.2.3a of the RCRA Post-Closure Care (PCC) Permit provides that Tank 815 and the area surrounding the tank within the secondary containment serve as the cover for the eastern portion of the NCL. Navajo views the objective of the corrective action (i.e., limited soil removal and placement of new fill to restore the cover and prevent unacceptable risks to Refinery workers) for the 2015 overflow as: (1) maintain the cover on the eastern portion of the NCL PCC unit and solid waste management unit (SWMU) 6]; and (2) prompt removal of the majority of affected soil to minimize impacted soil from serving as a new source of possible contamination of underlying hazardous waste and groundwater.

In recent discussions with NMED, it was suggested that re-grading the "secondary containment" would require a Class 1 (prior approval) permit modification. For clarification, Navajo would like to be able to re-grade the cover in this area, not the secondary containment berms. The purpose would be to establish a more limited potential drainage pathway around the two external valves to Tank 815 (sample valve on the northeast side and drain valve on the east side). Navajo views these actions as routine cover maintenance, and not as an activity that requires a permit modification. Such actions, for example, do not appear to be included in any of the permit modification classifications for land treatment facilities in Section K. (Land Treatment) or Section A. (General Permit Provisions) of 40 CFR 270.42, Appendix I—Classification of Permit Modification. Navajo would be glad to provide prior notice of any such actions and provide documentation of the activities relating to the eastern cover as part of ongoing communications with NMED.

Additionally, EPA guidance (Attachment E, RCRA Online 11025) indicates that re-contouring cover material (and even adjusting in-place waste) in order to maintain integrity of a closed unit's dimensions does not constitute "active management" of the unit. (*See also*, RCRA Online 11954 movement of waste and contaminated media within an "area of contamination" for the purpose of corrective action is not active management, also provided in Attachment E). Although the consequences of "active management" in these guidance documents (whether a permit is needed or RCRA technical requirements are triggered) are different than those presented with respect to the NCL (whether a permit modification is needed), Navajo believes that the rationales are instructive and supportive of our position on the issue of whether a permit modification is required for cover maintenance.

We also note that Section 3.2.3a of the PCC Permit further provides that, in the event Tank 815 is removed, an environmental characterization must be performed to determine if "petroleum-related" releases have occurred and if any necessary remediation is warranted. Navajo proposes that any further evaluation of impacts within the Tank 815 containment area related to the April 2015 event be conducted pursuant to this permit requirement at the end of service of this tank.

In conclusion, at this time, Navajo believes it has taken the primary actions needed to prevent or minimize future overflows and to promptly remove the impacted soil. Navajo requests concurrence from NMED that the response actions, together with the operational discipline changes described above, provide a completed response for this incident. We also ask for NMED's concurrence that any re-grading of the cover does not require a permit modification, and offer to provide documentation of such activities to your agency.

Should you have any questions about this revised report, please do not hesitate to contact me at (575) 746-5487 or scott.denton@hollyfrontier.com.

Sincerely,

Scott M. Denton
Environmental Manager

c: Robert A. Combs, Environmental Specialist, The HollyFrontier Companies
Michael W. Holder, Corporate Environmental Specialist, The HollyFrontier Companies
Leona Tsinnajinnie, NMED Hazardous Waste Bureau
Carl Chavez, Environmental Engineer, Oil Conservation Division

Enclosures:

Tank 815 Release Response Report, January 28, 2016, revised June 17, 2016, including revised C-141 Form

Attachment A	Figure 3, Tank 815 Release Extent, AMEC 2016
Attachment B-1	Figure 2, Tank 815 Soil Boring Locations, AMEC 2016
Attachment B-2	Figure 1, NCL Routine Soil Sampling Locations, Arcadis 2014
Attachment C	Boring Logs and Field Notes, May 2016 Soil Sampling Event, AMEC 2016
Attachment D	Table 1, Summary of Analytical Results in Tank 815 Borings
Attachment E	RCRA Online 11025; RCRA Online 11954

Attachment A

Figure 3, Tank 815 Release Extent



LEGEND

NORTH COLONY LANDFARM (NCL) AREA

APRIL 2015 RELEASE EXTENT

0 25 50 100 150 200

SCALE IN FEET

N

NAVAJO REFINING COMPANY
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

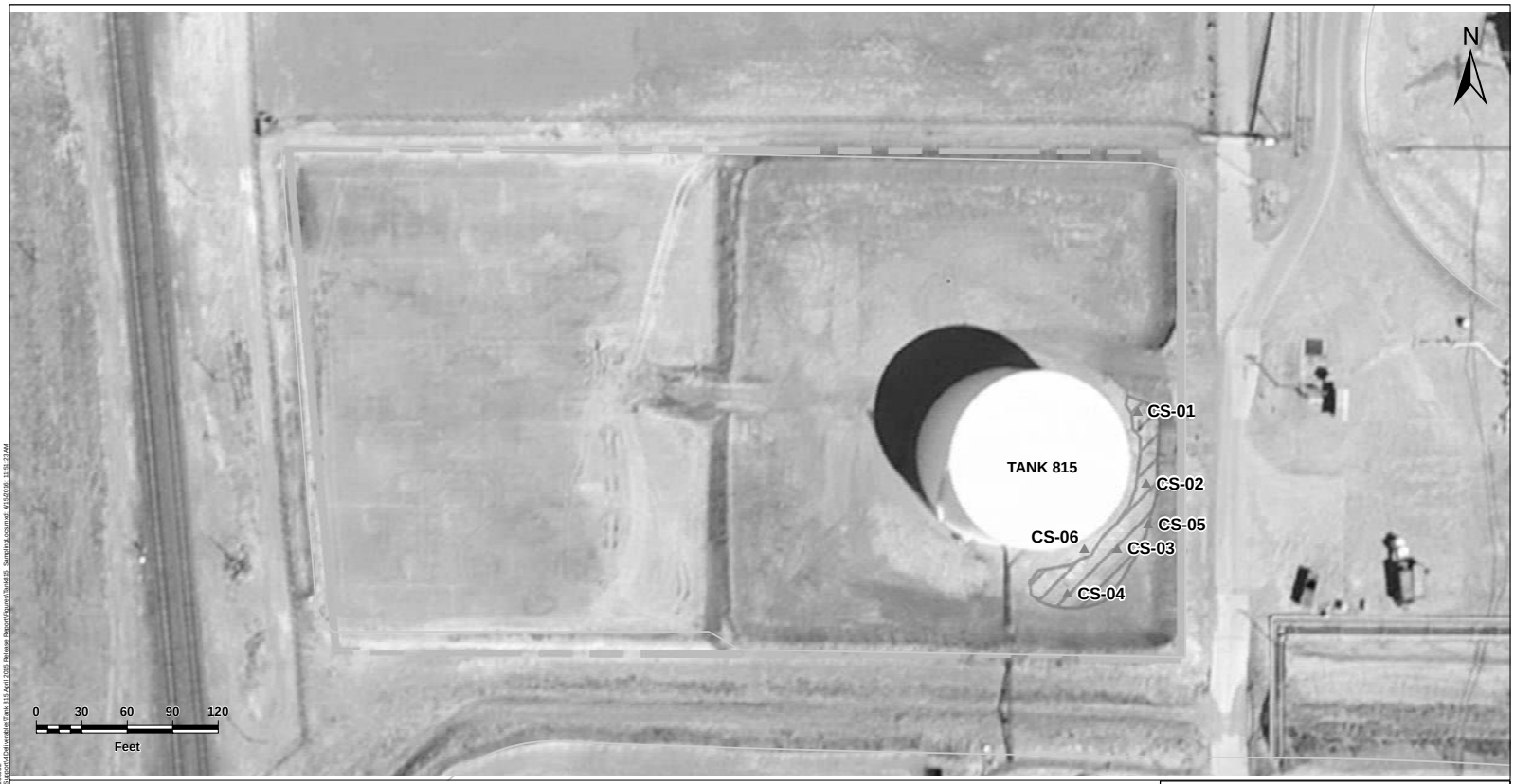
TANK 815 RELEASE EXTENT

AMEC FOSTER WHEELER
PROJECT NO.: 6703160002

Figure 3

Attachment B-1

Figure 2, Tank 815 Soil Boring Locations,
AMEC, 2016



Legend

- Tank 815 Boring Locations
- Tank 815 Release Area
- North Colony Landfarm Area



NAVAJO REFINING COMPANY
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

TANK 815 SOIL BORING LOCATIONS

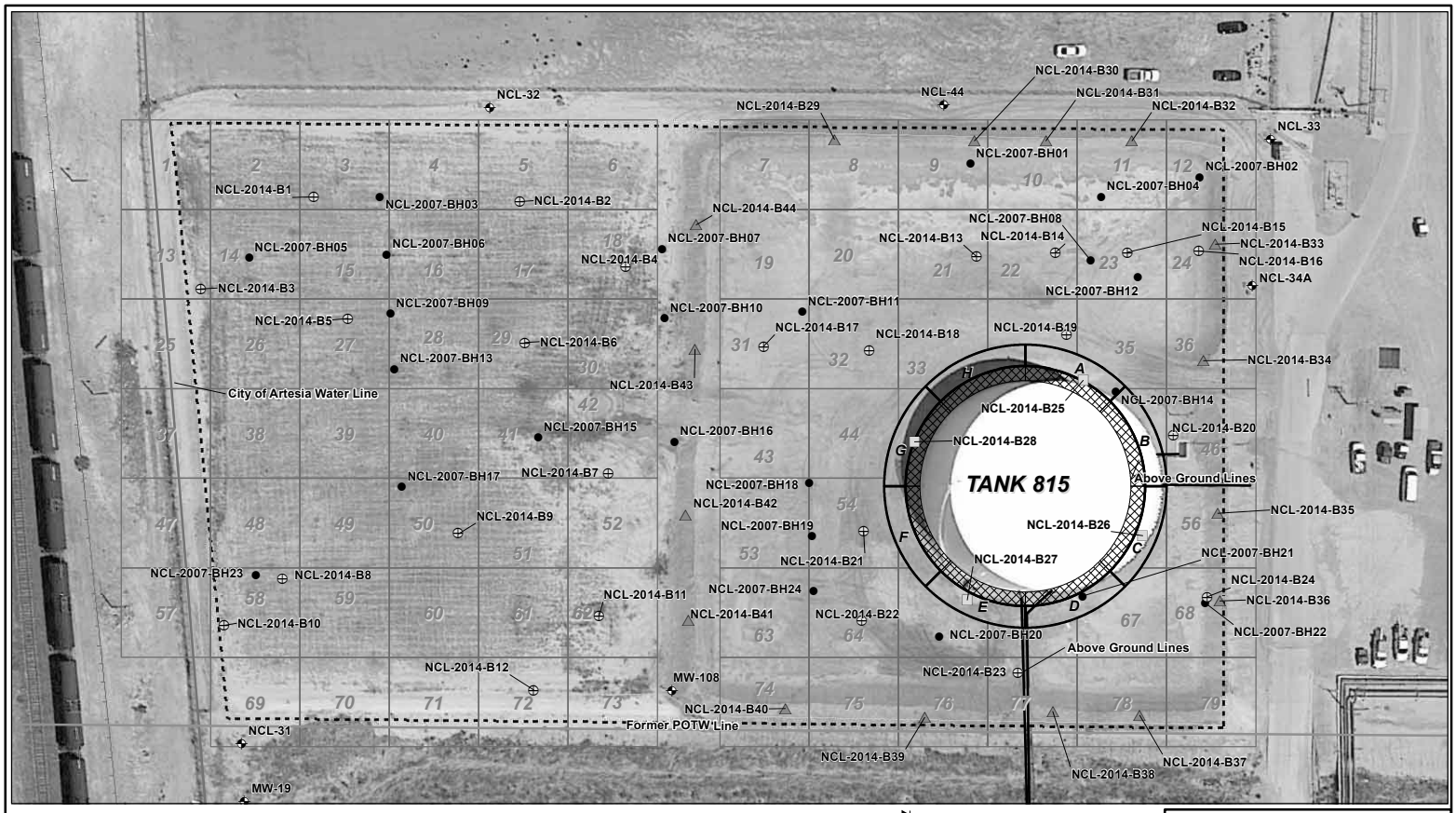
amec foster wheeler

FIGURE
2

DB: CRICHARDS, PM: P. KRUEGER Project: (Project #) 6703916002
Path: T:\Cartos\GIS\Projects\NAVAJO\Artesia\Environmental Support\Deliverables\Tank 815 April 2015 Release Report\Figure2Tank815_SoilBoring.mxd 4/15/2015 11:45:23 AM

Attachment B-2

Figure 1, NCL Routine Soil Sampling Locations,
Arcadis, 2014



Legend

- TREATMENT ZONE/NATIVE SOIL SAMPLES
- TANK 815 SAMPLES
- TANK 815 CONTAINMENT BERM SAMPLES
- 2007 NCL SAMPLE LOCATIONS
- MONITORING WELL
- A — TANK GRID (15', 460')
- DRILLING EXCLUSION ZONE (10')
- 1 — NCL GRID (50' x 50')
- NCL AREA

Utilities

- ABOVE GROUND LINE
- FORMER POTW LINE
- WATER LINE

NOTES:
POTW = PUBLICLY OWNED TREATMENT WORKS

N

0 25 50 Feet

GRAPHIC SCALE

New Mexico

NAVAJO REFINING COMPANY
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

SOIL SAMPLING LOCATIONS

ARCADIS

FIGURE 1

Document Path: Z:\GIS\PROJECTS_ENV\Navajo Refining\Artesia\Refinery\2015\NCL Report\Fig04_2014 Sample Locations.mxd

Attachment C

Boring Logs and Field Notes,
May 10, 2016 Soil Sampling Event, AMEC, 2016

LOG OF TEST BORING NO. CS-01

PROJECT HFN ARTESIA

JOB NO. _____ DATE 5/10/16

SHEET _____ OF _____

RIG TYPE _____

BORING TYPE _____

SURFACE ELEV. _____

DATUM _____

LOGGED _____

DWG BY _____

CHEKED BY _____

DRILLED BY _____

File No: _____

Depth in ~~feet~~ in.	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content % of Dry Weight	Unified Soil Classification	Atterberg Limits PL	Atterberg Limits LL	Atterberg Limits PI	REMARKS	VISUAL CLASSIFICATION
0							GC					ROUNDED PEBBLES 1-2" LT. BROWN CLAYS DRY, LOW-PI
5												
							GC				DARK BROWN STAIN, HYDROCARBON ODOR	ROUNDED PEBBLES 1-2" DARK BROWN STAIN CLAY/SOME SAND DRY, LOW-PI
10		X	S									
15												
20												
25												
30												
35												
40												

GROUND WATER		
DEPTH	HOUR	DATE

SAMPLE TYPE

A - Auger cuttings B - Block sample
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - 3" O.D. thin-walled Shelby tube

LOG OF TEST BORING NO. CZ-02

PROJECT HFN ARTESIA

JOB NO. _____ DATE 5/10/16

SHEET _____ OF _____

RIG TYPE _____

BORING TYPE _____

SURFACE ELEV. _____

DATUM _____

LOGGED _____

DWG BY _____

CHEKED BY _____

DRILLED BY _____

File No: _____

Depth in ft.	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content % of Dry Weight	Unified Soil Classification	Atterberg Limits PL	Atterberg Limits LL	Atterberg Limits PI	REMARKS	VISUAL CLASSIFICATION
0							GC					ROUNDED PEBBLES 1-2" CLAYS + CALICHE LT. BROWN, DRY, LOW PI
5							GC				DARK BROWN STAIN, HYDRO-CARBON ODOR	1-2" ROUNDED PEBBLES CLAY + CALICHE DRY, LOW-PI
10		S										
15												
20												
25												
30												
35												
40												

GROUND WATER		
DEPTH	HOUR	DATE

SAMPLE TYPE

A - Auger cuttings B - Block sample
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - 3" O.D. thin-walled Shelby tube

LOG OF TEST BORING NO. CS-03

PROJECT HFN ARTESIA

JOB NO. _____ DATE 5/10/16

SHEET _____ OF _____

RIG TYPE _____

BORING TYPE _____

SURFACE ELEV. _____

DATUM _____

LOGGED _____

DWG BY _____

CHEKED BY _____

DRILLED BY _____

File No: _____

Depth in ~~feet~~ IN.	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content % of Dry Weight	Unified Soil Classification	Atterberg Limits PL	Atterberg Limits LL	Atterberg Limits PI	REMARKS	VISUAL CLASSIFICATION
0							CL					LT. BROWN CLAYS DRY, LOW - PI SOME SILTS
5												
10		X	S								DARK BROWN STAIN, HYDRO C. ODOR, DENSE HARD CAKE-LIKE CRUMBLING MATERIAL	DENSE, HARD, CLAY-LIKE
15												
20												
25												
30												
35												
40												

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A - Auger cuttings B - Block sample
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - 3" O.D. thin-walled Shelby tube

LOG OF TEST BORING NO. CS-04

PROJECT HFN ARTESIA

JOB NO. _____ DATE 5/10/16

SHEET _____ OF _____

RIG TYPE _____

BORING TYPE _____

SURFACE ELEV. _____

DATUM _____

LOGGED _____

DWG BY _____

CHEKED BY _____

DRILLED BY _____

F8e No: _____

Depth in ~~feet~~ in.	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content % of Dry Weight	Unified Soil Classification	Atterberg Limits PL	Atterberg Limits LL	Atterberg Limits PI	REMARKS	VISUAL CLASSIFICATION
0							CL					LT. BROWN CLAY, FEW SILTS, DRY, LOW PI
5							CL				IMPACTED SOIL DARK BRN. STAIN HYDRO C. ODOR HARD COMPACTED CAKE-LIKE CLAY	
10		S	X									
15												
20												
25												
30												
35												
40												

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A - Auger cuttings B - Block sample
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - 3" O.D. thin-walled Shelby tube

LOG OF TEST BORING NO. CS-05

PROJECT HFN ARTESIA

JOB NO. _____ DATE 5/10/16

SHEET _____ OF _____

RIG TYPE _____

BORING TYPE _____

SURFACE ELEV. _____

DATUM _____

LOGGED _____

DWG BY _____

CHEKED BY _____

DRILLED BY _____

File No: _____

Depth in ~~feet~~ IN.	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content % of Dry Weight	Unified Soil Classification	Atterberg Limits PL	Atterberg Limits LL	Atterberg Limits PI	REMARKS	VISUAL CLASSIFICATION
0							GC					1-2" ROUNDED PEBBLES LT. BRN. HARD CLAY DRY, LOW PI
							GC				STAIN, DARK BRN. HARD CRUMBLY MATERIAL, NO ODOR	
5		X	S									
10												
15												
20												
25												
30												
35												
40												

GROUND WATER		
DEPTH	HOUR	DATE

SAMPLE TYPE

A - Auger cuttings B - Block sample
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - 3" O.D. thin-walled Shelby tube

LOG OF TEST BORING NO. CS-06

PROJECT HFN ARTESIA

JOB NO. _____ DATE 3/10/16

SHEET _____ OF _____

RIG TYPE _____

BORING TYPE _____

SURFACE ELEV. _____

DATUM _____

LOGGED _____

DWG BY _____

CHEKED BY _____

DRILLED BY _____

File No: _____

Depth in ~~feet~~ IN.	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content % of Dry Weight	Unified Soil Classification	Atterberg Limits PL	Atterberg Limits LL	Atterberg Limits PI	REMARKS	VISUAL CLASSIFICATION
0							CL					LT. BRN CLAY + SILTS + CALICHE. DRY, LOW-PI
5		X	S				CL				IMPACTED SOIL DARK BROWN	
											STAIN. COMPACTED HARD CRUMBLY MATERIAL NO ODOR.	
10												
15												
20												
25												
30												
35												
40												

GROUND WATER		
DEPTH	HOUR	DATE

SAMPLE TYPE

A - Auger cuttings B - Block sample
S - 2" O.D. 1.38" I.D. tube sample
U - 3" O.D. 2.42" I.D. tube sample
T - 3" O.D. thin-walled Shelby tube

6703160012 HFN ARTESIA

TRUCK: 2071

5/10/16

0430 - LEAVE EL PASO OFFICE

0800 - ARRIVE @ NAVAJO REFINERY

0830 - SAFETY ORIENTATION

1030 - FINISH ORIENTATION

1100 - DOWN TIME

1300 - ARRIVE @ DRILL SITE

ON SITE: D. ACOSTA, DOMINIC

ROBERT COMBS, ENVIRO-TECH SUB

1500 - START AUGER CS-01

IMPACTED HORIZON @ 5"

1535 - SAMPLED CS-01 @ 1'

1555 - SAMPLED CS-02 @ 1'

IMPACTED HORIZON @ 4"

1615 - SAMPLED CS-03 @ 1'

IMPACTED SOIL @ 3"

1630 - SAMPLED CS-04 @ 1'

IMPACTED SOILS

1640 - SAMPLED CS-05 @ 6"

IMPACTED SOIL @ 5"

1650 - SAMPLED CS-06 @ 6"

IMPACTED SOIL @

1655 - SAMPLED EQUIPMENT BLANK

1700 - LEFT TANK AREA

1730 - PUMPED DECON WATER

HEADED TO DRILL SITE

1830 - LEFT DRILL SITE.

1900 - LEFT SITE, TURNED IN TEMP. BADGE @ GUARD SHACK

CS-01 - 5" Gravel, Lt. Brn. Dry clay →
Dark brn gravel + clay
H.C. odor

CS-03 / CS-04 Impacted soil -
Dense dark brown caliche
like.

CS-01 - 0-6" CALICHE + GRAVEL Dry
IMPACTED SOIL - STAIN, ODOR NOPI, DRY

CS-02 = GRAVEL + CALICHE PRY - NOPI
6" IMPACTED SOIL - STAIN, ODOR NOPI

CS-03
HORIZON @ 7" HARD COMPACTED CLAY STAIN, ODOR

CS-04
HORIZON @ 3" - HARD STAINED CLAY, DRY, ODOR

CS-05 - 0-7" CALICHE + GRAVELS 1-2"
3" IMPACT HORIZON STAIN NO ODOR

CS-06
HORIZON @ 4" HARD COMPACTED
FRIABLE CLAY/CALICHE
NO ODOR

Attachment D

Table 1, Summary of Analytical Results in Tank 815 Borings

Table 1 - Summary of Analytical Results in Tank 815 Borings
Navajo Refining Company, Artesia, New Mexico

				TPH	SVOCs																					
				DRO	Benzo(a) anthracene		Benzo(a) pyrene		Benzo(b) fluoranthene		Benzo(k) fluoranthene		Chrysene		Fluoranthene		Fluorene		Naphthalene		1-Methylnapthalene		2-Methylnapthalene		Phenanthrene		Pyrene	
				mg/kg	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
NMED Ind/Occ SSL (July 2015)				**3,000**	**32.3**		**3.23**		**32.3**		**323**		**3,229**		**33,680**		**33,680**		**241**		**NA**		**NA**		**25,260**		**25,260**	
Location	**Depth (ft)**	**Date**	**Type**	**Result**	**Flag**	**Result**	**Flag**	**Result**	**Flag**	**Result**	**Flag**	**Result**	**Flag**	**Result**	**Flag**	**Result**	**Flag**	**Result**	**Flag**	**Result**	**Flag**	**Result**	**Flag**	**Result**	**Flag**	**Result**	**Flag**	**Result**	**Flag**
TK815-CS01	1	5/10/16	N	**3,530**	J3	< 0.428		< 0.548		<0.695		< 0.582		< 0.555		< 0.496		< 0.682		< 0.889		< 1.10		< 0.861		<0.528		1.53	J
TK815-CS02	1	5/10/16	N	**7,280**	J3	< 0.856		< 1.10		< 1.39		< 1.16		< 1.11		< 0.992		< 1.36		< 1.78		< 2.20		< 1.72		< 1.06		< 2.46	
TK815-CS03	1	5/10/16	N	**63,600**	J3	16		**13.9**		11.5		1.97	J	20.7		< 0.496		5.54		1.38	J	10.9		5.96		36.4		63.8	
TK815-CS04	1	5/10/16	N	**59,500**	J3	15.8		**13.4**		10.4		1.28	J	19.2		8.26		6.06	J	< 1.78		8.06		4.94	J	21.2		52.5	
TK815-CS05	0.5	5/10/16	N	2,530	J3	< 0.428		< 0.548		< 0.695		< 0.582		< 0.555		< 0.496		< 0.682		< 0.889		< 1.10		< 0.861		< 0.528		< 1.23	
TK815-CS06	0.5	5/10/16	N	**9,160**	J3	< 2.14		< 2.74		< 3.48		< 2.91		< 2.78		< 2.48		< 3.41		< 4.44		< 5.50		< 4.30		< 2.64		< 6.15	
Tank 815 S. Bro 25	NA	5/7/2015	Composite	**30,000**		0.246	J	< 0.300		DNS		DNS		0.395	J	DNS		2.2		2.03		DNS		< 0.54		0.996	J	1.82	J
Tank 815 S. Bro 53	NA	5/7/2015	Composite	**5,260**		0.634		0.488	J	DNS		DNS		0.662		DNS		0.29	J	0.16	J	DNS		< 0.110		0.896		1.59	
Tank 815 S. Bro 49	NA	5/7/2015	Composite	**9,610**		2.63	J	2.13	J	DNS		DNS		6.86		DNS		0.994	J	< 1.00		DNS		< 1.10		3.87		10.4	
NCL 2007 B-14	TZ	12/27/07	N	< 2180	D2	< 7.2	D2	< 7.2	D2	< 7.2	D2	< 7.2	D2	< 7.2	D2	< 7.2	D2	< 7.2	D2	< 7.2	D2	DNS		< 7.2	D2	< 7.2	D2	< 7.2	D2
	TZ	12/27/07	N	< 12.5		< 0.413		< 0.413		< 0.413		< 0.413		< 0.413		< 0.413		< 0.413		< 0.413		DNS		< 0.413		< 0.413		< 0.413	
	NS	12/27/07	N	< 12.5		< 0.417		< 0.417		< 0.417		< 0.417		< 0.417		< 0.417		< 0.417		< 0.417		DNS		< 0.417		< 0.417		< 0.417	
NCL 2007 B-20	TZ	12/27/07	N	35		< 0.401		< 0.401		< 0.401		< 0.401		< 0.401		< 0.401		< 0.401		< 0.401		DNS		< 0.401		< 0.401		< 0.401	
	NS	12/27/07	N	21		< 0.404		< 0.404		< 0.404		< 0.404		< 0.404		< 0.404		< 0.404		< 0.404		DNS		< 0.404		< 0.404		< 0.404	
NCL 2007 B-21	TZ	12/27/07	N	**16,100**	D1	< 15.5	D2	< 15.5	D2	< 15.5	D2	< 15.5	D2	< 15.5	D2	< 15.5	D2	< 15.5	D2	< 15.5	D2	DNS		< 15.5	D2	< 15.5	D2	< 15.5	D2
	NS	12/27/07	N	< 12.5		< 0.412		< 0.412		< 0.412		< 0.412		< 0.412		< 0.412		< 0.412		< 0.412		DNS		< 0.412		< 0.412		< 0.412	
NCL 2007 B-22	TZ	12/27/07	N	**12,700**	D1	< 4.16	D2	< 4.16	D2	< 4.16	D2	< 4.16	D2	< 4.16	D2	< 4.16	D2	< 4.16	D2	< 4.16	D2	DNS		< 4.16	D2	11,100	D2	4,460	D2
	NS	12/27/07	N	**10,200**	D2	< 15.1	D2	< 15.1	D2	< 15.1	D2	< 15.1	D2	< 15.1	D2	< 15.1	D2	< 15.1	D2	< 15.1	D2	DNS		< 15.1	D2	< 15.1	D2	< 15.1	D2
NCL-2014-B20	1-2	12/11/14	N	17		< 0.0052		< 0.0067		< 0.0085		< 0.0071		0.0088	J	< 0.0061		< 0.0083		< 0.011		DNS		DNS		0.0088	J	< 0.015	
	4-5	12/11/14	N	18		< 0.0054		< 0.0069		< 0.0088		< 0.0073		< 0.007		< 0.0063		< 0.0085		< 0.011		DNS		DNS		< 0.0066		< 0.015	
NCL-2014-B23	1-2	12/10/14	N	**38,000**		4.7		**6.9**		6.4		1.2	J	15		2.7	J	< 0.92		< 1.2		DNS		DNS		0.89	J	18	
	1-2	12/10/14	FD	**5,400**		6.8	J	**8.3**	J	8.8		< 1.6		18		3.2	J	< 1.8		< 2.3		DNS		DNS		6.4	J	23	
	4-5	12/10/14	N	**9,300**		4.8		**5.1**		3.5	J	< 0.70		11		2.2	J	< 0.82		< 1.1		DNS		DNS		0.9	J	16	
NCL-2014-B24	1-2	12/10/14	N	**46,000**		14	J	**19**	J	18	J	< 7.0		40	J	6.6	J	< 8.3		0.0024	J	DNS		DNS		8.5	J	47	
	4-5	12/10/14	N	< 20		< 0.0052		< 0.0067		< 0.0085		< 0.0071		< 0.0068		< 0.0061		< 0.0083		0.0015	J	DNS		DNS		< 0.0065		< 0.015	

Notes and Definitions:

	Analytical result is above the NMED Ind/Occ SSL.
< X	Analyte was not detected above the laboratory reporting limit.
	Blank cells indicate no flags associated with that analyte for that sample.
Ind/Occ	Industrial/Occupational
NMED	New Mexico Environment Department
SSL	Soil Screening Level, from 2015 NMED Risk Assessment Guidance.
TZ	Identifier indicating that the sample was taken from the Treatment Zone.
NS	Identifier indicating that the sample was identified as taken from the Native Soil.
N	Normal sample
FD	Field duplcate sample
TPH	Total Petroleum Hydrocarbons
DRO	Diesel Range Organics
SVOCs	Semivolatile Organic Compounds - Only SVOCs with at least one detected result are shown in this table.
mg/kg	milligrams per kilogram
DNS	Did not sample
D1	The analysis was performed at dilution due to high analyte concentration.
D2	The analysis was performed at dilution due to matrix interference.
ft	Feet
J	Estimated value below lowest calibration point.
J3	Associated batch QC was outside range for precision.
mg/kg	milligrams per kilogram

Attachment E

RCRA Online 11025; RCRA Online 11954

9476.1983(02)

JAN 11 1983

Dr. Reva Rubenstein
Director
Institute of Chemical Waste Management
National Solid Wastes Management Association
1120 Connecticut Avenue, N.W.
Washington, D.C. 20036

Dear Dr. Rubenstein:

This letter is in response to your letter of December 6, 1982, requesting interpretation of closure and post-closure requirements regarding land disposal facilities. I have responded to your questions in the order presented in your letter and attachment.

1. Recontouring the final cover material and/or adjusting inplace waste in the same unit as required to maintain the function of final cover as a result of subsidence and settlement, does not constitute receipt of hazardous waste after January 25, 1983. These sections must be described in each facility's closure and post-closure plans which must be approved by the Regional Administrator. Modifications can be made to these plans as necessary with Agency approval.

2. The controlled irrigation of the vegetative cover is allowed in order to establish vegetation during the closure period or to maintain it during prolonged dry spells in the post-closure period. But the regulations require the final cover to provide long-term minimization of migration of liquids through the closed landfill (§264.310(a)(1)), and to function with minimum maintenance (§264.310(a)(2)). Thus, the guidance documents recommend that the plant species chosen be indigenous, require minimal or no additional moisture, and be selected based on anticipated moisture, light, temperature, elevation, and competitive cohabitants, etc. The closure and post-closure plans should contain a description of why and when the irrigation may be determined to be necessary (e.g., recommended by local agronomist to establish vegetation during a dry period), the amount and

frequency of water application, and water balance analysis showing the effect of the irrigation water on total annual liquid input through the final cover.

EPA has available two reports that provide technical information on this subject, entitled "Evaluating Cover Systems for Solid and Hazardous Waste" SW-867, September 1982, which discusses irrigation of plant cover and other plant requirements; and (2) "Hydrologic Simulation on Solid Waste Disposal Sites" SW-868, September 1982, which is a computerized water balance model, to evaluate the probable hydrologic performance of existing or proposed landfill designs. Both of the reports are available from the Government Printing Office (SW-867 is Stock No. 055-000-00228-2 @$4.75, SW-868 is Stock No. 055-000-00225-8 @$6.00). EPA is currently revising the model for "Hydrologic Simulation on Solid Waste Disposal Sites" to enable its use in estimating seepage through the liner as well as through the cover. The revised model should be available early in 1983.

Your statement that 40 CFR Parts 264 and 265 prohibit the addition of bulk liquids to the waste management unit is not quite accurate. Bulk liquids are allowed if the site is lined and has a leachate collection and removal system. Liquids in the leachate collection system must be removed during operation, closure, and post-closure. In general, the addition of liquids into the unit during closure would be permitted only if by doing so the facility and waste will be stabilized sooner. As you know, the objective during and after closure is to remove liquids and keep them out. If liquids are added during closure, the closure period would need to be extended until the addition stopped.

To further clarify the above explanations I must emphasize four points. First, any liquid applied to the final cover of a landfill to sustain vegetation cannot be a hazardous waste (e.g., cannot be leachate unless it is no longer a hazardous waste), cannot harm the vegetation, and cannot otherwise impair the integrity of the final cover (e.g., cause increased infiltration because of damage caused by pH). Second, liquids may not be injected into the waste after closure (e.g., leachate recirculation by injection), since this is contrary to the post-closure objective of

keeping liquids out. Third, as stated above, liquids could be allowed during closure, including leachate recirculation, if: (a) there is a liner and leachate collection system, (b) leachate is removed from the leachate collection system, (c) the addition of liquids serves to enhance closure (e.g., accelerates subsidence and stabilization), rather than merely serves as a convenient way to dispose of the liquids, and (d) the liquid addition is explained and justified in the closure plan. Such closure would not be completed until recirculation ceases. Also, recirculation of a hazardous waste (leachate) after January 26, 1983 would make the unit a regulated unit subject to the requirements of Part 264. I should point out that recirculation of a hazardous waste (leachate) can occur during operation and would normally be considered an operational rather than closure activity. Closure activities are those which lead to stabilization of the unit in a timely manner after receipt of wastes has ceased. Fourth, the characteristics and purpose of any liquids to be added to the landfill or to the cover during or after closure must be specified in the closure or post-closure plans and approved by the RA (or authorized State), including any extension of the closure period. Such purpose and extension must be consistent with the environmental objectives specified in Part 264 or 265.

3. Landfills that are currently engaged in co-disposal of hazardous and non-hazardous wastes could continue to accept non-hazardous wastes after January 25, 1983, in order to complete a partially filled hazardous waste unit and close under either 40 CFR Part 265 or Part 264 requirements. This assumes that the owner or operator completes the cell in a timely manner, which generally means within the 180 day closure period. If the closure cannot be completed within the 180 days the owner or operator must apply to have the closure period extended beyond 6 months, for a specified time period, as provided in 40 CFR 265.113(b) or 264.113(b), to allow the waste to be filled until the designated elevation is reached. This type of closure could be approved if it provides for a more environmentally sound closure, and not merely for the economic convenience of the owner or operator. Each extension will be considered on a case-by-case basis. The regulatory concern is closing the landfill in as expedient a time as is practical (i.e., achieving final contour and

final cover) so as to prevent additional rainfall infiltration and other environmental exposure. Pertinent factors include use of earth materials and redesigning the final contours. The Regional Administrator or approved State permitting authority could approve a closure plan or modification to the closure plan allowing the unit or cell to be completed with non-hazardous waste after January 25, 1983, and possibly extending the closure period (more than 6 months) after January 25, 1983 upon such a showing. Conditions for accomplishing this would be in any approved closure plan or closure permit (e.g., time period, final contours, type of waste).

4. For the situation where a surface impoundment "closes as a landfill" before January 25, 1983, I presume you mean no more hazardous wastes received after January 25, 1983, but closure (e.g., dewatering, etc.) has not yet been done. The waste will be removed from the surface impoundment, solidified and replaced in the same impoundment, to ensure that it will bear the weight of the cover. EPA does not consider this replacement of waste after January 25, 1983, to be "receipt" of hazardous waste which would constitute a "regulated unit". This decision assumes that the solidifying material is not a hazardous waste.

5. For your last question you described the case where multiple hazardous waste trenches will cease to receive hazardous waste on or before January 25, 1983, and where the closure plan provides for a delayed closure of a half-filled trench for the deposit of solidified hazardous waste from closed and capped trenches. In general, such placement of solidified hazardous waste from the closed trenches into the reserved half-filled trench, even at the same facility, will be considered "receipt" of hazardous waste such as to constitute a "regulated" unit because the waste is received and disposed at the facility unit after January 26, 1983. I refer you to the July 26, 1982 Federal Register preamble discussion at 47 FR 32289 which describes the concept of a waste management unit. Where landfills consist of a series of trenches which are separately lined, each trench is a separate waste management unit. The transfer of hazardous waste from one unit to another unit after January 26, 1983 therefore makes the receiving trench or unit a "regulated" unit.

As a side note, I should mention that the closure performance standard for interim status and for permitting facilities is the same (40 CFR 264.111 and 40 CFR 265.111). The final cover or cap for landfills closed under Part 264 or 265 standards should be similar. Significant differences in the design of the cap should result from site specific factors rather than the type of permit the facility has. Thus, many of the above comments apply to both Part 264 and 265 closure requirements.

I hope the above explanations help clarify the regulations for you. Should you have any further questions with regard to how this regulation effects NSWMA members please contact me or Fred Lindsey of my staff (382-4756).

Sincerely yours,

John H. Skinner
Acting Director
Office of Solid Waste

cc: Regions I-X (With incoming)

Mike Cook
Eileen Claussen
John Lehman
Bruce Weddle
Lisa Friedman
Mark Greenwood
Fred Lindsey
Gene Lucero
Ken Shuster

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

March 13, 1996

SUBJECT: Use of the Area of Contamination (AOC) Concept During RCRA Cleanups

FROM: Michael Shapiro, Director
Office of Solid Waste

Stephen D. Luftig, Director
Office of Emergency and Remedial Response

Jerry Clifford, Director
Office of Site Remediation Enforcement

TO: RCRA Branch Chiefs
CERCLA Regional Managers

This memorandum confirms that under current regulations, certain broad areas of contamination (AOCs) may be considered RCRA landfills. Under certain conditions, hazardous wastes may be moved within such areas without triggering RCRA land disposal restrictions or minimum technology requirements. This memorandum also describes the distinctions between the final Corrective Action Management Unit (CAMU) regulations and the Area of Contamination (AOC) approach, and encourages appropriate use of both options to expedite remedial actions.

Area of Contamination Approach

The area of contamination concept was discussed in detail in the preamble to the National Contingency Plan (55 FR 8758-8760, March 8, 1990). In this discussion, EPA clarified that certain discrete areas of generally dispersed contamination (called "areas of contamination" or "AOCs") could be equated to a RCRA landfill and that movement of hazardous wastes within those areas would not be considered land disposal and would not trigger the RCRA land disposal restrictions. The NCP also discusses using the concept of "placement" to determine which requirements might apply within an AOC. The concept of "placement" is important because placement of hazardous waste into a landfill or other land based unit is considered land disposal, which triggers the land disposal restrictions, and may trigger other RCRA requirements including permitting (at a non-CERCLA site), closure and post-closure. In the NCP, EPA stated, "placement does not occur when waste is consolidated within an AOC, when it is treated in situ, or when it is left in place." Placement does occur, and additional RCRA requirements may be triggered, when wastes are moved from one AOC to another (e.g., for consolidation) or when waste is actively managed (e.g., treated *ex situ)* within or outside the AOC and returned to the

land. Additional information on when placement does and does not occur is provided in the attached guidance document, *Determining When Land Disposal Restrictions (LDRs) Are Applicable to CERCLA Response Actions*, OSWER Directive 9347.3-O5FS, July 1989.

Although the AOC concept was initially discussed in the context of the CERCLA program, it applies equally to RCRA corrective action sites, cleanups under state law, and voluntary cleanups[1]. For additional information on the AOC concept, see, for example, the October 9, 1990 memorandum from Sylvia Lowrance to David Ullrich, "Replacement of Contaminated Soil and Debris Treated under a Treatability Variance," the January 7, 1991 letter from Don Clay to Richard Stoll, and the June 11, 1992 letter from Sylvia Lowrance to Douglas Green (attached).

The interpretations of landfill, placement and the area of contamination concept discussed in the NCP preamble were reiterated by EPA in the 1990 subpart S proposal (55 FR 30798, July 27, 1990). In the 1990 proposal, EPA termed AOCs at RCRA facilities "Corrective Action Management Units" or "CAMUs." Although the name was changed, from AOC to CAMU, the CAMU concept discussed in the 1990 proposal was equivalent to the AOC concept (although, as discussed below, the CAMU concept was broadened when the final CAMU rule was issued). In response to great interest in the CAMU/AOC concept as discussed in the 1990 proposal, EPA issued a fact sheet titled *Use of the Corrective Action Management Unit Concept* in August 1992 (attached). In the August, 1992 fact sheet, EPA further reiterated the AOC concept by explaining that broad areas of contamination, including specific subunits[2], could be considered landfills under the RCRA regulations and discussed activities which would or would not trigger additional RCRA requirements when conducted in such areas.

The discussions of the AOC approach in the NCP preamble, 1990 subpart S proposal, and the August, 1992 fact sheet continue to reflect EPA's interpretation of current statutory and regulatory provisions. They remain useful guidance documents when the AOC approach is under consideration at RCRA corrective action sites, Superfund sites and during other cleanup actions involving the movement or consolidation of hazardous waste, or media and debris contaminated with hazardous waste.

Relationship of the AOC Concept to the Final CAMU Rules

[1] Although advance approval at the Federal level is not required for private parties to take advantage of the AOC concept, we encourage them to consult with the appropriate agency to ensure they implement the AOC concept appropriately. It should be noted that the agency responsible for determining that the AOC concept is being properly applied might not be the same as the agency overseeing cleanup at a site. Additionally, states may have more stringent standards which require consultation and/or prior approval of an AOC.

[2] Note, if the subunit were a RCRA regulated unit, inclusion of the unit within an AOC could necessitate a RCRA permit modification or a change under RCRA interim status.

On February 16, 1993, EPA published final Corrective Action Management Unit regulations (58 FR 8658, February 16, 1993). The final CAMU rule differs from the AOC approach in important respects. First, the CAMU regulations create a new type of RCRA unit - a "Corrective Action Management Unit" or "CAMU." CAMUs are distinct from the type of units listed in RCRA Section 3004(k)[3]. Second, only EPA and authorized states may choose to designate CAMUs for management of remediation waste during RCRA corrective action and other cleanups. Third, the CAMU regulations expanded the flexibility available for management of remediation wastes beyond that offered by the AOC approach. Under the CAMU regulations, certain activities which would normally be considered placement are allowed when carried out in an agency-approved CAMU, including: remediation waste[4] may be removed from a CAMU and replaced before or after treatment) in the same or a different CAMU; remediation waste may be consolidated into a CAMU before or after treatment; and, remediation waste may be moved (again, before or after treatment) between two or more CAMUs at the same facility.

While the CAMU concept contained in the final CAMU rule was historically an outgrowth of the AOC concept, it has a separate statutory and regulatory basis; therefore, it supplements rather than supersedes the AOC concept. The AOC concept was not altered when the final CAMU rules were promulgated and it does not depend on the existence of the CAMU rule.

As you may be aware, several parties challenged the CAMU rule. The lawsuit has been stayed pending promulgation of the final Hazardous Waste Identification Rule for contaminated media ("HWIR-Media"). At the time the stay was issued EPA stated that the HWIR-Media rule was expected to replace a substantial portion of the CAMU rule; however, as long as the CAMU rule remains in effect, CAMUs may be used to facilitate protective remedies under RCRA, CERCLA, and state cleanup authorities. If a CAMU is under consideration, we recommend you take the following steps, in addition to the CAMU approval steps required at 40 CFR § 264.552:

1) explain the potential risks associated with CAMUs to facility owner/operators by informing them that the CAMU rule has been challenged and that EPA may issue a proposal to withdraw it; 2) where possible, mitigate potential risks associated with CAMUs by, for example, implementing a CAMU remedy within the shortest possible time frame; and 3) document all CAMU decisions completely, emphasizing how the CAMU provides support for the best site-specific remedy.

Continued Use of the AOC Concept

[3]RCRA Section 3004(k) defines the term land disposal, when used with respect to a specified hazardous waste$_9$ to include placement of such hazardous. waste in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, salt bed formation, or underground mine or cave.

[4] Remediation waste is defined as, "all solid and hazardous wastes, and all media (including groundwater, surface water, soils, and sediments) and debris, which contain listed hazardous wastes or which themselves exhibit a hazardous waste characteristic, that are managed for the purpose of implementing corrective action requirements under 40. CFR § 264.101 and RCRA section 3008 (h). For a given facility, remediation wastes may originate only from within the facility boundary, but may include waste managed in implementing RCRA sections 3004(v) or 3008(h) for releases beyond the facility boundary.

Both AOCs and CAMUs can be used to expedite effective and protective remedial actions; however, EPA encourages the use of the AOC concept in cases where the additional flexibility provided in the final CAMU regulations is not needed. For example, the AOC concept is particularly useful for consolidation of contiguous units or areas of contaminated soil. Using the AOC concept, a RCRA facility owner/operator with a large contiguous area of soil contamination could consolidate such soils into a single area or engineered unit within an AOC without triggering the RCRA land disposal restrictions or minimum technology requirements. Use of the AOC concept would not be affected by the pending litigation over CAMU or any changes in the CAMU rule. In addition, please note, the AOC and CAMU concepts only address management of materials which would otherwise be subject to RCRA (i.e., hazardous wastes, or media and debris contaminated with hazardous waste). RCRA regulated materials are a subset of the materials managed during site cleanups.

We know you will continue to use the AOC and CAMU concepts to support appropriate remedies and to expedite cleanup processes. If you have any questions regarding the AOC or CAMU concepts, please contact Elizabeth McManus, Hugh Davis or Robin Anderson at (703) 308-8657, (703) 308-8633, and (703) 603-8747, respectively.

EPA Directive: 9347.3-05FS
July 1989

Determining When Land Disposal Restrictions (LDRs) Are Applicable to CERCLA Response Actions

CERCLA Section 121(d)(2) specifies that on-site Superfund remedial actions shall attain "other Federal standards, requirements, criteria, limitations, or more stringent State requirements that are determined to be legally applicable or relevant and appropriate (ARAR) to the specified circumstances at the site." In addition, the National Contingency Plan (NCP) requires that on-site removal actions attain ARARs to the extent practicable. Off-site removal and remedial actions must comply with legally applicable requirements. This guide outlines the process used to determine whether the Resource Conservation and Recovery Act (RCRA) land disposal restrictions LDRs) established under the Hazardous and Solid Waste Amendments (HSWA) are "applicable" to a CERCLA response action More detailed guidance on Superfund compliance with the LDRs is being prepared by the Office of Solid Waste and Emergency Response (OSWER).

For the LDRs to be applicable to a CERCLA response, the action must constitute placement of a restricted RCRA hazardous waste. Therefore, site managers (OSCs, RPMs) must answer three separate questions to determine if the LDRs are applicable:

(1) Does the response action constitute placement?

(2) Is the CERCLA substance being placed also a RCRA hazardous waste? and if so

(3) Is the RCRA waste restricted under the LDRs?

Site managers also must determine if the CERCLA substances are California list wastes, which arc a distinct category of RCRA hazardous wastes restricted under the LDRs (see Superfund LDR Guide #2).

(1) DOES THE RESPONSE CONSTITUTE PLACEMENT?

The LDRs place specific restrictions (e.g., treatment of waste to concentration levels) on RCRA hazardous wastes prior to their placement in land disposal units. Therefore, a key determination is whether the response action will constitute placement of wastes into a land disposal unit. As defined by RCRA, land disposal units include landfills, surface impoundments, waste piles, injection wells, land treatment facilities, salt dome formations, underground mines or caves, and concrete bunkers or vaults. If a CERCIA response includes disposal of wastes in any of these types of off-site land disposal units,

placement will occur. However, uncontrolled hazardous waste sites often have widespread and dispersed contamination, making the concept of a RCRA unit less useful for actions involving on-site disposal of wastes. Therefore, to assist in defining when "placement" does and does not occur for CERCLA actions involving on-site disposal of wastes, EPA uses the concept of -areas of contamination" (AOCs), which may be viewed as equivalent to RCRA units, for the purposes of LDR applicability determination

An AOC is delineated by the areal extent (or boundary) of contiguous contamination. Such contamination must be continuous, but may contain varying types and concentrations of hazardous substances. Depending on site characteristics, one or more AOCs may be delineated. Highlight 1 provides some examples of AOCs.

Highlight1: EXAMPLES OF AREAS OF CONTAMINATION (AOCs)

- A waste source (e.g., waste pit, landfill, waste pile) and the surrounding contaminated soil
- A waste source, and the sediments in a stream contaminated by the source, where the contamination is continuous from the source to the sediments.*
- Several lagoons separated only by dikes, where the dikes are contaminated and the lagoons share a common liner.

*The AOC does not include any contaminated surface or groundwater that may be associated with the landbased waste source.

For on-site disposal, placement occurs when wastes are moved from one AOC (or unit) into another AOC (or unit). Placement does not occur when wastes are left in place, or moved within a single AOC. Highlight 2 provides scenarios of when placement does and does not occur, as defined in the proposed NCP. The Agency is current reevaluating the definition of placement prior to the promulgation of the final NCP, and therefore, these scenarios are subject to change.

Highlight 2: Placement

Placement <u>does</u> occur when wastes are:

- Consolidated from different AOCs into a single AOC;
- Moved outside of an AOC (for treatment or storage, for example) and returned to the same or a different AOC; or
- Excavated from an AOC, placed in a separate unit, such as an incinerator or tank that is within the AOC, and redeposited into the same AOC.

Placement <u>does not</u> occur when wastes are:

- Treated in situ;
- Capped in place;
- Consolidated within the AOC; or
- Processed within the AOC (but not in a separate unit, such as a tank) to improve its structural stability (e.g., for capping or to support heavy machinery).

In summary, if placement on-site or off-site does not occur, the LDRs are not applicable to the Superfund action.

(2) IS THE CERCLA SUBSTANCE A RCRA HAZARDOUS WASTE?

Because a CERCLA response must constitute placement of a restricted RCRA hazardous waste for the LDRs to be applicable, site managers must evaluate whether the contaminants at the CERCLA site are RCRA hazardous wastes. Highlight 3 briefly describes the two types of RCRA hazardous wastes – listed and characteristic wastes.

Highlight 3: RCRA HAZARDOUS WASTES

A RCRA solid waste* is hazardous if it is listed or exhibits a hazardous characteristic.

Listed RCRA Hazardous Wastes

Any waste listed in Subpart D of 40 CFR 261, including:
- F waste codes (Part 261.31)
- K waste codes (Part 261.32)
- P waste codes (Part 261.33(e))
- U waste codes (Part 261.33(f))

Characteristic RCRA Hazardous Wastes
Any waste exhibiting one of the following characteristics, as defined in 40 CFR 261:
- Ignitability
- Corrosivity
- Reactivity
- Extraction Procedure (EP) Toxicity

*A solid waste is any material that is discarded or disposed or (i.e., abandoned, recycled in certain ways, or considered inherently waste-like). The waste may be solid, semi-solid, liquid, or a contained gaseous material. Exclusions from the definition (e.g., domestic sewage sludge) appear in 40 CFR 261.4(a). Exemptions (e.g., household wastes) are found in 40 CFR 261.4(b).

Site managers are not required to presume that a CERCLA hazardous substance is a RCRA hazardous waste unless there is affirmative evidence to support such a finding. Site managers, therefore, should

use "reasonable efforts" to determine whether a substance is a RCRA listed or characteristic waste. (Current data collection efforts during CERCLA removal and remedial site investigations should be sufficient for this purpose). For listed hazardous wastes, if ii manifests or labels are not available, this evaluation likely will require fairly specific information about the waste (e.g., source, prior use, process type) that is "reasonably ascertainable" within the scope of a Superfund investigation. Such information may be obtained from facility business records or from an examination of the processes used at the facility. For characteristic wastes, site managers may rely on the results of the tests described in 40 CFR 26121 - 26124 for each characteristic or on knowledge of the properties of the substance. Site managers should work with Regional RCRA staff, Regional Counsel, State RCRA staff, and Superfund enforcement personnel, as appropriate, in making these determinations.

In addition to understanding the two categories of RCRA hazardous wastes, site managers will also need to understand the derived-from rule, the mixture rule, and the contained-in interpretation to identify correctly whether a CERCLA substance is a RCRA hazardous waste. These three principles, as well as an introduction to the RCRA delisting process, are described below.

Derived-from Rule (40 CFR 2613(c)(2)) .

The derived-from rule states that any solid waste derived from the treatment, storage, or disposal of a listed RCRA hazardous waste is itself a listed hazardous waste (regardless of the concentration of hazardous constituents). For example, ash and scrubber water from the incineration of a listed waste are hazardous wastes on the basis of the derived-from rule. Solid wastes derived from a characteristic hazardous waste are hazardous wastes only if they exhibit a characteristic.

Mixture Rule (40 CFR 261.3(a)(2))

Under the mixture rule, when any solid waste and a listed hazardous waste are mixed, the entire mixture is a listed hazardous waste. For example, if a generator mixes a drum of listed F006 electroplating waste with a non-hazardous wastewater (wastewaters are solid wastes - see Highlight 3), the entire mixture of the F006 and wastewater is a listed hazardous waste.

Mixtures of solid wastes and characteristic hazardous wastes are hazardous only if the mixture exhibits a characteristic.

Contained-in Interpretation (OSW Memorandum dated November 13, 1986)

The contained-in interpretation states that any mixture of a non-solid waste and a RCRA listed hazardous waste must be managed as a hazardous waste as long as the material contains (i.e., is above health-based levels) the listed hazardous waste. For example, if soil or ground water (i.e., both non-solid wastes) contain an F00l spent solvent, that soil or ground water must be managed as a RCRA hazardous waste, as long as it "contains" the F001 spent solvent.

Delisting (40 CFR 260.20 and .22)

To be exempted from the RCRA hazardous waste "system," a listed hazardous waste, a mixture of a listed and solid waste, or a derived-from waste must be delisted (according to 40 CFR 260.20 and 22). Characteristic hazardous wastes never need to be delisted, but can be treated to no longer exhibit the characteristic. A contained-in waste also does not have to be delisted; it only has to "no longer contain" the hazardous waste.

If site managers determine that the hazardous substance(s) at the site is a RCRA hazardous waste(s), they should also determine whether that RCRA waste is a California list waste. California list wastes are a distinct category of RCRA wastes restricted under the LDRs (see Superfund LDR Guide #2).

(3) IS THE RCRA WASTE RESTRICTED UNDER THE LDRs?

If a site manager determines that a CERCLA waste is a RCRA hazardous waste, this waste also must be restricted for the LDRs to be an applicable requirement. A RCRA hazardous waste becomes a restricted waste on its HSWA statutory deadline or sooner if the Agency promulgates a standard before the deadline. Because the LDRs are being phased in over a period of time (see Highlight 4), site managers may need to determine what type-of-restriction is in effect at the time placement is to occur. For example, if the RCRA hazardous wastes at a site are currently under a national capacity extension when the CERCLA decision document is signed, site managers should evaluate whether the response action will be completed before the extension expires. If these wastes are disposed of in surface impoundments or landfills prior to the expiration of the extension, the receiving unit would have to meet minimum technology requirements, but the wastes would not have to be treated to meet the LDR treatment standards.

Highlight 4: LDR STATUTORY DEADLINES

Waste	**Statutory Deadline**
Spent Solvent and Dioxin-Containing Wastes	November 8, 1986
California List Wastes	July 8, 1987
First Third Wastes	August 8, 1988
Spent Solvent, Dioxin-Containing, and California List Soil and Debris From CERCLA/RCRA Corrective Actions	November 8, 1988
Second Third Wastes	June 8, 1989
Third Third Wastes	May 8, 1990

Newly Identified Wastes	Within 6 months of identification as a hazardous waste

APPLICABILITY DETERMINATIONS

If the site manager determines that the LDRs are applicable to the CERCLA, response based on the previous three questions, the site manager must: (1) comply with the LDR restriction in effect, (2) comply with the LDRs by choosing one of the LDR compliance options (e.g., Treatability Variance, No Migration Petition), or (3) invoke an ARAR waiver (available only for on-site actions). If the LDRs are determined not to be applicable, then, for on-site actions only, the site manager should determine if the LDRs are relevant and appropriate. The process for determining whether the LDRs are applicable to a CERCLA action is summarized in Highlight 5.

Highlight 5- DETERMINING WHEN LDRS ARE APPLICABLE REQUIREMENTS

Does placement occur → No → LDRs are not applicable
↓
yes
↓
Is the CERCLA waste a RCRA hazardous or California List waste? → No→ LDRs are not applicable: determine if they are relevant and appropriate (on-site response only)
↓
yes
↓
Is the RCRA hazardous waste restricted under the LDRs? →No → LDRs are not applicable
↓
yes
↓
LDRs are applicable requirements

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

October 9, 1990

SUBJECT: Replacement of Contaminated Soil and Debris Treated under a Treatability Variance

FROM: Sylvia K. Lowrance, Director
Office of Solid Waste

TO: David Ullrich, Acting Director
Waste Management Division, Region V

This memorandum is in response to your correspondence of April 25, 1990, in which you requested guidance in relation to six specific questions dealing generally with how the RCRA land disposal restrictions may affect certain remedial situations. We apologize for the delay in responding to your request; however, it was necessary for us to insure consensus at Headquarters in order to address the questions you have posed. We offer the following response to those six questions:

1. Q: Can soil and debris which has been treated in a tank within the area of contamination (AOC) in accordance with a treatability variance be replaced within the area of contamination without meeting any additional 40 CFR Part 264 requirements?

A: If contaminated soil and debris is treated to meet standards specified in a treatability variance that has been approved by the Agency, the treated soil/debris may then be placed in any treatment, storage or disposal unit that is in compliance with RCRA Subtitle C. This could include an "area of contamination" (i.e., a RCRA landfill) that has been designated by the Regional Administrator for the purpose of remediating the facility or site. Thus, as a regulatory matter, there would be no real distinction between soil/debris that is treated to the standard(s) set in the treatability variance and then placed in another unit, as opposed to "pure" hazardous wastes that are treated to the applicable Part 268 standards, and placed in another unit, except as discussed in the response to Question #5 (concerning contaminated media which no longer contains any waste).

By stating in your question that the treated wastes are to be redeposited into the AOC, we assume there is an implied question as to what design and operating

standards would then be applicable to the AOC itself. This is discussed in our response to question #6, below.

2. Q: Has the policy set forth on Page 5.12 of the document Implementing the Land Disposal Restrictions, October 1989, been revised?

A: This policy has not been revised. The policy states that once an owner/operator receives a treatability variance, completes treatment, and has a treatment residual to be land disposed, the residue can be directed to any permitted or interim status unit.

3. Q: For the purpose of land disposal, is the residue of soil treated under a treatability variance to be distinguished from the residue of waste treated according to treatment standards?

A: No. See response to Question 1, above.

4. Q: For the purpose of land disposal, is the residue of soil treated under a treatability variance in a tank within the area of contamination to be distinguished from the residue of soil treated under a treatability variance in a tank outside of the area of contamination?

A: No. The location of the tank in relation to the "area of contamination" would not create a distinction as to how or where the treatment residuals could be land disposed. This assumes, of course, that the wastes have been treated to the standards specified in the treatability variance. A tank cannot be considered a part of the AOC (landfill), regardless of where it is physically located; thus, its location would have no bearing on the standards that would apply to management of the contaminated soils (or other hazardous wastes, for that matter) after they have been treated in the tank.

5. Q: Is a treatability variance for soil and debris to be considered in effect a delisting? Do the principles of the "contained in" policy for the treatment of contaminated ground water have any applicability to the treatment of contaminated soil and debris?

A: A treatability variance for soil/debris does not have the effect of a delisting approved for the waste. The treated residuals typically will still contain hazardous wastes, and thus must be managed as such. In contrast, when wastes are delisted they are generally no longer subject to Subtitle C regulation.

The “contained in” policy applies to ground water and other contaminated media such as soil which are contaminated with listed hazardous wastes. Thus, if ground water or soil are treated such that concentrations of the listed wastes are at or below health based levels, the ground water or soil would no longer "contain" the hazardous wastes, and would therefore be no longer subject to Subtitle C regulation.

6. Q: If an AOC can be considered a RCRA unit for the purpose of closure, would an AOC ever be considered equivalent to a RCRA compliant unit for the purpose of disposal? (See page 6 of OSWER Directive 9234.2-04F5 RCRA ARARs: Focus on C1osure Requirements.)

A: As outlined in the cited ARARs manual, the AOC is a concept which can be applied in the context of remediation under CERCLA response actions or RCRA corrective actions. It is in many ways analogous to situations where two or more regulated surface impoundments would be treated as one unit in the context of closure of the impoundments.

When applied in the context of RCRA corrective actions or CERCLA remedial actions, the AOC concept would allow the Regional Administrator to designate a broadly contaminated contiguous area to be a RCRA "unit" (i.e., a landfill) for the purpose of' implementing the remedy. In an existing landfill, the movement or consolidation of hazardous wastes within the designated area would not by itself trigger Subtitle C requirements (including the land disposal restrictions and the RCRA minimum technology requirements) since that movement or consolidation does not constitute "disposal'" for Subtitle C purposes. If, however, wastes are excavated from the designated area, treated in another unit, and subsequently redeposited into the same area or unit, disposal has occurred, and the landfill would have to comply with applicable Part 264 or 265 requirements, including the LDRs, MTRs, closure standards (264.310), and the ground water monitoring requirements of Subpart F, Part 264 or 265.

The proposed Subpart S corrective action rule explains the AOC (described therein as the '"corrective action management unit") concept in more detail. However, if you have more specific questions or issues regarding AOCs, we will be glad to work with you or your staff to resolve them.

If there are any questions on the above responses to your questions, please contact Dave Fagan (FTS 382-4497) or Judy Goldberg (FTS 382-4534).

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

January 7, 1991

Richard G. Stoll
Freedman, Levy, Kroll & Simonds
1050 Connecticut Ave. N.W.
Washington, D.C. 20036-5366

Dear Mr. Stoll,

This letter is in response to your inquiry dated August 22, 1990 concerning the applicability of EPA's "Superfund LDR Guides." As you asserted, those interpretations of RCRA were found in the 1990 NCP and other CERCLA documents, but you asked whether those interpretations apply at all sites, regardless of whether the cleanup activity is being conducted under federal CERCLA authorities.

The preamble to the 1990 NCP represents an official Agency-side position concerning the interpretation of RCRA and other statutes relevant to federally-mandated CERCLA cleanups (see 53 FR 51394, 51443-45 (December 21, 1988) and 55 FR 8666, 8758-62 (March 8, 1990)). The LDR Guides implement these interpretations in more detail. These interpretation of RCRA would apply at Superfund sties and at non-Superfund sites. Therefore, in general, the answer to your question about the applicability of the LDR Guides and NCP interpretations is that they apply wherever the cleanup involves a RCRA waste. However, it is conceivable that some of the interpretations of RCRA developed to apply to federal CERCLA sites may not exactly match non-CERCLA circumstances because of different statutory constraints or authorities. With that caveat, let me address the specific issues and questions raised in your letter.

First, you comments focus on the interpretations of Area of Contamination (AOC), "placement," and the presumption of entitlement to treatability variances for contaminated soil and debris. Your principal concern focused on whether the interpretations offered of these issues in the NCP and LDR Guides apply at all sites. The answer is yes.

Second, you also questioned whether the NCP interpretations and the LDR Guides noted above apply equally where a "party may want to move or treat contaminated soil and debris as part of a RCRA corrective action, as part of a cleanup carried out under State law, and/or as part of a voluntary cleanup." The answer is yes.

Third, you asked whether in situ treatment is not "placement" at a CERCLA site is also not placement at a non-CERCLA site (site A in your letter). The answer is yes.

Fourth, you question whether excavation and movement of contaminated soil within a certain area would be "placement" at a non-CERCLA site (site B), since you interpret it not to be placement at a CERCLA site. The limited facts given in that question do not allow us to unambiguously state whether there is "placement" at either site, although as a general rule the AOC concept is operable at RCRA corrective action sites. It should be noted, however, that designation of an AOC is a function performed by the regulating agency.

Fifth, you asked whether the presumption in favor of treatability variances and definition of appropriate alternative treatment would be the same for a non-CERLCA site (site C). The answer is that any presumption in favor of a treatability variance would be the same whether the site is a RCRA site or a federal or private party CERCLA site.

I hope that this response meets your needs. If you need additional information or clarification, please contact Steve Golian at (703) 308-8360

Sincerely,

Don R. Clay
Assistant Administrator

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

June 11, 1992

Mr. Douglas H. Green
Piper & Marbury
1200 Nineteenth Street, N.W.
Washington, D.C 20036-2430

Dear Mr. Green:

Thank you for your letter of April 30, 1992, requesting clarification of the Environmental Protection Agency's (EPA's) interpretation of the applicability of certain Resource Conservation and Recovery Act (RCRA) requirements to common excavation-type activities.

The particular situation which you presented in your letter involves excavation of soils, such as trenching operations for pipeline installation, where the soils may be hazardous by characteristic, or may contain listed hazardous wastes. We understand that your questions specifically relate to excavations being conducted on public roadways or at other similar locations that are not necessary associated with or are part of a RCRA-regulated treatment, storage, or disposal facility.

In the example which you sited in your letter, the soils from the excavation or construction activities are temporarily moved within the area of contamination, and subsequently redeposited into the same excavation area. In these situations, we agree that such activity does not constitute treatment, storage, or disposal of a hazardous waste under RCRA. The activity placing waste in the ground would not normally meet the regulatory definitions of "treatment" or "storage" (40 CFR 260.10). In addition, as you noted in your letter, movement of wastes within an area of contamination does not constitute "land disposal" and thus does not trigger RCRA hazardous waste disposal requirements (55 FR 8666, March 8, 1990). Thus, RCRA requirements such as land disposal restrictions would not apply.

With respect to generator requirements, as you indicated, a hazardous waste "generator" is one, by site, who produces a hazardous waste or first causes the waste to be regulated as hazardous (40 CFR 260.10). In the circumstances you described, the excavation does not "produce" the hazardous waste, nor does it subject the waste to hazardous waste regulation since, as discussed above, the activity you describe is not "treatment," "storage," or "land disposal" of hazardous waste. Therefore, we agree that the activity is not subject to any generator requirements.

Please let me know if you have any further questions regarding this issue.

Sincerely yours,

Sylvia K. Lowrance, Director
Office of Solid Waste

EPA August 1992

Use of the Corrective Action Management Unit Concept

BACKGROUND

Beginning in 1992, EPA began implementing a new strategy to increase the pace of cleanup and to achieve positive environmental results at RCRA treatment, storage and disposal facilities (TSDFs) requiring corrective action. While comprehensive facility cleanup is still the long-term goal for the RCRA Corrective Action Program, this new initiative emphasizes the importance of stabilizing sites by controlling releases and preventing the further spread f contaminants.

At most RCRA facilities, stabilization or final remedial actions will involve excavation and on-site management of contaminated soils, sludges and other wastes that are subject to the RCRA Subtitle C hazardous waste regulations. In these situations, a number of issues can arise regarding the applicability of certain RCRA requirements, and how these requirements may affect the remedial activities. Specifically, experience in the RCRA and CERCLA remedial programs has shown that the RCRA land disposal restrictions (LDRs) and minimum technology requirements (MTRs) may limit the types of remedial options available at sites, as well as affect the types of specific technologies that may be used, the volumes of materials that are managed, and other features of remedies under consideration.

Recognizing that strict application of these RCRA requirements may limit or constrain desirable remedies, including stabilization programs, EPA is developing an important regulatory concept, known as the Corrective Action Management Unit (CAMU), to facilitate effective and protective remedial actions. This concept, first discussed in the proposed Subpart S corrective action regulations (55FR 307898, July 27, 1990), is similar to the Superfund concept of the "area of contamination," in which broad areas of contamination, often including specific subunits, are considered to be a single land disposal unit for remedial purposes.

CAMUs may be particularly useful for specific remedial activities such as consolidation of units or contaminated surficial soils. For example, a group of unlined inactive lagoons that are continuing sources of releases to groundwater may be best remediated by removing and treating the concentrated wastes in another unit, and excavating the remaining low-concentration contaminated soils from underneath the lagoons. These soils could then be consolidated and placed into a protective and cost-effective single-capped unit, thereby controlling further releases to groundwater. In other situations site remediations will require excavation of large quantities of relatively low-level contaminated surficial soils. In these cases a protective and cost-effective remedy might be to excavate the soils and consolidate them into a single area or engineered unit within the area of contamination. For both of these examples, application of LDRs and possibly MTR requirements would result in a more costly and complex remedy, that may delay remediation and result in little additional environmental protection for the site.

As proposed in the Subpart S rule, there may be certain types of situations in which application of the CAMU concept (55 FR 30842) would be inappropriate. In addition, several factors (55 FR

30883) may be considered by decision-makers in determining how CAMUs would actually be designated at sites. Although owner/operators may propose a specific area as a CAMU, it is the responsibility of EPA or the authorized State to determine whether a CAMU is necessary and appropriate, and, if so, to determine the boundaries of the unit.

The Subpart S regulations have not yet been finalized. However, although the CAMU concept has been presented only in proposed regulations, existing regulatory authority may be used to implement this type of approach in site remediations and stabilization actions. The Agency's experience with the RCRA and CERCLA remedial programs indicates that the CAMU concept could be applied immediately to great advantage at a significant number of RCRA cleanup sites. This guidance is presented to clarify the use of the CAMU concept prior to final regulations.

USE OF LANDFIL DESIGNATION FOR REMEDIAL PURPOSES

Specifically, certain contaminated areas at sites that require remediation, including groups of units in such areas, may be designated as a "landfill" under the current RCRA landfill definition (40 CFR 260.10). Designating such an area of a facility as a landfill within the existing regulatory framework can achieve remedial benefits similar to those that would be obtained by using CAMUs under the Subpart S proposal. Prior to the promulgation of final CAMU rules, EPA encourages the use of this approach at contaminated sites, where it can promote effective and expeditious remedial solutions. EPA recommends that decisions on designating certain contaminated areas or groups of units as a landfill be made in accordance with applicable regulations and generally in accordance with the CAMU provisions in the Subpart S proposal.

Owner/operators proposing to address certain areas at a facility as a single landfill for remedial purposes should request approval from EPA or the authorized State agency. The Regional Administrator or the authorized State Director will be the ultimate decision-maker as to whether such a landfill unit will help achieve the remedial objectives at the facility. EPA recommends decisions to use existing authorities, waivers, or variances to achieve many of the same objectives as the proposed Subpart S rule CAMU provisions should generally follow the proposed regulatory provisions (55 FR 30883) and the preamble discussion (55 FR 30842) in defining the boundaries of the remedial unit. The Region or authorized State may also look to Superfund guidance in the designation of AOCs (55 FR 8758-8760).

Designating an area of contamination as a "landfill" will require that the unit comply with certain RCRA requirements that are applicable to landfills. The specific requirements that apply will differ, depending on whether the landfill is considered to be: (1) an existing non-regulated landfill, or (2) a regulated hazardous waste landfill. This distinction is determined by the regulatory status of the units or areas that are included as part of the landfill. The following discussion explains further the requirements associated with these two types of landfills.

Existing Non-Regulated Landfills

Figure 1 shows an area of contamination at a facility that includes several land-based solid waste management units (SWMUs) that are not regulated as hazardous waste units under RCRA (e.g., because all of the disposal occurred before the RCRA hazardous waste regulations went into effect.) By designating this area as a single landfill, EPA can approve movement and consolidation of hazardous wastes and soils contaminated with hazardous waste within the unit boundary, without triggering the LDRs or MTRs. For example, contaminated soils in and around SWMUs 1 and 2 could be consolidated into SWMU 3 and capped without triggering LDR requirements.

This landfill would not be subject to the RCRA Part 264 or Part 265 design and operating requirements for hazardous waste landfills. This is because the landfill would not have received hazardous waste after November 19, 1980. (See 40 CFR 270.1 (c)). In the absence of specific Part 264 or 265 requirements for such units, appropriate ground water monitoring and closure requirements for the landfill can be determined by EPA or the State as part of the corrective action remedial decision-making process. These requirements would be based on an assessment of site specific factors, such as waste characteristics, site hydrogeology, exposure potential, and other factors. This allows the regulator further flexibility in designing remedial solutions which are effective and protective based on actual site conditions.

These non-regulated landfills would remain exempt from regulation under Parts 264 and 265, under the following circumstances:

- The landfill cannot receive hazardous waste from other units, either on-site or off-site. The landfill could, however, receive non-hazardous wastes as part of the cleanup actions. If it were to receive hazardous waste, the landfill would become a regulated unit (40 CFR 270.1(c)) subject to the requirements of Subparts F (40 CFR 264.90) and G (40 CFR 264.110). The facility permit would have to be modified accordingly (for interim status facilities, a change would have to be approved under 40 CFR 270.72), and the wastes would have to be treated to comply with applicable LDR standards prior to placement in the landfill.

- If hazardous waste treatment (including in-situ treatment) takes place within the landfill, the owner/operator must comply with all Part 264 and 265 requirements applicable to the treatment unit, and must modify the permit or Part A to include the new treatment unit.

- Similarly, residuals from treatment of hazardous wastes that have been removed from the landfill and treated in a non-land-based unit cannot be redeposited into the landfill unless the residuals meet the LDRs. If the residuals were still hazardous by characteristic or still contained hazardous wastes, disposal of the residuals into the landfill would require the landfill to be designated a “regulated unit,” as the unit would have received hazardous waste after July 26, 1982.

- Hazardous wastes transferred from the non-regulated landfill to another land-based unit would also have to meet LDR standards.

Regulated Landfills

Figure 2 shows an area of contamination that could be designated as a landfill, which contains two regulated units (as defined in 40 CFR 264,90). As with the previous example in Figure 1, designating this area as a landfill would allow wastes to be moved and consolidated within the area without triggering the LDRs. However, because this landfill contains regulated units, the entire area must be considered a regulated unit. Accordingly, the following requirements would apply:

- The unit boundaries of the original regulated units that were specified on the Part A or Part B application would have to be redesignated to encompass the entire new landfill unit, according to the applicable procedures in 40 CFR 270.72, 270.41, or 270.42.

- The landfill would have to comply with applicable Part 264 or 265 requirements for landfills, including the Subpart F ground water monitoring requirements and Subpart G closure and post-closure requirements. Subpart F requirements would generally involve installation of additional ground water monitoring wells. Compliance with Subpart G would likely also require modifications to the closure and post-closure plans for the unit.

MTRs would not necessarily apply to these newly designated regulated landfills. If the original regulated unit located within the landfill was not subject to the MTRs (i.e., the landfill was not new or expanding after 1984), the landfill could be considered by the Agency or authorized State to be a redesignation of that existing unit, rather than a lateral expansion. As such, the landfill would not be subject to the MTRs. However, if the regulated unit encompassed by the landfill was originally subject to MTRs, the entire area of the landfill would be subject to MTRs.

SUMMARY

Existing regulatory standards (e.g., replacement of treatment residuals into the CAMU triggers the LDRs) cannot be waived to implement the CAMU concept prior to a final CAMU rulemaking, EPA is considering removing some of these limitations in the final rule. Nonetheless despite these current limitations, there may be a number of situations where the use of landfills can yield substantial benefits in remediating sites. EPA recommends that the guidance provided in this fact sheet be used in evaluating the use of landfills to implement timely and protective corrective actions at RCRA facilities.

FOR FURTHER INFORMATION

Inquiries concerning the guidance contained in this fact sheet should be directed to Dave Fagan (202) 260-4497, or Anne Price (202) 260-6725.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

August 31, 1992

MEMORANDUM

SUBJECT: Use of the Corrective Action Management Unit (CAMU) Concept

To: Waste Management Division Directors, Regions I-X
RCRA Branch Chiefs, Regions I-X
RCRA Regional Counsel, Regions I-X

FROM: Sylvia Lowrance, Director
Office of Solid Waste

Bruce Diamond, Director
Office of Waste Programs Enforcement

At the February 1992 Stabilization Conference in Colorado Springs we discussed the possibility of implementing the corrective action management unit (CAMU) concept before the final promulgation of the Subpart S regulations. At that time OSWER made a commitment to provide further guidance to the Regions on how to use existing RCRA regulations to achieve some of the remedial benefits of the CAMU. The attached document, "Use of the Corrective Action Management Unit Concept," provides that guidance.

The CAMU portion of Subpart S is on a current schedule to be finalized by December 1992. The attached guidance, which was developed jointly by OSWER and OGC, clarifies the Agency's legal authority for utilizing a CAMU-like approach before the CAMU rule is finalized, and provides guidance on when and how to use the concept. The concept can be applied during final remedies, and in the implementation of stabilization actions to reduce imminent threats and contain releases. We encourage the use of this concept whenever the success of the remedial option at a particular facility will be enhanced.

If you have any questions regarding the content of this guidance, please call Dave Fagan at (202) 260-4497.

Revised Tank 815 Release Response Report

AMEC, 2016

June 16, 2016

Mr. Scott Denton
Dr. Robert Combs
HollyFrontier Navajo Refining LLC
501 East Main Street
Artesia, New Mexico 88210

Revised Tank 815 Release Response Report

Dear Scott and Robert:

Amec Foster Wheeler has prepared this release response report to describe activities that have occurred to address a reported release of diesel from the Tank 815 water draw sump at the Navajo Refining Company, LLC (NRC) refinery located in Artesia, New Mexico (Figure 1). This letter documents the release response and remedial actions associated with the April 16, 2015 release.

Release

On April 16, 2015, an overflow of a water and diesel mixture from the water draw sump at Tank 815 was observed. The water draw valve was immediately closed upon discovery of the overflow, and a vacuum truck was used to recover free liquids from the area. Approximately 30 barrels of free liquid was recovered from the release area and the sump and was returned to the crude process. The exact volume of liquids released from the sump is unknown, but was reported as greater than 25 barrels based on the volume of liquid recovered.

Notification

Sections 1.5.13, 3.2.3.a.g, and 4.7.4 of the Post-Closure Care Permit (PCC Permit) issued by the New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB) require notification of a release. Section 1.5.13 requires verbal notification within 24 hours in the event that a release may endanger public drinking water supplies or could threaten the environment or human health outside the refinery, and requires written notification within five calendar days. Section 3.2.3.a.g specifically requires notification within 24 hours of a release from Tank 815. Section 4.7.4 requires notification of a new release from an existing solid waste management unit (SWMU) be reported within 15 days. Tank 815 is located within the North Colony Landfarm (NCL) which is listed as SWMU 6 in the PCC Permit (Figure 2).

Section 2.D.1 of the Discharge Permit GW-028 issued by the New Mexico Energy, Minerals and Natural Resources Department Oil Conservation Division (OCD) for the refinery requires oral notification of a release within twenty-four hours. Section 2.D.2 of the Discharge Permit requires written notification within one week of the identification of a release.

NRC personnel verbally reported the release to the NMED HWB and the OCD on April 16, 2015. Written notification was provided to both agencies on April 21, 2015 using an initial C-141 report. A copy of the initial C-141 report is provided in Attachment A. Thus, the initial reporting requirements of both the PCC Permit and the Discharge Permit have been met.

Remedial Actions

The internal Incident Report for the April 16, 2015, overflow event states that, following a daily water draw, the single valve at the end of the Tank 815 drain line did not shut off completely, resulting in leakage and overfilling the sump box. The investigation revealed that during the daily draws, the operator opens and closes the valve manually, and sometimes has difficulty doing so. In this case, the valve was manually closed after the tank was drained, but it failed to seal properly and leaked into the sump overnight. Upon discovery of the overflow the following morning, a valve wrench was used to fully close the leaking valve.

A work order and Management of Change documentation are underway to install a second valve at the end of the drain line to protect against liquid losses from the main shutoff valve. In addition, the draw procedure has been changed from a daily to weekly frequency and is only conducted with a vacuum truck present. Operators will also be required to use a valve wrench on the primary valve to ensure that it is closed and tightly sealed upon completion of the drain event. Following the weekly draw, the operators will also be required to inspect the valve assembly and sump to ensure that there is no additional drain water.

NRC's initial response to the discovery of the release was to immediately remove the source of contamination (the liquids, of which 30 barrels were removed by vacuum truck), followed by source removal of impacted soils, which were visibly outlined on the ground. In order to maintain appropriate cover for the NCL, the saturated soil in the vicinity of the release was excavated and was placed into three covered, lined rolloff containers. Soil was excavated to a depth of no more than 12 inches below the ground surface. The depth of the excavation was intended to promptly capture the majority of visibly saturated soil and to avoid intrusion into the historically land-applied hazardous waste. Soil was removed to a depth necessary (not more than 12") to remove visibly saturated soil, and was therefore not uniform across the entire release area. Once the excavation was completed, the area was backfilled with clean soil from an off-site source and graded to match the surrounding area. This soil work focused upon excavation and characterization of the excavated soil in order to meet any temporary accumulation deadline.

Figure 3 shows the extent of the affected area. The approximate dimensions are 35 feet wide by 140 feet long. The quantity of contaminated soil removed for off-site disposal, according to the manifests, was approximately 56,340 pounds. As noted in NRC's letter to NMED dated July 23, 2015, the volume manifested was approximately 36 cubic yards. The soil was not characteristically hazardous, but was RCRA-manifested under the waste codes K048, K049, K051, and K052 (the wastes historically treated at the NCL). Photographs from before and after the excavation was performed are provided in Attachment B.

Amec Foster Wheeler Environment & Infrastructure, Inc.
585 N. Dairy Ashford Road
Houston, TX 77079
Phone: 713.570.8314
Fax: 713.570.8606

Waste Characterization and Disposal

One representative composite sample of the excavated soil was collected from each of the rolloff containers and analyzed for constituents of concern. The analytical results from each of the three samples were compared to the concentrations used to define a waste as characteristically hazardous under the Toxicity Characteristic. The analytical results were also compared to the land disposal restriction treatment standards for the listed wastes that were historically treated within the NCL and to the alternative standards for soils containing those listed wastes. Table 1 provides the waste characterization analytical results and the standards used for these comparisons.

NRC requested an extension from NMED HWB for the 90-day storage period for the soils placed in the rolloffs on July 15, 2015. At that time, the characterization of the soils was still being evaluated and the soil was considered potentially a hazardous waste. NMED HWB granted a one-time 30-day extension for the stored soils while the characterization was evaluated. Copies of the letters are provided in Attachment C.

On July 23, 2015, NRC submitted a letter to the NMED HWB stating that the excavated soil would be disposed of at an authorized Resource Conservation and Recovery Act (RCRA) Subtitle C treatment, storage, and disposal facility (TSDF) as a conservative measure. However, because the samples indicated that the soil is not characteristically hazardous and all of the sample concentrations were below the land disposal restrictions for soils, NRC requested that the soils in the rolloffs be designated as non-hazardous under a “no longer contained-in” determination. The NMED HWB denied the request in a response letter dated August 4, 2015. Copies of the letters are provided in Attachment C.

The three rolloffs of excavated soil were transported to U.S. Ecology, Inc. in Robstown, Texas on August 14, 2015. A copy of the completed hazardous waste manifests documenting the disposal of the excavated soils as hazardous waste are provided in Attachment D.

Conclusion

The remedial response to the April 16, 2015 release of a water and diesel mixture from the water draw sump for Tank 815 has been completed. Saturated soil was excavated from the release area and disposed of off-site at an approved TSDF. The excavated area was backfilled with clean soil and graded to match the surrounding areas of the NCL. No further remedial actions are recommended at this time. A final C-141 report should be filed with both the NMED HWB and the OCD.

Should you have any questions or comments, please feel free to contact me at 713.929.5674.

Sincerely,

Pamela R. Krueger
Senior Associate
Amec Foster Wheeler Environment & Infrastructure, Inc.
585 N. Dairy Ashford Road
Houston, TX 77079
Phone: 713.570.8314
Fax: 713.570.8606

Enclosures:
Table
Figures
Attachment A: Initial C-141
Attachment B: Photographs
Attachment C: Correspondence
Attachment D: Waste Manifests

Amec Foster Wheeler Environment & Infrastructure, Inc.
585 N. Dairy Ashford Road
Houston, TX 77079
Phone: 713.570.8314
Fax: 713.570.8606

Tables

Table 1 - Waste Soil Characterization Analytical Results
Tank 815
Navajo Refining Company, Artesia, New Mexico

Analyte	Toxicity Characteristic Limit (mg/L)	Hazardous Waste Treatment Standards (mg/kg)				Alternative Treatment Standards for Soils (mg/kg)				Analytical Results		
		K048	K049	K051	K052	K048	K049	K051	K052	S. Bro 25	S. Bro 53	S. Bro 49
Semivolatile Organic Compounds (mg/kg)												
2,4-Dimethylphenol	--	--	NA	--	NA	--	NA	--	NA	<18.5	<3.81	<38.1
Acenaphthene	--	--	--	NA	--	--	--	NA	--	1.25 J	0.168 J	0.845 J
Anthracene	--	--	3.4	3.4	--	--	34	34	--	0.552 J	0.262 J	1.35 J
Benz(a)anthracene	--	--	--	3.4	3.4	--	--	34	34	0.246 J	0.634	2.63 J
Benzo(a)pyrene	--	3.4	3.4	3.4	--	34	34	34	--	<1.83	0.488 J	2.13 J
bis(2-Ethylhexyl) phthalate	--	28	28	28	--	280	280	280	--	<18.5	<3.81	<38.1
Carbon disulfide	--	--	NA	--	--	--	NA	--	--	not analyzed	not analyzed	not analyzed
Chrysene	--	3.4	3.4	3.4	--	34	34	34	--	0.395 J	0.662	6.86
Di-n-butyl phthalate	--	28	--	28	--	280	--	280	--	<18.5	<3.81	<38.1
Fluorene	--	NA	--	NA	--	NA	--	NA	--	2.2	0.290 J	0.994 J
m-Cresol (3-methylphenol)	--	--	--	--	5.6	--	--	--	56	<18.5	<3.81	<38.1
Naphthalene	--	5.6	5.6	5.6	5.6	56	56	56	56	2.03	0.160 J	<3.77
o-Cresol (2-methylphenol)	--	--	--	--	5.6	--	--	--	56	<18.5	<3.81	<38.1
p-Cresol (4-methylphenol)	--	--	--	--	5.6	--	--	--	56	<18.5	<3.81	<38.1
Phenanthrene	--	5.6	5.6	5.6	5.6	56	56	56	56	0.996 J	0.896	3.87
Phenol	--	6.2	6.2	6.2	6.2	62	62	62	62	<18.5	<3.81	<38.1
Pyrene	--	8.2	8.2	8.2	--	82	82	82	--	1.82 J	1.59	10.4
TCLP Volatile Organic Compounds (mg/L)												
1,1-Dichloroethene	0.7	--	--	--	--	--	--	--	--	<0.050	<0.050	<0.050
1,2-Dichloroethane	0.5	--	--	--	--	--	--	--	--	<0.050	<0.050	<0.050
2-Butanone	200	--	--	--	--	--	--	--	--	<0.50	<0.50	<0.50
Benzene	0.5	--	--	--	--	--	--	--	--	<0.050	<0.050	<0.050
Carbon tetrachloride	0.5	--	--	--	--	--	--	--	--	<0.050	<0.050	<0.050
Chlorobenzene	100	--	--	--	--	--	--	--	--	<0.050	<0.050	<0.050
Chloroform	6	--	--	--	--	--	--	--	--	<0.25	<0.25	<0.25
Tetrachloroethene	0.7	--	--	--	--	--	--	--	--	<0.050	<0.050	<0.050
Trichloroethene	0.5	--	--	--	--	--	--	--	--	<0.050	<0.050	<0.050
Vinyl Chloride	0.2	--	--	--	--	--	--	--	--	<0.050	<0.050	<0.050
TCLP Semivolatile Organic Compounds (mg/L)												
1,4-Dichlorobenzene	7.5	--	--	--	--	--	--	--	--	<0.10	<0.10	<0.10
2,4,5-Trichlorophenol	400	--	--	--	--	--	--	--	--	<0.10	<0.10	<0.10
2,4,6-Trichlorophenol	2	--	--	--	--	--	--	--	--	<0.10	<0.10	<0.10
2,4-Dinitrotoluene	0.13	--	--	--	--	--	--	--	--	<0.10	<0.10	<0.10
Cresols, Total	200	--	--	--	--	--	--	--	--	<0.20	<0.20	<0.20
Hexachlorobenzene	0.13	--	--	--	--	--	--	--	--	<0.10	<0.10	<0.10
Hexachlorobutadiene	0.5	--	--	--	--	--	--	--	--	<0.10	<0.10	<0.10
Hexachloroethane	3	--	--	--	--	--	--	--	--	<0.10	<0.10	<0.10
Nitrobenzene	2	--	--	--	--	--	--	--	--	<0.10	<0.10	<0.10
Pentachlorophenol	100	--	--	--	--	--	--	--	--	<0.10	<0.10	<0.10
Pyridine	5	--	--	--	--	--	--	--	--	<0.10	<0.10	<0.10

Table 1 - Waste Soil Characterization Analytical Results
Tank 815
Navajo Refining Company, Artesia, New Mexico

Analyte	Toxicity Characteristic Limit (mg/L)	Hazardous Waste Treatment Standards (mg/kg)				Alternative Treatment Standards for Soils (mg/kg)				Analytical Results		
		K048	K049	K051	K052	K048	K049	K051	K052	S. Bro 25	S. Bro 53	S. Bro 49
TCLP Metals (mg/L)												
Arsenic	5	--	--	--	--	--	--	--	--	<0.450	<0.450	<0.450
Barium	100	--	--	--	--	--	--	--	--	<1.40	<1.40	<1.40
Cadmium	1	--	--	--	--	--	--	--	--	<0.450	<0.450	<0.450
Chromium	5	0.6	0.6	0.6	0.6	6	6	6	6	<0.450	<0.450	<0.450
Lead	5	--	--	--	--	--	--	--	--	<0.450	<0.450	<0.450
Mercury	0.2	--	--	--	--	--	--	--	--	<0.0100	<0.0100	<0.0100
Nickel	--	11	11	11	11	110	110	110	110	<0.450	<0.450	<0.450
Selenium	1	--	--	--	--	--	--	--	--	<0.450	<0.450	<0.450
Silver	5	--	--	--	--	--	--	--	--	<0.450	<0.450	<0.450
Total Metals (mg/kg)												
Total Lead	--	NA	NA	NA	NA	NA	NA	NA	NA	20.9	13.1	40.2
Total Petroleum Hydrocarbons (mg/kg)												
Diesel Range Organics	--	--	--	--	--	--	--	--	--	30,000	5,260	9,610

Notes and Abbreviations:

-- Analyte is not listed as characteristically hazardous or as an analyte associated with the listed waste.

< x = Sample result was not detected with reporting limit value of x.

B = The indicated compound was found in the associated method blank as well as the laboratory samples.

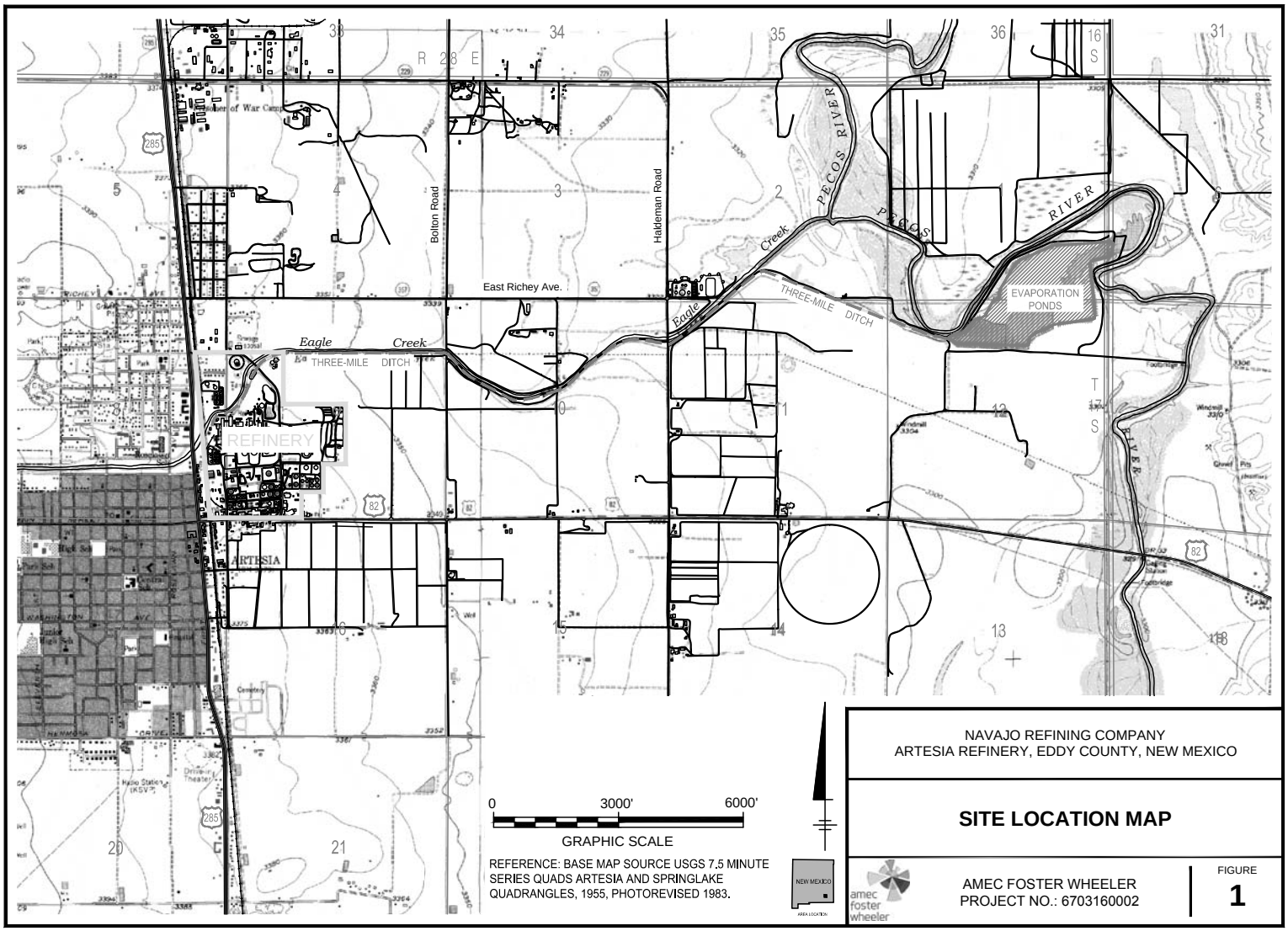
J = Estimated value below the lowest calibration point.

mg/kg = milligrams per kilogram

mg/L = milligrams per liter

NA = Analyte .identified in 40 CFR 268.40 as associated with the waste code, but standard listed as "not applicable for non-wastewater forms"

Figures



NAVAJO REFINING COMPANY
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

SITE LOCATION MAP

amec foster wheeler

AMEC FOSTER WHEELER
PROJECT NO.: 6703160002

FIGURE
1



Legend

- AOC OR SWMU ADDED IN 2010 PERMIT MODIFICATION
- AOC OR SWMU LISTED IN 2003 PERMIT

NOTES:
AOC - Area of Concern
SWMU - Solid Waste Management Unit
DAF - Dissolved Air Flotation
API - American Petroleum Institute
CBO - Carbon Black Oil
LPG - Liquefied Petroleum Gas
AOCs and SWMUs not shown in figure include:
- Three Mile Ditch, Evaporation Pond 1 (SWMU 7)
- Evaporation Ponds 2, 3, 5, 6 (SWMU 1)
- Wastewater Collection System (AOC 12)
- Above and Underground Piping (AOC 15)

0 250 500 750 1,000
SCALE IN FEET

NAVAJO REFINING COMPANY
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

AOC AND SWMU LOCATIONS

AMEC FOSTER WHEELER
PROJECT NO.: 6703160002

FIGURE
2



LEGEND

NORTH COLONY LANDFARM (NCL) AREA

APRIL 2015 RELEASE EXTENT

0 25 50 100 150 200

SCALE IN FEET

N

NAVAJO REFINING COMPANY
ARTESIA REFINERY, EDDY COUNTY, NEW MEXICO

TANK 815 RELEASE EXTENT

AMEC FOSTER WHEELER
PROJECT NO.: 6703160002

Attachment A
Initial C-141 Form

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	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County

Latitude_Longitude 32.852260 ° / -104.395653 °

NATURE OF RELEASE

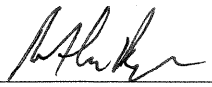
Type of Release: finished diesel/water	Volume of Release: > 25 bbls	Volume Recovered: 30 bbls
Source of Release: water draw/sump at T-815	Date and Hour of Occurrence: 04/16/15, Unknown time	Date and Hour of Discovery: 04/16/15 6:30 am
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	If YES, To Whom? NM Oil Conservation Division Santa Fe– Left message to Carl Chavez NMED Hazardous Waste Bureau – Left message to Leona Tsinnajinnie	
By Whom? R. Combs	Date and Hour 04/16/15 ~13:00 - 15:00	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse. N/A	

If a Watercourse was Impacted, Describe Fully.*
N/A

Describe Cause of Problem and Remedial Action Taken.* The water collection sump from T-815 overflowed during routine dewatering of the tank. The water draw valve had a small leak that continued to slowly fill the sump. The valve was immediately tightened upon discovery to stop the leak and a vacuum truck was sent to recover any free liquids. The recovered liquids were returned to the crude process.

Describe Area Affected and Cleanup Action Taken.*
Pooled liquids were removed by vacuum truck and absorbent pads were used to remove remaining hydrocarbons. Stained or saturated soil was removed to a depth of up to 12 inches and was placed into three covered, lined roll-off containers. The excavated area was backfilled with clean soil from an off-site source and graded to match the surrounding area. Representative samples were collected from each roll-off container for waste characterization. Following receipt of the waste characterization analytical data, the three roll-off bins were transported to U.S. Ecology, Inc. in Robstown, Texas, and disposed as hazardous waste. Further corrective actions to prevent future releases include the addition of a second block valve on the dewatering line and a modified procedure for dewatering the tank.

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 ☐
Date: 6/16/16 Phone: 575-746-5382		

* Attach Additional Sheets If Necessary

Attachment B
Photographs



Photo 1: View of extent of release to north of the water draw sump. View is to the northwest, April 17, 2015.



Photo 2: View of extent of release to south of the water draw sump. View is to the south, April 17, 2015.



Photo 3: View of piping south of water draw sump. View is to the west, April 17, 2015.

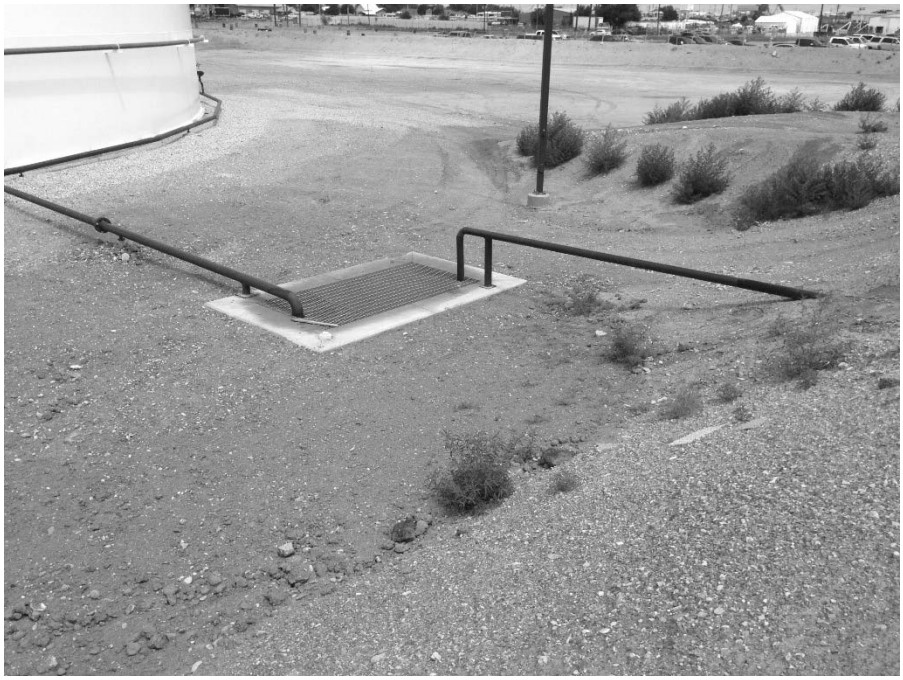


Photo 4: View of area surrounding water draw sump after excavation and backfill. View is to the northwest, June 24, 2015.



Photo 5: View of piping south of water draw sump after excavation and backfill. View is to the west, June 24, 2015.



Photo x: View of southeastern corner of NCL, south of the water draw sump, after excavation and backfill. View is to the south-southwest, June 24, 2015.

Attachment C
Correspondence

HOLLYFRONTIER.

July 15, 2015

Mr. John Kieling
Chief, Hazardous Waste Bureau
New Mexico Environmental Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505

Certified Mail/Return Receipt
7015 0640 0006 9944 5680

RE: Extension Request for 90-day Storage Period
Navajo Refining Company, L.L.C., Artesia Refinery
RCRA Permit No. NMD048918817

Dear Mr. Kieling:

Navajo Refining Company (NRC) reported an overflow of a water/diesel mixture from the sump located adjacent to Tank 815 within the North Colony Landfarm (NCL) to the New Mexico Environment Department (NMED) on April 16, 2015, as required by the Resource Conservation and Recovery Act (RCRA) Post-Closure Care Permit (Permit). The release was also reported to the New Mexico Energy, Minerals & Natural Resources Department Oil Conservation Division (OCD), as required by NRC's discharge permit (GW-028). The release occurred during a routine water draw from the bottom of the tank, and affected a portion of the southeast quadrant of the Tank 815 containment area.

In order to maintain appropriate cover for the NCL, the stained and saturated soil in the vicinity of the release was excavated and was placed into three covered, lined roll-off containers. Representative samples of the soil were collected from each roll-off bin and analytical data will be used to characterize the soil, for which NRC intends to request a "no longer contained-in" determination from NMED. The excavation was backfilled with clean soil to maintain the cover of the NCL. The excavated soils were containerized beginning on April 17, 2015 and, thus, the 90-day maximum temporary storage period for potentially hazardous soils is imminent.

NRC respectfully requests NMED's immediate approval of a 90-day accumulation period extension, allowed by 40 CFR 262.34 (b), as incorporated by references at NMAC 20.4.1.300. We believe that this one-time extension will provide adequate time for NMED's review and action on our "no longer contained-in" determination for the excavated soils.

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
Navajo Refining Company, L.L.C.

c: Robert Combs, NRC
Micki Schultz, NRC

NEW MEXICO
ENVIRONMENT DEPARTMENT

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Phone (505) 476-6000 Fax (505) 476-6030
www.env.nm.gov

SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

RYAN FLYNN
Cabinet Secretary
BUTCH TONGATE
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

July 16, 2015

Scott M. Denton
Environmental Manager
Navajo Refining Company, L.L.C.
P.O. Box 159
Artesia, New Mexico 88211-0159

RE: APPROVAL
EXTENSION REQUEST FOR 90-DAY STORAGE PERIOD
NAVAJO REFINING COMPANY, L.L.C. - ARTESIA REFINERY
EPA ID NO. NMD048918817
HWB-NRC-MISC

Dear Mr. Denton:

The New Mexico Environment Department (NMED) has received the Navajo Refining Company, L.L.C., Artesia Refinery's (the Permittee) *Extension Request for 90-Day Storage Period* (letter) dated July 15, 2015. On April 16, 2015, the Permittee reported an overflow of water/diesel mixture from the sump located adjacent to Tank 815 within the North Colony Landfarm (NCL), a hazardous waste management unit (HWMU). The release occurred during a routine water draw from the bottom of the tank, and affected a portion of the southeast quadrant of the Tank 815 containment area. Excavated soil from the site was placed in three lined roll-off containers on April 17, 2015 and samples were collected from each roll-off to characterize the soil. The Permittee is approaching the 90-day time limit and is requesting NMED's immediate approval of an extension to the 90-day period allowable by 40 CFR 262.34(b), as incorporated by reference at NMAC 20.4.1.300. This one-time extension will provide additional time to temporarily store the potentially hazardous excavated soils on site and allow the Permittee to prepare a request for a "no longer contained-in" determination. NMED hereby approves the Permittee's extension request for an additional 30 days and must submit the "no longer contained-in" request as soon as possible.

If you have any questions regarding this letter, please contact Leona Tsinnajinnie of my staff at (505) 476-6057.

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
N. Dhawan, NMED HWB
K. VanHorn, NMED HWB
L. Tsinnajinnie, NMED HWB
M. Holder, Navajo Refining Company, L.L.C.
R. Combs, NRC, Artesia Refinery
P. Krueger, ARCADIS

File: Reading File and NRC 2015, HWB-NRC-MISC

HOLLYFRONTIER.

July 23, 2015

Mr. John Kieling
Chief, Hazardous Waste Bureau
New Mexico Environmental Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505

RE: Characterization of Soil Excavated from Tank 815 Release
Navajo Refining Company, L.L.C., Artesia Refinery
RCRA Permit No. NMD048918817

Dear Mr. Kieling:

Navajo Refining Company (NRC) reported an overflow of a water/diesel mixture from the sump located adjacent to Tank 815 within the North Colony Landfarm (NCL) to the New Mexico Environment Department (NMED) on April 16, 2015, as required by the Resource Conservation and Recovery Act (RCRA) Post-Closure Care Permit (Permit). The release was also reported to the New Mexico Energy, Minerals & Natural Resources Department Oil Conservation Division (OCD), as required by the refinery's discharge permit (GW-028). The release occurred during a routine water draw from the bottom of the tank, and affected a portion of the southeast quadrant of the Tank 815 containment area.

In order to maintain appropriate cover for the NCL, the saturated soil in the vicinity of the release was excavated and was placed into three covered, lined roll-off containers (currently containing approximately 12 cubic yards per container). One representative sample (composite) of the excavated soil was collected from each of the roll-off containers and analyzed for constituents of concern. Table 1 provides a summary of the analytical results from the samples and compares the results to the concentrations for defining a waste as characteristically hazardous under the Toxicity Characteristic. Table 1 also provides a comparison of the analytical results to the land disposal restriction treatment standards for the listed wastes that were historically treated within the NCL, and the alternative standards for soils containing those listed wastes. A copy of the laboratory report is included as an attachment to this letter.

As demonstrated in Table 1, none of the concentrations reported for the constituents of concern in the samples exceeded the characteristically hazardous (toxicity) concentrations or the land disposal restriction treatment standards for soils. The sample collected from roll-off bin S. Bro 49 contained two constituents—chrysene and pyrene—at concentrations of 6.86 mg/kg and 10.4 mg/kg, respectively, above the relevant hazardous waste treatment standards for K048, K049 and K051 wastes (40 CFR 268.40, Table "Treatment Standards for Hazardous Waste," non-wastewater form).

As a conservatively protective measure, NRC plans to dispose of the contents of all three roll-off bins at an authorized RCRA Subtitle C treatment, storage, and disposal facility (TSDF). Based

Table 1 - Waste Soil Characterization Analytical Results
Tank 815
Navajo Refining Company, Artesia, New Mexico

Analyte	Toxicity Characteristic Limit (mg/L)	Hazardous Waste Treatment Standards (mg/kg)				Alternative Treatment Standards for Soils (mg/kg)				Analytical Results		
		K048	K049	K051	K052	K048	K049	K051	K052	S. Bro 25	S. Bro 53	S. Bro 49
Semivolatile Organic Compounds (mg/kg)												
2,4-Dimethylphenol	--	--	NA	--	NA	--	NA	--	NA	<18.5	<3.81	<38.1
Acenaphthene	--	--	--	NA	--	--	--	NA	--	1.25 J	0.168 J	0.845 J
Anthracene	--	--	3.4	3.4	--	--	34	34	--	0.552 J	0.262 J	1.35 J
Benz(a)anthracene	--	--	--	3.4	3.4	--	--	34	34	0.246 J	0.634	2.63 J
Benzo(a)pyrene	--	3.4	3.4	3.4	--	34	34	34	--	<1.83	0.488 J	2.13 J
bis(2-Ethylhexyl) phthalate	--	28	28	28	--	280	280	280	--	<18.5	<3.81	<38.1
Carbon disulfide	--	--	NA	--	--	--	NA	--	--	not analyzed	not analyzed	not analyzed
Chrysene	--	3.4	3.4	3.4	--	34	34	34	--	0.395 J	0.662	6.86
Di-n-butyl phthalate	--	28	--	28	--	280	--	280	--	<18.5	<3.81	<38.1
Fluorene	--	NA	--	NA	--	NA	--	NA	--	2.2	0.290 J	0.994 J
m-Cresol (3-methylphenol)	--	--	--	--	5.6	--	--	--	56	<18.5	<3.81	<38.1
Naphthalene	--	5.6	5.6	5.6	5.6	56	56	56	56	2.03	0.160 J	<3.77
o-Cresol (2-methylphenol)	--	--	--	--	5.6	--	--	--	56	<18.5	<3.81	<38.1
p-Cresol (4-methylphenol)	--	--	--	--	5.6	--	--	--	56	<18.5	<3.81	<38.1
Phenanthrene	--	5.6	5.6	5.6	5.6	56	56	56	56	0.996 J	0.896	3.87
Phenol	--	6.2	6.2	6.2	6.2	62	62	62	62	<18.5	<3.81	<38.1
Pyrene	--	8.2	8.2	8.2	--	82	82	82	--	1.82 J	1.59	10.4
TCLP Volatile Organic Compounds (mg/L)												
1,1-Dichloroethene	0.7	--	--	--	--	--	--	--	--	<0.050	<0.050	<0.050
1,2-Dichloroethane	0.5	--	--	--	--	--	--	--	--	<0.050	<0.050	<0.050
2-Butanone	200	--	--	--	--	--	--	--	--	<0.50	<0.50	<0.50
Benzene	0.5	--	--	--	--	--	--	--	--	<0.050	<0.050	<0.050
Carbon tetrachloride	0.5	--	--	--	--	--	--	--	--	<0.050	<0.050	<0.050
Chlorobenzene	100	--	--	--	--	--	--	--	--	<0.050	<0.050	<0.050
Chloroform	6	--	--	--	--	--	--	--	--	<0.25	<0.25	<0.25
Tetrachloroethene	0.7	--	--	--	--	--	--	--	--	<0.050	<0.050	<0.050
Trichloroethene	0.5	--	--	--	--	--	--	--	--	<0.050	<0.050	<0.050
Vinyl Chloride	0.2	--	--	--	--	--	--	--	--	<0.050	<0.050	<0.050
TCLP Semivolatile Organic Compounds (mg/L)												
1,4-Dichlorobenzene	7.5	--	--	--	--	--	--	--	--	<0.10	<0.10	<0.10
2,4,5-Trichlorophenol	400	--	--	--	--	--	--	--	--	<0.10	<0.10	<0.10
2,4,6-Trichlorophenol	2	--	--	--	--	--	--	--	--	<0.10	<0.10	<0.10
2,4-Dinitrotoluene	0.13	--	--	--	--	--	--	--	--	<0.10	<0.10	<0.10
Cresols, Total	200	--	--	--	--	--	--	--	--	<0.20	<0.20	<0.20
Hexachlorobenzene	0.13	--	--	--	--	--	--	--	--	<0.10	<0.10	<0.10
Hexachlorobutadiene	0.5	--	--	--	--	--	--	--	--	<0.10	<0.10	<0.10
Hexachloroethane	3	--	--	--	--	--	--	--	--	<0.10	<0.10	<0.10
Nitrobenzene	2	--	--	--	--	--	--	--	--	<0.10	<0.10	<0.10
Pentachlorophenol	100	--	--	--	--	--	--	--	--	<0.10	<0.10	<0.10
Pyridine	5	--	--	--	--	--	--	--	--	<0.10	<0.10	<0.10

Table 1 - Waste Soil Characterization Analytical Results
Tank 815
Navajo Refining Company, Artesia, New Mexico

Analyte	Toxicity Characteristic Limit (mg/L)	Hazardous Waste Treatment Standards (mg/kg)				Alternative Treatment Standards for Soils (mg/kg)				Analytical Results		
		K048	K049	K051	K052	K048	K049	K051	K052	S. Bro 25	S. Bro 53	S. Bro 49
TCLP Metals (mg/L)												
Arsenic	5	--	--	--	--	--	--	--	--	<0.450	<0.450	<0.450
Barium	100	--	--	--	--	--	--	--	--	<1.40	<1.40	<1.40
Cadmium	1	--	--	--	--	--	--	--	--	<0.450	<0.450	<0.450
Chromium	5	0.6	0.6	0.6	0.6	6	6	6	6	<0.450	<0.450	<0.450
Lead	5	--	--	--	--	--	--	--	--	<0.450	<0.450	<0.450
Mercury	0.2	--	--	--	--	--	--	--	--	<0.0100	<0.0100	<0.0100
Nickel	--	11	11	11	11	110	110	110	110	<0.450	<0.450	<0.450
Selenium	1	--	--	--	--	--	--	--	--	<0.450	<0.450	<0.450
Silver	5	--	--	--	--	--	--	--	--	<0.450	<0.450	<0.450
Total Metals (mg/kg)												
Total Lead	--	NA	NA	NA	NA	NA	NA	NA	NA	20.9	13.1	40.2
Total Petroleum Hydrocarbons (mg/kg)												
Diesel Range Organics	--	--	--	--	--	--	--	--	--	30,000	5,260	9,610

Notes and Abbreviations:

-- Analyte is not listed as characteristically hazardous or as an analyte associated with the listed waste.

< x = Sample result was not detected with reporting limit value of x.

B = The indicated compound was found in the associated method blank as well as the laboratory samples.

J = Estimated value below the lowest calibration point.

mg/kg = milligrams per kilogram

mg/L = milligrams per liter

NA = Analyte .identified in 40 CFR 268.40 as associated with the waste code, but standard listed as "not applicable for non-wastewater forms"

ANALYTICAL REPORT

June 02, 2015

ARCADIS US - TX

Sample Delivery Group:	L763904
Samples Received:	05/08/2015
Project Number:	TX001155.0000
Description:	Navajo Refining Company - Artesia, NM

Report To:

Pam Krueger
2929 Briarpark Dr., Suite 300
Houston, TX 77042

Entire Report Reviewed By:

Pamela A. Langford

Pam Langford

Pam Langford
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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TANK 815 S. BRO 25 L763904-01 Waste

Collected by: I. Castro | Collected date/time: 05/07/15 09:10 | Received date/time: 05/08/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analysis Analyst
Mercury by Method 7470A	WG788910	1	05/14/15 21:17	05/15/15 06:53	ESC
Metals (ICP) by Method 6010B	WG789056	1	05/15/15 20:28	05/17/15 14:37	JDG
Preparation by Method 1311	WG788648	1	05/13/15 15:58	05/13/15 15:59	BG
Preparation by Method 1311	WG788704	1	05/14/15 14:41	05/14/15 14:42	LJN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG789017	1	05/14/15 21:09	05/15/15 14:48	ADF
Volatile Organic Compounds (GC/MS) by Method 8260B	WG789393	1	05/17/15 09:45	05/17/15 09:45	MCB

TANK 815 S. BRO 53 L763904-02 Waste

Collected by: I. Castro | Collected date/time: 05/07/15 09:25 | Received date/time: 05/08/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analysis Analyst
Mercury by Method 7470A	WG788910	1	05/14/15 21:17	05/15/15 07:00	ESC
Metals (ICP) by Method 6010B	WG789056	1	05/15/15 20:28	05/17/15 14:41	JDG
Preparation by Method 1311	WG788648	1	05/13/15 15:58	05/13/15 15:59	BG
Preparation by Method 1311	WG788704	1	05/14/15 14:41	05/14/15 14:42	LJN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG789017	1	05/14/15 21:09	05/15/15 15:58	ADF
Volatile Organic Compounds (GC/MS) by Method 8260B	WG789393	1	05/17/15 10:44	05/17/15 10:44	MCB

TANK 815 S. BRO 49 L763904-03 Waste

Collected by: I. Castro | Collected date/time: 05/07/15 09:40 | Received date/time: 05/08/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analysis Analyst
Mercury by Method 7470A	WG788952	1	05/14/15 21:57	05/15/15 09:23	ESC
Metals (ICP) by Method 6010B	WG789055	1	05/15/15 23:32	05/17/15 13:39	JDG
Preparation by Method 1311	WG788648	1	05/13/15 15:58	05/13/15 15:59	BG
Preparation by Method 1311	WG788704	1	05/14/15 14:41	05/14/15 14:42	LJN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG789017	1	05/14/15 21:09	05/15/15 16:21	ADF
Volatile Organic Compounds (GC/MS) by Method 8260B	WG789393	1	05/17/15 11:04	05/17/15 11:04	MCB

TRIP BLANK L763904-04 GW

Collected by: I. Castro | Collected date/time: 05/07/15 00:00 | Received date/time: 05/08/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analysis Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG787918	1	05/17/15 08:15	05/17/15 08:15	MCB

TANK 815 S. BRO 25 L763904-05 Solid

Collected by: I. Castro | Collected date/time: 05/07/15 09:10 | Received date/time: 05/08/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analysis Analyst
Metals (ICP) by Method 6010B	WG788480	1	05/12/15 18:27	05/13/15 12:35	LTB
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG788184	50	05/11/15 18:23	05/12/15 20:21	KMF
Semi-Volatile Organic Compounds (GC) by Method 3546/DRO	WG788415	100	05/12/15 18:02	05/13/15 14:40	CLG
Total Solids by Method 2540 G-2011	WG788085	1	05/11/15 13:39	05/12/15 09:21	MEL

TANK 815 S. BRO 53 L763904-06 Solid

Collected by: I. Castro | Collected date/time: 05/07/15 09:25 | Received date/time: 05/08/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analysis Analyst
Metals (ICP) by Method 6010B	WG788480	1	05/12/15 18:27	05/13/15 12:40	LTB
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG788184	10	05/11/15 18:23	05/12/15 19:58	KMF
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG788184	20	05/11/15 18:23	05/13/15 20:02	KMF
Semi-Volatile Organic Compounds (GC) by Method 3546/DRO	WG788415	20	05/12/15 18:02	05/13/15 11:35	CLG
Total Solids by Method 2540 G-2011	WG788085	1	05/11/15 13:39	05/12/15 09:21	MEL

TANK 815 S. BRO 49 L763904-07 Solid

Collected by: I. Castro

Collected date/time: 05/07/15 09:40

Received date/time: 05/08/15 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analysis Analyst
Metals (ICP) by Method 6010B	WG788480	1	05/12/15 18:27	05/13/15 12:44	LTB
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG788184	100	05/11/15 18:23	05/12/15 20:44	KMF
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG788184	200	05/11/15 18:23	05/13/15 19:38	KMF
Semi-Volatile Organic Compounds (GC) by Method 3546/DRO	WG788415	200	05/12/15 18:02	05/13/15 14:50	CLG
Total Solids by Method 2540 G-2011	WG788085	1	05/11/15 13:39	05/12/15 09:21	MEL

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. 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.

Pamela A. Langford

Pam Langford

Pam Langford
Technical Service Representative

Preparation by Method 1311

Analyte	Result	Qualifier	Prep date / time	Batch
TCLP ZHE Extraction	-		5/14/2015 2:41:09 PM	WG788704
TCLP Extraction	-		5/13/2015 3:58:54 PM	WG788648

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Limit	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	ND		0.0100	0.20	1	05/15/2015 06:53	WG788910

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Limit	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Arsenic	ND		0.450	5	1	05/17/2015 14:37	WG789056
Barium	ND		1.40	100	1	05/17/2015 14:37	WG789056
Cadmium	ND		0.450	1	1	05/17/2015 14:37	WG789056
Chromium	ND		0.450	5	1	05/17/2015 14:37	WG789056
Lead	ND		0.450	5	1	05/17/2015 14:37	WG789056
Nickel	ND		0.450		1	05/17/2015 14:37	WG789056
Selenium	ND		0.450	1	1	05/17/2015 14:37	WG789056
Silver	ND		0.450	5	1	05/17/2015 14:37	WG789056

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Benzene	U		16.5	50.0	1	05/17/2015 09:45	WG789393
Carbon tetrachloride	U		16.5	50.0	1	05/17/2015 09:45	WG789393
Chlorobenzene	U		16.5	50.0	1	05/17/2015 09:45	WG789393
Chloroform	U		82.5	250	1	05/17/2015 09:45	WG789393
1,2-Dichloroethane	U		16.5	50.0	1	05/17/2015 09:45	WG789393
1,1-Dichloroethene	U		16.5	50.0	1	05/17/2015 09:45	WG789393
2-Butanone (MEK)	U		165	500	1	05/17/2015 09:45	WG789393
Tetrachloroethene	U		16.5	50.0	1	05/17/2015 09:45	WG789393
Trichloroethene	U		16.5	50.0	1	05/17/2015 09:45	WG789393
Vinyl chloride	U		16.5	50.0	1	05/17/2015 09:45	WG789393
(S) Toluene-d8	*101*			*88.5-111*		*05/17/2015 09:45*	WG789393
(S) Dibromofluoromethane	*97.8*			*78.3-121*		*05/17/2015 09:45*	WG789393
(S) a,a,a-Trifluorotoluene	*102*			*85.0-114*		*05/17/2015 09:45*	WG789393
(S) 4-Bromofluorobenzene	*104*			*71.0-126*		*05/17/2015 09:45*	WG789393

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	RDL	Limit	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,4-Dichlorobenzene	ND		0.100	7.50	1	05/15/2015 14:48	WG789017
2,4-Dinitrotoluene	ND		0.100	0.13	1	05/15/2015 14:48	WG789017
Hexachlorobenzene	ND		0.100	0.13	1	05/15/2015 14:48	WG789017
Hexachloro-1,3-butadiene	ND		0.100	0.50	1	05/15/2015 14:48	WG789017
Hexachloroethane	ND		0.100	3	1	05/15/2015 14:48	WG789017
Nitrobenzene	ND		0.100	2	1	05/15/2015 14:48	WG789017
Pyridine	ND		0.100	5	1	05/15/2015 14:48	WG789017
3&4-Methyl Phenol	ND		0.100	400	1	05/15/2015 14:48	WG789017
2-Methylphenol	ND		0.100	200	1	05/15/2015 14:48	WG789017
Pentachlorophenol	ND		0.100	100	1	05/15/2015 14:48	WG789017
2,4,5-Trichlorophenol	ND		0.100	400	1	05/15/2015 14:48	WG789017
2,4,6-Trichlorophenol	ND		0.100	2	1	05/15/2015 14:48	WG789017
(S) 2-Fluorophenol	*35.9*		*10.0-77.9*	*87*		*05/15/2015 14:48*	WG789017

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	RDL	Limit	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
(S) Phenol-d5	*23.7*		*5.00-70.1*	*67*		*05/15/2015 14:48*	WG789017
(S) Nitrobenzene-d5	*48.2*		*21.8-123*	*120*		*05/15/2015 14:48*	WG789017
(S) 2-Fluorobiphenyl	*51.2*		*29.5-131*	*122*		*05/15/2015 14:48*	WG789017
(S) 2,4,6-Tribromophenol	*75.5*		*11.2-130*	*148*		*05/15/2015 14:48*	WG789017
(S) p-Terphenyl-d14	*58.4*		*29.3-137*	*149*		*05/15/2015 14:48*	WG789017

Preparation by Method 1311

Analyte	Result	Qualifier	Prep date / time	Batch
TCLP Extraction	-		5/13/2015 3:58:54 PM	WG788648
TCLP ZHE Extraction	-		5/14/2015 2:41:09 PM	WG788704

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Limit	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	ND		0.0100	0.20	1	05/15/2015 07:00	WG788910

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Limit	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Arsenic	ND		0.450	5	1	05/17/2015 14:41	WG789056
Barium	ND		1.40	100	1	05/17/2015 14:41	WG789056
Cadmium	ND		0.450	1	1	05/17/2015 14:41	WG789056
Chromium	ND		0.450	5	1	05/17/2015 14:41	WG789056
Lead	ND		0.450	5	1	05/17/2015 14:41	WG789056
Nickel	ND		0.450		1	05/17/2015 14:41	WG789056
Selenium	ND		0.450	1	1	05/17/2015 14:41	WG789056
Silver	ND		0.450	5	1	05/17/2015 14:41	WG789056

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Benzene	U		16.5	50.0	1	05/17/2015 10:44	WG789393
Carbon tetrachloride	U		16.5	50.0	1	05/17/2015 10:44	WG789393
Chlorobenzene	U		16.5	50.0	1	05/17/2015 10:44	WG789393
Chloroform	U		82.5	250	1	05/17/2015 10:44	WG789393
1,2-Dichloroethane	U		16.5	50.0	1	05/17/2015 10:44	WG789393
1,1-Dichloroethene	U		16.5	50.0	1	05/17/2015 10:44	WG789393
2-Butanone (MEK)	U		165	500	1	05/17/2015 10:44	WG789393
Tetrachloroethene	U		16.5	50.0	1	05/17/2015 10:44	WG789393
Trichloroethene	U		16.5	50.0	1	05/17/2015 10:44	WG789393
Vinyl chloride	U		16.5	50.0	1	05/17/2015 10:44	WG789393
(S) Toluene-d8	*101*			*88.5-111*		*05/17/2015 10:44*	WG789393
(S) Dibromofluoromethane	*97.1*			*78.3-121*		*05/17/2015 10:44*	WG789393
(S) a,a,a-Trifluorotoluene	*101*			*85.0-114*		*05/17/2015 10:44*	WG789393
(S) 4-Bromofluorobenzene	*103*			*71.0-126*		*05/17/2015 10:44*	WG789393

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	RDL	Limit	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,4-Dichlorobenzene	ND		0.100	7.50	1	05/15/2015 15:58	WG789017
2,4-Dinitrotoluene	ND		0.100	0.13	1	05/15/2015 15:58	WG789017
Hexachlorobenzene	ND		0.100	0.13	1	05/15/2015 15:58	WG789017
Hexachloro-1,3-butadiene	ND		0.100	0.50	1	05/15/2015 15:58	WG789017
Hexachloroethane	ND		0.100	3	1	05/15/2015 15:58	WG789017
Nitrobenzene	ND		0.100	2	1	05/15/2015 15:58	WG789017
Pyridine	ND		0.100	5	1	05/15/2015 15:58	WG789017
3&4-Methyl Phenol	ND		0.100	400	1	05/15/2015 15:58	WG789017
2-Methylphenol	ND		0.100	200	1	05/15/2015 15:58	WG789017
Pentachlorophenol	ND		0.100	100	1	05/15/2015 15:58	WG789017
2,4,5-Trichlorophenol	ND		0.100	400	1	05/15/2015 15:58	WG789017
2,4,6-Trichlorophenol	ND		0.100	2	1	05/15/2015 15:58	WG789017
(S) 2-Fluorophenol	*45.0*		*10.0-77.9*	*87*		*05/15/2015 15:58*	WG789017

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	RDL	Limit	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
(S) Phenol-d5	*31.7*		*5.00-70.1*	*67*		*05/15/2015 15:58*	WG789017
(S) Nitrobenzene-d5	*59.1*		*21.8-123*	*120*		*05/15/2015 15:58*	WG789017
(S) 2-Fluorobiphenyl	*63.0*		*29.5-131*	*122*		*05/15/2015 15:58*	WG789017
(S) 2,4,6-Tribromophenol	*81.8*		*11.2-130*	*148*		*05/15/2015 15:58*	WG789017
(S) p-Terphenyl-d14	*65.4*		*29.3-137*	*149*		*05/15/2015 15:58*	WG789017

Preparation by Method 1311

Analyte	Result	Qualifier	Prep date / time	Batch
TCLP Extraction	-		5/13/2015 3:58:54 PM	WG788648
TCLP ZHE Extraction	-		5/14/2015 2:41:09 PM	WG788704

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Limit	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	ND		0.0100	0.20	1	05/15/2015 09:23	WG788952

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Limit	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Arsenic	ND		0.450	5	1	05/17/2015 13:39	WG789055
Barium	ND		1.40	100	1	05/17/2015 13:39	WG789055
Cadmium	ND		0.450	1	1	05/17/2015 13:39	WG789055
Chromium	ND		0.450	5	1	05/17/2015 13:39	WG789055
Lead	ND		0.450	5	1	05/17/2015 13:39	WG789055
Nickel	ND		0.450		1	05/17/2015 13:39	WG789055
Selenium	ND		0.450	1	1	05/17/2015 13:39	WG789055
Silver	ND		0.450	5	1	05/17/2015 13:39	WG789055

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Benzene	U		16.5	50.0	1	05/17/2015 11:04	WG789393
Carbon tetrachloride	U		16.5	50.0	1	05/17/2015 11:04	WG789393
Chlorobenzene	U		16.5	50.0	1	05/17/2015 11:04	WG789393
Chloroform	U		82.5	250	1	05/17/2015 11:04	WG789393
1,2-Dichloroethane	U		16.5	50.0	1	05/17/2015 11:04	WG789393
1,1-Dichloroethene	U		16.5	50.0	1	05/17/2015 11:04	WG789393
2-Butanone (MEK)	U		165	500	1	05/17/2015 11:04	WG789393
Tetrachloroethene	U		16.5	50.0	1	05/17/2015 11:04	WG789393
Trichloroethene	U		16.5	50.0	1	05/17/2015 11:04	WG789393
Vinyl chloride	U		16.5	50.0	1	05/17/2015 11:04	WG789393
(S) Toluene-d8	*100*			*88.5-111*		*05/17/2015 11:04*	WG789393
(S) Dibromofluoromethane	*97.9*			*78.3-121*		*05/17/2015 11:04*	WG789393
(S) a,a,a-Trifluorotoluene	*101*			*85.0-114*		*05/17/2015 11:04*	WG789393
(S) 4-Bromofluorobenzene	*104*			*71.0-126*		*05/17/2015 11:04*	WG789393

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	RDL	Limit	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
1,4-Dichlorobenzene	ND		0.100	7.50	1	05/15/2015 16:21	WG789017
2,4-Dinitrotoluene	ND		0.100	0.13	1	05/15/2015 16:21	WG789017
Hexachlorobenzene	ND		0.100	0.13	1	05/15/2015 16:21	WG789017
Hexachloro-1,3-butadiene	ND		0.100	0.50	1	05/15/2015 16:21	WG789017
Hexachloroethane	ND		0.100	3	1	05/15/2015 16:21	WG789017
Nitrobenzene	ND		0.100	2	1	05/15/2015 16:21	WG789017
Pyridine	ND		0.100	5	1	05/15/2015 16:21	WG789017
3&4-Methyl Phenol	ND		0.100	400	1	05/15/2015 16:21	WG789017
2-Methylphenol	ND		0.100	200	1	05/15/2015 16:21	WG789017
Pentachlorophenol	ND		0.100	100	1	05/15/2015 16:21	WG789017
2,4,5-Trichlorophenol	ND		0.100	400	1	05/15/2015 16:21	WG789017
2,4,6-Trichlorophenol	ND		0.100	2	1	05/15/2015 16:21	WG789017
(S) 2-Fluorophenol	*38.2*		*10.0-77.9*	*87*		*05/15/2015 16:21*	WG789017

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result	Qualifier	RDL	Limit	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
(S) Phenol-d5	*25.7*		*5.00-70.1*	*67*		*05/15/2015 16:21*	WG789017
(S) Nitrobenzene-d5	*51.2*		*21.8-123*	*120*		*05/15/2015 16:21*	WG789017
(S) 2-Fluorobiphenyl	*53.5*		*29.5-131*	*122*		*05/15/2015 16:21*	WG789017
(S) 2,4,6-Tribromophenol	*69.8*		*11.2-130*	*148*		*05/15/2015 16:21*	WG789017
(S) p-Terphenyl-d14	*55.3*		*29.3-137*	*149*		*05/15/2015 16:21*	WG789017

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	ug/l		ug/l	ug/l		date / time	
Benzene	U		0.330	1.00	1	05/17/2015 08:15	WG787918
Carbon tetrachloride	U		0.380	1.00	1	05/17/2015 08:15	WG787918
Chloroform	U		0.320	5.00	1	05/17/2015 08:15	WG787918
1,2-Dibromoethane	U		0.380	1.00	1	05/17/2015 08:15	WG787918
1,1-Dichloroethane	U		0.260	1.00	1	05/17/2015 08:15	WG787918
1,2-Dichloroethane	U		0.360	1.00	1	05/17/2015 08:15	WG787918
1,1-Dichloroethene	U		0.400	1.00	1	05/17/2015 08:15	WG787918
Ethylbenzene	U		0.380	1.00	1	05/17/2015 08:15	WG787918
Methylene Chloride	U		1.00	5.00	1	05/17/2015 08:15	WG787918
1,1,1,2-Tetrachloroethane	U		0.380	1.00	1	05/17/2015 08:15	WG787918
1,1,2,2-Tetrachloroethane	U		0.130	1.00	1	05/17/2015 08:15	WG787918
Toluene	U		0.780	5.00	1	05/17/2015 08:15	WG787918
1,1,1-Trichloroethane	U		0.319	1.00	1	05/17/2015 08:15	WG787918
1,1,2-Trichloroethane	U		0.380	1.00	1	05/17/2015 08:15	WG787918
Vinyl chloride	U		0.260	1.00	1	05/17/2015 08:15	WG787918
o-Xylene	U		0.340	1.00	1	05/17/2015 08:15	WG787918
m&p-Xylene	U		0.720	2.00	1	05/17/2015 08:15	WG787918
Xylenes, Total	U		1.10	3.00	1	05/17/2015 08:15	WG787918
(S) Toluene-d8	*99.8*			*88.5-111*		*05/17/2015 08:15*	WG787918
(S) Dibromofluoromethane	*93.5*			*78.3-121*		*05/17/2015 08:15*	WG787918
(S) 4-Bromofluorobenzene	*101*			*71.0-126*		*05/17/2015 08:15*	WG787918

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	90.1		1	05/12/2015 09:21	WG788085

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Lead	20.9		0.210	0.555	1	05/13/2015 12:35	WG788480

Semi-Volatile Organic Compounds (GC) by Method 3546/DRO

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) High Fraction	30000		85.0	444	100	05/13/2015 14:40	WG788415
(S) o-Terphenyl	*0.000*	X		*50.0-150*		*05/13/2015 14:40*	WG788415

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzo(a)pyrene	U		0.300	1.83	50	05/12/2015 20:21	WG788184
Naphthalene	2.03		0.490	1.83	50	05/12/2015 20:21	WG788184
2,4-Dimethylphenol	U		2.70	18.5	50	05/12/2015 20:21	WG788184
Acenaphthene	1.25	J	0.360	1.83	50	05/12/2015 20:21	WG788184
Anthracene	0.552	J	0.360	1.83	50	05/12/2015 20:21	WG788184
Benzo(A)Anthracene	0.246	J	0.230	1.83	50	05/12/2015 20:21	WG788184
Bis(2-Ethylhexyl)phthalate	U		0.660	18.5	50	05/12/2015 20:21	WG788184
Chrysene	0.395	J	0.310	1.83	50	05/12/2015 20:21	WG788184
Di-n-butyl phthalate	U		0.600	18.5	50	05/12/2015 20:21	WG788184
Fluorene	2.20		0.380	1.83	50	05/12/2015 20:21	WG788184
3&4-Methyl Phenol	U		0.430	18.5	50	05/12/2015 20:21	WG788184
2-Methylphenol	U		0.540	18.5	50	05/12/2015 20:21	WG788184
Phenanthrene	0.996	J	0.290	1.83	50	05/12/2015 20:21	WG788184
Phenol	U		0.390	18.5	50	05/12/2015 20:21	WG788184
Pyrene	1.82	J	0.690	1.83	50	05/12/2015 20:21	WG788184
(S) 2-Fluorophenol	*74.2*	X		*21.1-116*		*05/12/2015 20:21*	WG788184
(S) Phenol-d5	*92.5*	X		*26.3-121*		*05/12/2015 20:21*	WG788184
(S) Nitrobenzene-d5	*163*	X		*21.9-129*		*05/12/2015 20:21*	WG788184
(S) 2-Fluorobiphenyl	*89.1*	X		*34.9-129*		*05/12/2015 20:21*	WG788184
(S) 2,4,6-Tribromophenol	*89.2*	X		*21.6-142*		*05/12/2015 20:21*	WG788184
(S) p-Terphenyl-d14	*114*	X		*21.5-128*		*05/12/2015 20:21*	WG788184

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	87.4		1	05/12/2015 09:21	WG788085

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Lead	13.1		0.220	0.572	1	05/13/2015 12:40	WG788480

Semi-Volatile Organic Compounds (GC) by Method 3546/DRO

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) High Fraction	5260		17.0	91.5	20	05/13/2015 11:35	WG788415
(S) o-Terphenyl	*0.000*	X		*50.0-150*		*05/13/2015 11:35*	WG788415

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzo(a)pyrene	0.488	J	0.120	0.755	20	05/13/2015 20:02	WG788184
Naphthalene	0.160	J	0.100	0.378	10	05/12/2015 19:58	WG788184
2,4-Dimethylphenol	U		0.540	3.81	10	05/12/2015 19:58	WG788184
Acenaphthene	0.168	J	0.0730	0.378	10	05/12/2015 19:58	WG788184
Anthracene	0.262	J	0.0720	0.378	10	05/12/2015 19:58	WG788184
Benzo(A)Anthracene	0.634		0.0490	0.378	10	05/12/2015 19:58	WG788184
Bis(2-Ethylhexyl)phthalate	U		0.140	3.81	10	05/12/2015 19:58	WG788184
Chrysene	0.662		0.0640	0.378	10	05/12/2015 19:58	WG788184
Di-n-butyl phthalate	U		0.120	3.81	10	05/12/2015 19:58	WG788184
Fluorene	0.290	J	0.0780	0.378	10	05/12/2015 19:58	WG788184
3&4-Methyl Phenol	U		0.0890	3.81	10	05/12/2015 19:58	WG788184
2-Methylphenol	U		0.110	3.81	10	05/12/2015 19:58	WG788184
Phenanthrene	0.896		0.0610	0.378	10	05/12/2015 19:58	WG788184
Phenol	U		0.0800	3.81	10	05/12/2015 19:58	WG788184
Pyrene	1.59		0.140	0.378	10	05/12/2015 19:58	WG788184
(S) 2-Fluorophenol	*77.5*			*21.1-116*		*05/12/2015 19:58*	WG788184
(S) Phenol-d5	*79.1*			*26.3-121*		*05/12/2015 19:58*	WG788184
(S) Nitrobenzene-d5	*114*			*21.9-129*		*05/12/2015 19:58*	WG788184
(S) 2-Fluorobiphenyl	*77.3*			*34.9-129*		*05/12/2015 19:58*	WG788184
(S) 2,4,6-Tribromophenol	*91.2*			*21.6-142*		*05/12/2015 19:58*	WG788184
(S) p-Terphenyl-d14	*87.7*			*21.5-128*		*05/12/2015 19:58*	WG788184

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	87.4		1	05/12/2015 09:21	WG788085

Metals (ICP) by Method 6010B

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Lead	40.2		0.220	0.572	1	05/13/2015 12:44	WG788480

Semi-Volatile Organic Compounds (GC) by Method 3546/DRO

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
TPH (GC/FID) High Fraction	9610		170	915	200	05/13/2015 14:50	WG788415
(S) o-Terphenyl	*0.000*	X		*50.0-150*		*05/13/2015 14:50*	WG788415

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result (dry)	Qualifier	MDL	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Benzo(a)pyrene	2.13	J	1.20	7.55	200	05/13/2015 19:38	WG788184
Naphthalene	U		1.00	3.77	100	05/12/2015 20:44	WG788184
2,4-Dimethylphenol	U		5.40	38.1	100	05/12/2015 20:44	WG788184
Acenaphthene	0.845	J	0.730	3.77	100	05/12/2015 20:44	WG788184
Anthracene	1.35	J	0.720	3.77	100	05/12/2015 20:44	WG788184
Benzo(A)Anthracene	2.63	J	0.490	3.77	100	05/12/2015 20:44	WG788184
Bis(2-Ethylhexyl)phthalate	U		1.40	38.1	100	05/12/2015 20:44	WG788184
Chrysene	6.86		0.640	3.77	100	05/12/2015 20:44	WG788184
Di-n-butyl phthalate	U		1.20	38.1	100	05/12/2015 20:44	WG788184
Fluorene	0.994	J	0.780	3.77	100	05/12/2015 20:44	WG788184
3&4-Methyl Phenol	U		0.890	38.1	100	05/12/2015 20:44	WG788184
2-Methylphenol	U		1.10	38.1	100	05/12/2015 20:44	WG788184
Phenanthrene	3.87		0.610	3.77	100	05/12/2015 20:44	WG788184
Phenol	U		0.800	38.1	100	05/12/2015 20:44	WG788184
Pyrene	10.4		1.40	3.77	100	05/12/2015 20:44	WG788184
(S) 2-Fluorophenol	*69.5*	X		*21.1-116*		*05/12/2015 20:44*	WG788184
(S) Phenol-d5	*71.0*	X		*26.3-121*		*05/12/2015 20:44*	WG788184
(S) Nitrobenzene-d5	*126*	X		*21.9-129*		*05/12/2015 20:44*	WG788184
(S) 2-Fluorobiphenyl	*86.6*	X		*34.9-129*		*05/12/2015 20:44*	WG788184
(S) 2,4,6-Tribromophenol	*83.2*	X		*21.6-142*		*05/12/2015 20:44*	WG788184
(S) p-Terphenyl-d14	*140*	X		*21.5-128*		*05/12/2015 20:44*	WG788184

Method Blank (MB)

(MB) 05/12/15 09:20

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	%		%	%
Total Solids	0.000900			

L763908-02 Original Sample (OS) • Duplicate (DUP)

(OS) 05/12/15 09:21 • (DUP) 05/12/15 09:22

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	%	%		%		%
Total Solids	79.1	78.0	1	1.44		5

Laboratory Control Sample (LCS)

(LCS) 05/12/15 09:20

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	%	%	%	%	
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) 05/15/15 06:34

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Mercury	U		0.0033	0.0100

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 05/15/15 06:36 • (LCSD) 05/15/15 06:38

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Mercury	0.0300	0.0295	0.0284	98	95	80-120			4	20

L763935-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 05/15/15 06:40 • (MS) 05/15/15 06:42 • (MSD) 05/15/15 06:44

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Mercury	0.0300	ND	0.0294	0.0299	98	100	1	75-125			2	20

L764413-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 05/15/15 06:47 • (MS) 05/15/15 06:49 • (MSD) 05/15/15 06:51

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Mercury	0.0300	ND	0.0239	0.0288	80	96	1	75-125			18	20

Method Blank (MB)

(MB) 05/15/15 09:06

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Mercury	U		0.0033	0.0100

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 05/15/15 09:12 • (LCSD) 05/15/15 09:14

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Mercury	0.0300	0.0289	0.0284	96	95	80-120			2	20

L763928-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 05/15/15 09:17 • (MS) 05/15/15 09:19 • (MSD) 05/15/15 09:21

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Mercury	0.0300	ND	0.0289	0.0289	96	96	1	75-125			0	20

Method Blank (MB)

(MB) 05/13/15 10:24

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
Lead	U		0.19	0.500

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 05/13/15 10:28 • (LCSD) 05/13/15 10:32

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	%	%	%			%	%
Lead	100	104	108	104	108	80-120			4	20

L763845-13 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 05/13/15 10:37 • (MS) 05/13/15 10:50 • (MSD) 05/13/15 11:09

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	%	%		%			%	%
Lead	100	3.93	102	107	98	103	1	75-125			5	20

Method Blank (MB)

(MB) 05/17/15 13:06

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Arsenic	U		0.149	0.450
Barium	U		0.446	1.35
Cadmium	U		0.149	0.450
Chromium	U		0.149	0.450
Lead	U		0.149	0.450
Nickel	U		0.149	0.450
Selenium	U		0.149	0.450
Silver	U		0.149	0.450

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 05/17/15 13:10 • (LCSD) 05/17/15 13:16

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Arsenic	9.00	9.21	9.10	102	101	80-120			1	20
Barium	9.00	9.47	9.40	105	104	80-120			1	20
Cadmium	9.00	9.39	9.30	104	103	80-120			1	20
Chromium	9.00	9.48	9.50	105	106	80-120			0	20
Lead	9.00	9.42	9.34	105	104	80-120			1	20
Nickel	9.00	9.19	9.10	102	101	80-120			1	20
Selenium	9.00	9.70	9.52	108	106	80-120			2	20
Silver	9.00	9.47	9.43	105	105	80-120			0	20

L763928-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 05/17/15 13:21 • (MS) 05/17/15 13:30 • (MSD) 05/17/15 13:34

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Arsenic	9.00	ND	9.49	9.55	105	106	1	75-125			1	20
Barium	9.00	2.58	11.7	11.6	102	101	1	75-125			1	20
Cadmium	9.00	ND	9.60	9.53	107	106	1	75-125			1	20
Chromium	9.00	0.00831	9.26	9.12	103	101	1	75-125			1	20
Lead	9.00	0.0154	9.41	9.32	104	103	1	75-125			1	20
Nickel	9.00	0.00105	9.25	9.19	103	102	1	75-125			1	20
Selenium	9.00	0.00165	10.2	10.1	113	112	1	75-125			0	20
Silver	9.00	ND	9.62	9.53	107	106	1	75-125			1	20

Method Blank (MB)

(MB) 05/17/15 13:43

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Arsenic	U		0.149	0.450
Barium	U		0.446	1.35
Cadmium	U		0.149	0.450
Chromium	U		0.149	0.450
Lead	U		0.149	0.450
Nickel	U		0.149	0.450
Selenium	U		0.149	0.450
Silver	U		0.149	0.450

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 05/17/15 13:59 • (LCSD) 05/17/15 14:04

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Arsenic	9.00	9.66	9.46	107	105	80-120			2	20
Barium	9.00	9.82	9.61	109	107	80-120			2	20
Cadmium	9.00	9.74	9.52	108	106	80-120			2	20
Chromium	9.00	9.67	9.47	107	105	80-120			2	20
Lead	9.00	9.65	9.44	107	105	80-120			2	20
Selenium	9.00	10.2	9.94	113	110	80-120			2	20
Silver	9.00	9.74	9.52	108	106	80-120			2	20

L764199-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 05/17/15 14:08 • (MS) 05/17/15 14:17 • (MSD) 05/17/15 14:23

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Arsenic	9.00	0.0209	9.91	9.96	110	110	1	75-125			1	20
Barium	9.00	1.16	10.7	10.6	106	105	1	75-125			1	20
Cadmium	9.00	ND	9.84	9.76	109	108	1	75-125			1	20
Chromium	9.00	0.00609	9.50	9.41	106	105	1	75-125			1	20
Lead	9.00	ND	9.53	9.42	106	105	1	75-125			1	20
Nickel	9.00	0.0629	9.56	9.48	106	105	1	75-125			1	20
Selenium	9.00	0.0407	10.6	10.6	118	117	1	75-125			0	20
Silver	9.00	ND	9.97	9.86	111	110	1	75-125			1	20

Method Blank (MB)

(MB) 05/17/15 06:17

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Benzene	U		0.000331	0.00100
Carbon tetrachloride	U		0.000379	0.00100
Chloroform	U		0.000324	0.00500
1,2-Dibromoethane	U		0.000381	0.00100
1,1-Dichloroethane	U		0.000259	0.00100
1,2-Dichloroethane	U		0.000361	0.00100
1,1-Dichloroethene	U		0.000398	0.00100
Ethylbenzene	U		0.000384	0.00100
Methylene Chloride	U		0.00100	0.00500
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100
Toluene	U		0.000780	0.00500
1,1,1-Trichloroethane	U		0.000319	0.00100
1,1,2-Trichloroethane	U		0.000383	0.00100
Vinyl chloride	U		0.000259	0.00100
Xylenes, Total	U		0.00106	0.00300
o-Xylene	U		0.000341	0.00100
m&p-Xylenes	U		0.000719	0.00200
(S) Toluene-d8	*98.6*			*88.5-111*
(S) Dibromofluoromethane	*93.1*			*78.3-121*
(S) 4-Bromofluorobenzene	*99.0*			*71.0-126*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 05/17/15 05:07 • (LCSD) 05/17/15 05:25

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Benzene	0.0250	0.0220	0.0217	87.8	86.7	74.8-121			1.27	20
Carbon tetrachloride	0.0250	0.0241	0.0241	96.5	96.4	70.2-123			0.0800	20
Chloroform	0.0250	0.0218	0.0217	87.3	86.9	76.0-121			0.470	20
1,2-Dibromoethane	0.0250	0.0261	0.0260	104	104	76.6-121			0.160	20
1,1-Dichloroethane	0.0250	0.0228	0.0229	91.2	91.4	70.7-126			0.230	20
1,2-Dichloroethane	0.0250	0.0232	0.0236	92.8	94.2	68.8-124			1.55	20
1,1-Dichloroethene	0.0250	0.0229	0.0221	91.5	88.4	67.8-129			3.52	20
Ethylbenzene	0.0250	0.0253	0.0247	101	99.0	78.8-122			2.22	20
Methylene Chloride	0.0250	0.0192	0.0182	76.9	72.6	70.3-120			5.69	20
1,1,1,2-Tetrachloroethane	0.0250	0.0263	0.0260	105	104	74.2-124			1.21	20
1,1,2,2-Tetrachloroethane	0.0250	0.0268	0.0269	107	108	70.7-122			0.110	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 05/17/15 05:07 • (LCSD) 05/17/15 05:25

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Toluene	0.0250	0.0228	0.0233	91.1	93.1	79.7-116			2.23	20
1,1,1-Trichloroethane	0.0250	0.0226	0.0235	90.3	94.0	73.2-123			4.00	20
1,1,2-Trichloroethane	0.0250	0.0250	0.0251	100	100	77.7-118			0.350	20
Vinyl chloride	0.0250	0.0223	0.0211	89.3	84.5	65.9-128			5.52	20
Xylenes, Total	0.0750	0.0761	0.0764	101	102	78.7-121			0.360	20
o-Xylene	0.0250	0.0258	0.0258	103	103	77.6-122			0.0300	20
m&p-Xylenes	0.0500	0.0503	0.0506	101	101	78.8-121			0.530	20
(S) Toluene-d8				*99.7*	*101*	*88.5-111*				
(S) Dibromofluoromethane				*97.8*	*94.6*	*78.3-121*				
(S) 4-Bromofluorobenzene				*99.2*	*96.7*	*71.0-126*				

L763891-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 05/17/15 08:32 • (MS) 05/17/15 08:50 • (MSD) 05/17/15 09:07

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Benzene	0.0250	ND	0.0195	0.0212	78.1	84.7	1	54.3-133			8.13	20
Carbon tetrachloride	0.0250	ND	0.0227	0.0233	90.7	93.4	1	55.7-134			2.86	20
Chloroform	0.0250	ND	0.0192	0.0207	76.7	83.0	1	63.0-129			7.91	20
1,2-Dibromoethane	0.0250	ND	0.0226	0.0262	90.4	105	1	67.1-125			15.0	20
1,1-Dichloroethane	0.0250	ND	0.0207	0.0221	82.8	88.5	1	58.5-132			6.65	20
1,2-Dichloroethane	0.0250	ND	0.0206	0.0225	82.4	90.1	1	60.0-126			8.91	20
1,1-Dichloroethene	0.0250	ND	0.0211	0.0222	84.4	88.9	1	51.1-140			5.22	20.2
Ethylbenzene	0.0250	ND	0.0233	0.0260	93.2	104	1	61.4-133			11.1	20
Methylene Chloride	0.0250	ND	0.0159	0.0171	63.7	68.2	1	58.1-122			6.93	20
1,1,1,2-Tetrachloroethane	0.0250	ND	0.0236	0.0252	94.4	101	1	64.0-128			6.73	20
1,1,2,2-Tetrachloroethane	0.0250	ND	0.0252	0.0265	101	106	1	56.0-132			4.85	22.2
Toluene	0.0250	ND	0.0206	0.0233	82.2	93.2	1	61.4-130			12.5	20
1,1,1-Trichloroethane	0.0250	ND	0.0215	0.0224	86.0	89.5	1	58.7-134			3.93	20
1,1,2-Trichloroethane	0.0250	ND	0.0234	0.0259	93.7	104	1	66.3-125			10.0	20
Vinyl chloride	0.0250	ND	0.0197	0.0210	78.9	83.9	1	47.8-137			6.23	20
Xylenes, Total	0.0750	ND	0.0700	0.0780	93.3	104	1	63.3-131			10.9	20
o-Xylene	0.0250	ND	0.0233	0.0256	93.2	103	1	63.3-130			9.58	20
m&p-Xylenes	0.0500	ND	0.0467	0.0524	93.4	105	1	61.7-133			11.5	20
(S) Toluene-d8					*98.7*	*98.7*		*88.5-111*				
(S) Dibromofluoromethane					*98.4*	*93.9*		*78.3-121*				
(S) 4-Bromofluorobenzene					*99.1*	*100*		*71.0-126*				

Method Blank (MB)

(MB) 05/17/15 09:26

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.0165	0.0500
Carbon tetrachloride	U		0.0165	0.0500
Chlorobenzene	U		0.0165	0.0500
Chloroform	U		0.0825	0.250
1,2-Dichloroethane	U		0.0165	0.0500
1,1-Dichloroethene	U		0.0165	0.0500
2-Butanone (MEK)	U		0.165	0.500
Tetrachloroethene	U		0.0165	0.0500
Trichloroethene	U		0.0165	0.0500
Vinyl chloride	U		0.0165	0.0500
(S) Toluene-d8	*101*			*88.5-111*
(S) Dibromofluoromethane	*98.4*			*78.3-121*
(S) a,a,a-Trifluorotoluene	*101*			*85.0-114*
(S) 4-Bromofluorobenzene	*103*			*71.0-126*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 05/17/15 06:53 • (LCSD) 05/17/15 07:12

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	0.0226	0.0252	90.4	101	74.8-121			11.0	20
Carbon tetrachloride	0.0250	0.0235	0.0262	94.0	105	70.2-123			10.9	20
Chlorobenzene	0.0250	0.0229	0.0255	91.5	102	78.1-119			10.7	20
Chloroform	0.0250	0.0231	0.0257	92.5	103	76.0-121			10.7	20
1,2-Dichloroethane	0.0250	0.0236	0.0264	94.5	105	68.8-124			10.9	20
1,1-Dichloroethene	0.0250	0.0237	0.0267	94.7	107	67.8-129			12.2	20
2-Butanone (MEK)	0.125	0.119	0.132	95.1	106	55.0-149			10.6	20
Tetrachloroethene	0.0250	0.0229	0.0257	91.7	103	72.6-126			11.4	20
Trichloroethene	0.0250	0.0229	0.0253	91.7	101	77.7-118			9.78	20
Vinyl chloride	0.0250	0.0254	0.0284	101	113	65.9-128			11.2	20
(S) Toluene-d8				*101*	*101*	*88.5-111*				
(S) Dibromofluoromethane				*99.8*	*98.8*	*78.3-121*				
(S) a,a,a-Trifluorotoluene				*101*	*101*	*85.0-114*				
(S) 4-Bromofluorobenzene				*102*	*102*	*71.0-126*				

L763904-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 05/17/15 09:45 • (MS) 05/17/15 10:05 • (MSD) 05/17/15 10:25

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	1.25	ND	1.06	1.17	84.7	93.4	1	54.3-133			9.86	20
Carbon tetrachloride	1.25	ND	1.05	1.17	84.0	93.7	1	55.7-134			11.0	20
Chlorobenzene	1.25	ND	1.06	1.18	85.0	94.8	1	67.0-125			10.9	20.3
Chloroform	1.25	ND	1.08	1.20	86.5	96.1	1	63.0-129			10.4	20
1,2-Dichloroethane	1.25	ND	1.10	1.22	87.9	97.9	1	60.0-126			10.8	20
1,1-Dichloroethene	1.25	ND	1.09	1.19	86.9	95.4	1	51.1-140			9.29	20.2
2-Butanone (MEK)	6.25	ND	5.08	5.67	81.2	90.7	1	22.4-138			11.0	27
Tetrachloroethene	1.25	ND	1.05	1.17	84.3	93.3	1	53.0-139			10.1	20
Trichloroethene	1.25	ND	1.05	1.17	83.8	93.5	1	44.1-149			10.9	20
Vinyl chloride	1.25	ND	1.18	1.28	94.3	102	1	47.8-137			8.31	20
(S) Toluene-d8					*101*	*102*		*88.5-111*				
(S) Dibromofluoromethane					*99.7*	*98.9*		*78.3-121*				
(S) a,a,a-Trifluorotoluene					*101*	*102*		*85.0-114*				
(S) 4-Bromofluorobenzene					*102*	*101*		*71.0-126*				

Method Blank (MB)

(MB) 05/13/15 09:57

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
TPH (GC/FID) High Fraction	U		0.769	4.00
(S) o-Terphenyl	*97.2*			*50.0-150*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 05/13/15 10:07 • (LCSD) 05/13/15 10:17

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) High Fraction	60.0	51.6	51.1	86.0	85.2	50.0-150			0.860	20
(S) o-Terphenyl				*87.8*	*89.9*	*50.0-150*				

Method Blank (MB)

(MB) 05/12/15 11:15

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
Acenaphthene	U		0.00642	0.0330
Anthracene	U		0.00632	0.0330
Benzo(a)anthracene	U		0.00428	0.0330
Benzo(a)pyrene	U		0.00548	0.0330
Chrysene	U		0.00555	0.0330
Fluorene	U		0.00682	0.0330
Naphthalene	U		0.00889	0.0330
Phenanthrene	U		0.00528	0.0330
Bis(2-ethylhexyl)phthalate	U		0.0120	0.333
Di-n-butyl phthalate	U		0.0109	0.333
Pyrene	U		0.0123	0.0330
2-Methylphenol	U		0.00986	0.333
3&4-Methyl Phenol	U		0.00783	0.333
2,4-Dimethylphenol	U		0.0471	0.333
Phenol	U		0.00695	0.333
(S) Nitrobenzene-d5	*70.2*			*21.9-129*
(S) 2-Fluorobiphenyl	*73.9*			*34.9-129*
(S) p-Terphenyl-d14	*70.1*			*21.5-128*
(S) Phenol-d5	*72.7*			*26.3-121*
(S) 2-Fluorophenol	*68.9*			*21.1-116*
(S) 2,4,6-Tribromophenol	*74.8*			*21.6-142*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 05/12/15 10:28 • (LCSD) 05/12/15 10:51

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	%	%	%			%	%
Acenaphthene	0.667	0.493	0.506	74.0	75.8	48.9-107			2.44	20
Anthracene	0.667	0.528	0.529	79.1	79.4	52.0-112			0.320	20
Benzo(a)anthracene	0.667	0.530	0.515	79.4	77.2	52.3-106			2.86	20
Benzo(a)pyrene	0.667	0.532	0.526	79.7	78.9	51.9-106			1.01	20
Chrysene	0.667	0.507	0.499	76.0	74.7	54.4-110			1.69	20
Fluorene	0.667	0.512	0.524	76.7	78.5	51.1-109			2.35	20
Naphthalene	0.667	0.464	0.473	69.6	71.0	43.4-103			2.02	20
Phenanthrene	0.667	0.502	0.511	75.2	76.6	51.6-107			1.76	20
Bis(2-ethylhexyl)phthalate	0.667	0.513	0.508	76.9	76.1	48.1-116			1.09	20.5
Di-n-butyl phthalate	0.667	0.506	0.512	75.9	76.8	49.7-113			1.22	20
Pyrene	0.667	0.541	0.517	81.2	77.5	47.1-108			4.55	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 05/12/15 10:28 • (LCSD) 05/12/15 10:51

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	%	%	%			%	%
2-Methylphenol	0.667	0.448	0.468	67.2	70.1	42.4-100			4.23	20
3&4-Methyl Phenol	0.667	0.512	0.534	76.7	80.0	50.5-115			4.17	20
2,4-Dimethylphenol	0.667	0.472	0.470	70.8	70.4	42.2-110			0.520	20
Phenol	0.667	0.467	0.478	70.0	71.7	41.5-106			2.41	20
(S) Nitrobenzene-d5				*72.6*	*72.7*	*21.9-129*				
(S) 2-Fluorobiphenyl				*77.3*	*78.0*	*34.9-129*				
(S) p-Terphenyl-d14				*74.3*	*69.3*	*21.5-128*				
(S) Phenol-d5				*72.3*	*73.2*	*26.3-121*				
(S) 2-Fluorophenol				*70.5*	*69.7*	*21.1-116*				
(S) 2,4,6-Tribromophenol				*88.7*	*87.8*	*21.6-142*				

L764231-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 05/12/15 15:41 • (MS) 05/12/15 16:05 • (MSD) 05/12/15 16:28

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	%	%		%			%	%
Acenaphthene	0.667	ND	0.529	0.511	79.2	76.7	1	32.2-134			3.30	27.3
Anthracene	0.667	ND	0.538	0.528	80.7	79.2	1	32.3-137			1.87	28.4
Benzo(a)anthracene	0.667	ND	0.531	0.515	79.6	77.3	1	33.3-124			3.00	29
Benzo(a)pyrene	0.667	ND	0.528	0.523	79.1	78.4	1	28.2-128			0.950	28.4
Chrysene	0.667	ND	0.499	0.486	74.8	72.9	1	36.3-129			2.58	28
Fluorene	0.667	ND	0.542	0.525	81.3	78.8	1	34.0-133			3.15	27.1
Naphthalene	0.667	ND	0.489	0.480	73.3	71.9	1	36.4-121			1.94	27.2
Phenanthrene	0.667	ND	0.517	0.510	77.5	76.4	1	30.8-137			1.49	26.5
Bis(2-ethylhexyl)phthalate	0.667	ND	0.525	0.510	78.7	76.5	1	21.8-141			2.85	35.2
Di-n-butyl phthalate	0.667	0.00527	0.532	0.526	78.9	78.0	1	32.2-133			1.12	25.9
Pyrene	0.667	ND	0.529	0.496	79.4	74.3	1	24.1-130			6.53	29.9
2-Methylphenol	0.667	ND	0.474	0.466	71.1	69.9	1	30.3-118			1.70	25.1
3&4-Methyl Phenol	0.667	ND	0.546	0.538	81.9	80.6	1	33.3-141			1.52	25.7
2,4-Dimethylphenol	0.667	ND	0.504	0.498	75.5	74.7	1	12.3-149			1.09	32.3
Phenol	0.667	ND	0.490	0.490	73.5	73.5	1	25.1-130			0.0200	29.6
(S) Nitrobenzene-d5					*76.5*	*76.3*		*21.9-129*				
(S) 2-Fluorobiphenyl					*82.2*	*79.8*		*34.9-129*				
(S) p-Terphenyl-d14					*69.7*	*67.5*		*21.5-128*				
(S) Phenol-d5					*73.9*	*73.8*		*26.3-121*				
(S) 2-Fluorophenol					*75.3*	*74.1*		*21.1-116*				
(S) 2,4,6-Tribromophenol					*91.6*	*91.8*		*21.6-142*				

Method Blank (MB)

(MB) 05/15/15 11:20

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
1,4-Dichlorobenzene	U		0.0330	0.100
2,4-Dinitrotoluene	U		0.0330	0.100
Hexachlorobenzene	U		0.0330	0.100
Hexachloro-1,3-butadiene	U		0.0330	0.100
Hexachloroethane	U		0.0330	0.100
Nitrobenzene	U		0.0330	0.100
Pyridine	U		0.0330	0.100
2-Methylphenol	U		0.0330	0.100
3&4-Methyl Phenol	U		0.0330	0.100
Pentachlorophenol	U		0.0330	0.100
2,4,5-Trichlorophenol	U		0.0330	0.100
2,4,6-Trichlorophenol	U		0.0330	0.100
(S) Nitrobenzene-d5	*60.7*			*21.8-123*
(S) 2-Fluorobiphenyl	*59.3*			*29.5-131*
(S) p-Terphenyl-d14	*59.9*			*29.3-137*
(S) Phenol-d5	*30.3*			*5.00-70.1*
(S) 2-Fluorophenol	*45.1*			*10.0-77.9*
(S) 2,4,6-Tribromophenol	*73.3*			*11.2-130*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 05/15/15 10:10 • (LCSD) 05/15/15 10:33

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 %
1,4-Dichlorobenzene	0.0500	0.0222	0.0253	44.4	50.6	21.0-89.4			13.1	32.6
2,4-Dinitrotoluene	0.0500	0.0333	0.0371	66.5	74.2	31.2-105			11.0	22
Hexachlorobenzene	0.0500	0.0365	0.0402	73.0	80.5	38.5-116			9.77	20.1
Hexachloro-1,3-butadiene	0.0500	0.0254	0.0295	50.8	59.0	16.1-104			14.9	31.2
Hexachloroethane	0.0500	0.0207	0.0246	41.3	49.2	16.5-89.8			17.4	30.7
Nitrobenzene	0.0500	0.0299	0.0313	59.8	62.5	31.4-106			4.55	25.7
Pyridine	0.0500	0.0112	0.0121	22.5	24.1	13.5-58.9			7.10	32.5
2-Methylphenol	0.0500	0.0259	0.0279	51.8	55.9	26.4-86.9			7.61	26.5
3&4-Methyl Phenol	0.0500	0.0293	0.0312	58.6	62.4	27.9-92.0			6.34	27
Pentachlorophenol	0.0500	0.0340	0.0391	67.9	78.2	10.0-97.4			14.1	35.1
2,4,5-Trichlorophenol	0.0500	0.0356	0.0390	71.3	78.0	34.9-112			9.09	23.9
2,4,6-Trichlorophenol	0.0500	0.0361	0.0404	72.1	80.7	29.8-107			11.2	24.1
(S) Nitrobenzene-d5				*56.6*	*59.6*	*21.8-123*				
(S) 2-Fluorobiphenyl				*59.6*	*62.1*	*29.5-131*				

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) 05/15/15 10:10 • (LCSD) 05/15/15 10:33

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 %
(S) p-Terphenyl-d14				*53.7*	*59.2*	*29.3-137*				
(S) Phenol-d5				*31.3*	*32.6*	*5.00-70.1*				
(S) 2-Fluorophenol				*43.9*	*46.4*	*10.0-77.9*				
(S) 2,4,6-Tribromophenol				*84.0*	*95.6*	*11.2-130*				

L763904-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) 05/15/15 14:48 • (MS) 05/15/15 15:11 • (MSD) 05/15/15 15:35

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 %
1,4-Dichlorobenzene	0.500	ND	0.258	0.255	51.6	50.9	1	14.0-104			1.30	36.4
2,4-Dinitrotoluene	0.500	ND	0.342	0.401	68.5	80.1	1	16.2-135			15.7	20.6
Hexachlorobenzene	0.500	ND	0.379	0.435	75.8	87.0	1	31.9-135			13.8	20
Hexachloro-1,3-butadiene	0.500	ND	0.291	0.285	58.1	57.1	1	15.7-109			1.85	37.6
Hexachloroethane	0.500	ND	0.244	0.238	48.9	47.5	1	10.4-105			2.84	40
Nitrobenzene	0.500	ND	0.309	0.329	61.8	65.8	1	23.1-121			6.35	29
Pyridine	0.500	ND	0.124	0.127	24.8	25.4	1	10.0-77.8			2.61	38.8
2-Methylphenol	0.500	ND	0.262	0.289	52.4	57.8	1	10.0-133			9.89	40
3&4-Methyl Phenol	0.500	ND	0.293	0.321	58.6	64.1	1	17.4-100			9.10	27.7
Pentachlorophenol	0.500	ND	0.415	0.495	83.0	98.9	1	10.0-108			17.6	40
2,4,5-Trichlorophenol	0.500	ND	0.365	0.418	73.0	83.6	1	30.6-120			13.5	33.8
2,4,6-Trichlorophenol	0.500	ND	0.378	0.433	75.6	86.7	1	19.1-114			13.7	29.9
(S) Nitrobenzene-d5					*58.4*	*64.6*		*21.8-123*				
(S) 2-Fluorobiphenyl					*61.8*	*68.0*		*29.5-131*				
(S) p-Terphenyl-d14					*55.8*	*63.0*		*29.3-137*				
(S) Phenol-d5					*29.4*	*31.9*		*5.00-70.1*				
(S) 2-Fluorophenol					*42.8*	*47.2*		*10.0-77.9*				
(S) 2,4,6-Tribromophenol					*90.1*	*108*		*11.2-130*				

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
J	Estimated value.
X	Surrogate recovery outside the control limit.

ACCREDITATIONS & LOCATIONS

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.**

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California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
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Indiana	C-TN-01	Pennsylvania	68-02979
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Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	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		

[1.] Drinking Water [2.] Underground Storage Tanks [3.] Aquatic Toxicity [4.] Chemical/Microbiological [5.] Mold [n/a] Accreditation not applicable

Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
Canada	1461.01	DOD	1461.01
EPA–Crypto	TN00003	USDA	S-67674

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.**



ARCADIS US - TX
2929 Briarpark Dr., Suite 300
Houston, TX 77042

Billing Information:
Attn: Accounts Payable
630 Plaza Drive, Suite 600
Highlands Ranch, CO 80129

Report to: **Project Manager**
Email To: **@arcadis-us.com**

Project Description: **Navajo Refining Company - Artesia, NM**
City/State Collected: Artesia/NM

Phone: **713-953-4800**
Fax:
Client Project # ~~TX000833.0000.00004~~ TX001155.0000
Lab Project # **ARCADHTX-NAVAJO**

Collected by (print): I. Castro
Site/Facility ID #
P.O. #

Collected by (signature):
Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X__Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

ESC LABORATORY SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L # L763904
Table F065
Acctnum: ARCADHTX
Template: T102293
Prelogin: P508494
TSR: 638 - Pam Langford
PB: 5.1 MF
Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	~~BTEX 2oz Clr-NoPres~~	FULL TCLP - P/H 16oz Clr-NoPres	~~RCI, pH, CYANIDE 8oz Clr-NoPres~~	~~SV8270, LEAD 4oz Clr-NoPres~~	8260 VOCs						Rem./Contaminant	Sample # (lab only)
Tank 815 S.Bro 25	Grab	TCLP	—	5/7/15	9:10	3	X	X	X	X								-01
Tank 815 S.Bro 53	Grab	TCLP	—	5/7/15	9:25	3	X	X	X	X								-02
Tank 815 S.Bro 49	Grab	TCLP	—	5/7/15	9:40	3	X	X	X	X								-03
Trip Blank	—	W	—	—	—	1					X							-04

* Matrix: **SS** - Soil **GW** - Groundwater **WW** - WasteWater **DW** - Drinking Water **OT** - Other

Remarks: Full TCLP includes (TCLP metals, TCLP VOCs, TCLP SVOCs, TPH DRO)

pH ____ Temp ____
Flow ____ Other ____

6361091445

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	5/7/15	10:45	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)
			Bobbi Thomas

Samples returned via: ☐ UPS ☒ FedEx ☐ Courier ☐ ____
Temp: 3.7 °C Bottles Received: 10
Date: 5-8-15 Time: 09:00

Condition: (lab use only) OK
COC Seal Intact: ___Y ___N ___NA
pH Checked: NCF:

NEW MEXICO
ENVIRONMENT DEPARTMENT

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Phone (505) 476-6000 Fax (505) 476-6030
www.env.nm.gov

SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

RYAN FLYNN
Cabinet Secretary
BUTCH TONGATE
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

August 4, 2015

Mr. Scott M. Denton
Environmental Manager
Navajo Refining Company, L.L.C.
P.O. Box 159
Artesia, New Mexico 88211-0159

RE: DENIAL
"NO LONGER CONTAINED-IN" DETERMINATION FOR
CHARACTERIZATION OF SOIL EXCAVATED FROM TANK 815 RELEASE
NAVAJO REFINING COMPANY, L.L.C., ARTESIA REFINERY
EPA ID# NMD048918817
HWB-NRC-MISC

Dear Mr. Denton:

The New Mexico Environment Department (NMED) has received Navajo Refining Company, L.L.C., Artesia Refinery's (the Permittee) *Characterization of Soil Excavated from Tank 815 Release*, dated July 23, 2015. On April 16, 2015, the Permittee notified NMED and the New Mexico Energy, Minerals & Natural Resources Department Oil Conservation Division (OCD) that the sump located adjacent to Tank 815 had overflowed and that a water/diesel mixture from the sump had been released inside the containment area of the North Colony Landfarm (NCL), a hazardous waste management unit (HWMU).

Three roll-off containers were filled with excavated soil from the southeast quadrant of the containment area and one representative soil sample was collected from each roll-off container in May 2015 and submitted to a laboratory to characterize the soil for disposal. Historically, K048, K049, K051, and K052 listed RCRA hazardous wastes were applied to the NCL. Based on the analytical results of the soil samples, the Permittee is requesting a "no longer contained-in" determination from NMED to allow the excavated soil to be managed as nonhazardous waste.

The excavated soil meets New Mexico's residential soil screening levels (SSLs) for all analytes with the exception of benzo(a)anthracene and benzo(a)pyrene. However, benzo(a)anthracene and benzo(a)pyrene are below the industrial SSLs. Although the excavated soil is not a characteristically hazardous waste per 40 CFR Part 261 Subpart C, it is a K-Listed waste because chrysene and pyrene exceed the hazardous constituent standards as defined in Part 268.2(i) of the Land Disposal Restriction (LDR) Treatment Standards listed in 40 CFR Part 268.40 and the Universal Treatment Standards listed in 40 CFR Part 268.48 regulatory limits.

NMED has reviewed the Permittee's request and has determined that the excavated soil is a hazardous waste and does not meet applicable LDR standards. NMED hereby denies the Permittee's request for a "no longer contained-in" determination and must manage the excavated soil as hazardous waste and dispose of the excavated soil at an appropriate facility.

If you have any questions regarding this letter, please contact Leona Tsinnajinnie of my staff at (505) 476-6057.

Sincerely,

for

John E. Kieling
Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
N. Dhawan, NMED HWB
K. Van Horn, NMED HWB
L. Tsinnajinnie, NMED HWB
C. Chavez, NMEMNRD OCD
M. Holder, Navajo Refining Company, L.L.C.
R. Combs, Navajo Refining Company, L.L.C., Artesia Refinery
P. Kruger, ARCADIS
L. King, EPA 6PD-N

File: Reading and NRC 2015, HWB-NRC-MISC

Attachment D
Waste Manifests

Smartt Move #295

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Manifest Tracking Number
NMD048918817	1	800-424-9300	008302034 JJK

GENERATOR

5. Generator's Name and Mailing Address
Navajo Refining Co., L.L.C. (Artesia)
P.O. Box 159
Artesia, NM 88211-0159
Generator's Phone: 575-748-3311

Generator's Site Address (if different than mailing address)
Navajo Refining Co., L.L.C.
501 E. Main
Artesia, NM 88210

6. Transporter 1 Company Name: Fluid Transports, INC — U.S. EPA ID Number: TXD988057931

7. Transporter 2 Company Name: Fluid Transport — U.S. EPA ID Number: TXD988057931

8. Designated Facility Name and Site Address: U.S. Ecology Texas, Inc.
3277 County Road 69
Robstown, TX 78380 USA
Facility's Phone: 800-242-3209-116
U.S. EPA ID Number: TXD069452340

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
X	1. RQ, NA3077, Hazardous Waste, Solid, N.O.S., 9, PG III (K048, K049, K051 & K052 Impacted Soil)	1	CM	27580	P	K048 K049 K051 K052 OUT S 489H
	2.					
	3.					
	4.					

14. Special Handling Instructions and Additional Information
1. 090091916-0 ERG# 171 Chemtrec Cust# CCN15402
Material passed TCLP but may contain legacy K listed wastes
Unit 8 Tank 815 NCL Impacted Soil Bin Wt. 7,840 Bin # 53

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Bernie Cordero — Signature: Bernie Cordero — Month: 8 Day: 14 Year: 15

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Michael Sons — Signature: Michael Sons — Month: 8 Day: 14 Year: 15

Transporter 2 Printed/Typed Name: Steve Broker — Signature: Steve Broker — Month: 8 Day: 17 Year: 15

DESIGNATED FACILITY

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator) — U.S. EPA ID Number
Facility's Phone:

18c. Signature of Alternate Facility (or Generator) — Month: Day: Year:

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1.	2.	3.	4.
H039			

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name: Robert Gutierrez — Signature: — Month: 8 Day: 18 Year: 15

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

Truck #75

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Manifest Tracking Number
	NMD048918817	1	800-424-9300	008302035 JJK

GENERATOR

5. Generator's Name and Mailing Address
Navajo Refining Co., L.L.C. (Artesia)
P.O. Box 159
Artesia, NM 88211-0159
Generator's Phone: 575-748-3311

Generator's Site Address (if different than mailing address)
Navajo Refining Co., L.L.C.
501 E. Main
Artesia, NM 88210

6. Transporter 1 Company Name
Fluid Transports, INC
U.S. EPA ID Number
TXD988057931

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address
U.S. Ecology Texas, Inc.
3277 County Road 69
Robstown, TX 78380 USA
U.S. EPA ID Number
TXD069452340
Facility's Phone: 800-242-3209-116

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes		
X	1. RQ, NA3077, Hazardous Waste, Solid, N.O.S., 9, PG III (K048, K049, K051 & K052 Impacted Soil)	1	CM	9,580	P	K048 K052	K049 OUT S	K051 489H
	2.							
	3.							
	4.							

14. Special Handling Instructions and Additional Information
1. 090091916-0 ERG# 171 Chemtrec Cust# CCN15402
Material passed TCLP but may contain legacy K listed wastes
Unit 8 Tank 815 NCL Impacted Soil Bin Wt. 7,920 Bin # 25

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Bernie Cordero
Signature: Bernie Cordero
Month 8 Day 14 Year 15

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Gary Johnson
Signature:
Month 8 Day 14 Year 15

Transporter 2 Printed/Typed Name:
Signature:
Month Day Year

DESIGNATED FACILITY

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:

18c. Signature of Alternate Facility (or Generator)
Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1.	2.	3.	4.
H039			

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name: Robert Gibson
Signature:
Month 8 Day 19 Year 15

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

255

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Manifest Tracking Number
NMD048918817	1	800-424-9300	008302033 JJK

GENERATOR

5. Generator's Name and Mailing Address
Navajo Refining Co., L.L.C. (Artesia)
P.O. Box 159
Artesia, NM 88211-0159
Generator's Phone: 575-748-3311

Generator's Site Address (if different than mailing address)
Navajo Refining Co., L.L.C.
501 E. Main
Artesia, NM 88210

6. Transporter 1 Company Name: Fluid Transports, INC — U.S. EPA ID Number: TXD988057931

7. Transporter 2 Company Name: Fluid Trasports, Inc — U.S. EPA ID Number: TXD988057931

8. Designated Facility Name and Site Address
U.S. Ecology Texas, Inc.
3277 County Road 69
Robstown, TX 78380 USA
Facility's Phone: 800-242-3209-116
U.S. EPA ID Number: TXD069452340

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
X	1. RQ, NA3077, Hazardous Waste, Solid, N.O.S., 9, PG III (K048, K049, K051 & K052 Impacted Soil)	1	CM	18,900	P	K048 K049 K051 K052 OUT S 489H
	2.					
	3.					
	4.					

14. Special Handling Instructions and Additional Information
1. 000091916-0 ERG# 171 Chemtrec Cust# CCN15402
Material passed TCLP but may contain legacy K listed wastes
Unit 8 Tank 815 NCL Impacted Soil Bin Wt. 7,900 Bin # 49

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Deanie Cardenas — Signature: Deanie Cardenas — Month 5 Day 15 Year 15

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Florentino Saavedra — Signature: [signature] — Month 5 Day 14 Year 15

Transporter 2 Printed/Typed Name: Ruben Villa — Signature: [signature] — Month 08 Day 19 Year 15

DESIGNATED FACILITY

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator) U.S. EPA ID Number
Facility's Phone:

18c. Signature of Alternate Facility (or Generator) Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1.	2.	3.	4.
H039			

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name: Adrian Villarl — Signature: [signature] — Month 8 Day 20 Year 15

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

HOLLYFRONTIER.

January 28, 2016

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

Mr. John Kieling
Chief, Hazardous Waste Bureau
New Mexico Environmental Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505

RE: Final Release Report for April 2015 Tank 815 Release
HollyFrontier Navajo, L.L.C., Artesia Refinery
Discharge Permit GW-028; RCRA Permit No. NMD048918817

Dear Mr. Chavez and Mr. Kieling:

Enclosed is the final C-141 form and the *Tank 815 Release Response Report* for the April 16, 2015 release. The release response report documents the actions taken immediately following the release as well as the remediation and waste disposal activities. This release report is being submitted in both hard copy and electronic format.

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
Navajo Refining Company, L.L.C.

c: Robert Combs

REVISED OCD DISCHARGE PLAN
PERMIT REQUIREMENTS

The Oil Conservation Division (OCD) has reviewed its authority to regulate the disposition of non-domestic waste from the activities described in NMSA 1978, Section 70-2-12(B)(22) under the Oil and Gas Act and the Water Quality Act, and has revised its permitting policies. These changes may affect the renewal of your discharge permit.

Previously, the OCD issued discharge permits under the Water Quality Act covering all processes at a facility that may impact ground water, even if those processes did not have intentional discharges, and were not designed or operated to allow discharges. The discharge permits often covered processes that would otherwise be subject to regulation under the Oil and Gas Act, such as pits, below-grade tanks, sumps, and surface waste management facilities, such as landfarms and landfills. In addition, discharge permits typically included requirements imposed under the Oil and Gas Act, such as the hydrogen sulfide contingency plans required by 19.15.11 NMAC.

Going forward, the OCD will issue new Water Quality Act discharge permits and renew existing Water Quality Act Discharge permits for the activities described in NMSA 1978, Section 70-2-12(B)(22) to cover the following:

- Processes that intentionally discharge or allow the discharge of a water contaminant in the form of effluent or leachate so that it may move directly or indirectly into ground water. OCD-regulated processes that intentionally discharge water contaminants are rare. An example of a process that allows the discharge of a water contaminant would be a compressor station that steam-cleans its machinery and allows the contaminated run-off to reach the ground. However, if the compressor station designed its facility to contain the run-off and properly dispose of the contaminated fluids at a commercial disposal facility, the steam-cleaning activity would not require a discharge permit.
- Class I non-hazardous waste wells, as defined in 20.6.2.5002(B)(1) NMAC. A well used at a refinery to inject non-hazardous, non-domestic waste would be an example of a Class I well regulated by the OCD under the Water Quality Act.
- Class III wells, as defined in 20.6.2.5002(B)(3) NMAC. A solution mining well for the production of brine is an example of a Class III well regulated by the OCD under the Water Quality Act.
- Class V wells, as defined in 20.6.2.5002(B)(5) NMAC. A ground water remediation injection well used to inject contaminated ground water that has been treated to ground water quality standards is an example of a Class V well regulated by the OCD under the Water Quality Act.
- Abatement. An operator may abate contamination pursuant to an abatement plan, provided that the abatement is consistent with the abatement requirements set out in the Water Quality Control Commission rules. See 20.6.2.4105(A)(6) NMAC.

Water Quality Act discharge permits and discharge permit renewals issued by the OCD will not cover the following:

- Pits, below-grade tanks, sumps, surface waste management facilities, such as landfarms and landfills associated with the facility, unless those processes intentionally discharge or allow the discharge of a water contaminant. This means that operators who hold Water Quality Act discharge permits may also be subject to permit requirements under the Oil and Gas Act for pits and below-grade tanks (*see* 19.15.17 NMAC) and surface waste management facilities, such as landfarms and landfills (*see* 19.15.36 NMAC).
- Hydrogen sulfide contingency plans, and other requirements imposed under the Oil and Gas Act. If the facility requires a hydrogen sulfide contingency plan pursuant to 19.15.11 NMAC, that plan will be addressed separately from the discharge permit.

As discharge permits come up for renewal, the OCD will review the permit with the operator to determine which processes must be covered by a discharge plan and which processes must be covered by a permit or plan issued pursuant to the Oil and Gas Act. If your current discharge permit covers processes subject to Oil and Gas Act permit requirements, such as pits, below-grade tanks, and surface waste management facilities (landfarms or landfills), you may continue to operate under your current discharge permit until its normal expiration date or November 15, 2012, whichever is later. By November 16, 2012 you must have a Water Quality Act discharge permit for processes subject to the Water Quality Act, Oil and Gas Act permits for processes subject to permitting under the Oil and Gas Act, and an approved hydrogen sulfide contingency plan if your facility requires a plan pursuant to 19.15.11 NMAC.

Currently, many discharge plans are awaiting renewal and others will reach their renewal date within the next six months. So that we can address the backlog in an orderly manner, we are asking permittees of these discharge plans to respond by July 15, 2011 to a questionnaire designed to determine if a facility may be required to have a WQCC discharge permit, based on this announcement. After review, we will rescind or modify many discharge permits and may require plans and permits, based on Oil and Gas Act and OCD regulations, such as Part 11 (hydrogen sulfide contingency plans), Part 17 (pits, below-grade tanks, and sumps), and Part 36 (surface waste management facilities).

New Mexico Energy, Minerals and Natural Resources Department

Susana Martinez
Governor

John H. Bemis
Cabinet Secretary-Designate

Brett F. Woods, Ph.D.
Deputy Cabinet Secretary

Jami Bailey
Division Director
Oil Conservation Division

May 12, 2011

Oil & Gas Facilities Questionnaire for Determination of a WQCC Discharge Permit

Only Water Quality Control Commission- regulated systems will be incorporated into the OCD's WQCC Permits, while OCD regulated systems will be handled under separate permit(s). A current discharge permit is valid until its normal expiration date or November 15, 2012, whichever is later. All facilities with processes subject to the Water Quality Act must have permits in place by November 16, 2012. H2S Contingency Plans; pits, ponds, above and/or below-grade tanks; waste treatment, storage and disposal; and landfarms and landfills may require separate permitting under the OCD Oil, Gas, and Geothermal regulations.

Proper completion and timely submission of this questionnaire is requested ***for all facilities with discharge permit expiration dates before November 15, 2012****. Please complete and submit a separate questionnaire for each facility* ***before July 15, 2011****.*

- **Name of the owner or operator of the facility**

_____

- **Point of contact**
  Name_____
  Telephone_____
  Email_____
  Mailing address_____
  _____

- **Facility name**_____

- **Facility location**
  Unit Letter, Section, Township, Range_____
  Street address (if any)_____
  _____

- **Facility type** ☐ Refinery ☐ Gas Plant ☐ Compressor
  ☐ Crude Oil Pump Station ☐ Injection Well ☐ Service Company
  ☐ Geothermal ☐ Abatement
  ☐ Other (describe)_____

- **Current and Past Operations** (please check all that apply)
  ☐ Impoundments ☐ Treatment Plant ☐ Waterflood
  ☐ Disposal Well ☐ Brine Well ☐ Wash Bay

☐ Steam Cleaning ☐ Groundwater Remediation

• **Facility Status** ☐ Active ☐ Idle ☐ Closed

• **Does this facility currently have a discharge permit?** ☐ Yes ☐ No

If so, what is the permit number?_____

• **Are there any routine activities at the facility which intentionally result in materials other than potable water being released either onto the ground or directly into surface or ground water?**
(This includes process activities, equipment maintenance, or the cleanup of historic spills.)
☐ Yes ☐ No

If so, describe those activities including the materials involved, the frequency of discharge, and the estimated volume per discharge event.

_____

_____

_____

_____

_____

• **What is the depth below surface to shallowest ground water in the area?** _____

• **Are there any water supply, groundwater monitoring, or recovery wells at the facility?**
Water supply ☐ Monitoring ☐ Recovery ☐

If these wells are registered with the Office of the State Engineer (OSE), what are the OSE well numbers?_____

• **Are abatement actions ongoing?** _____

• **Are there any active or inactive UIC wells present as part of the federal Underground Injection Control program associated with this facility?** ☐ Yes ☐ No

If so, what are the API numbers assigned to those wells?

_____

_____

• **Are there any sumps at the facility?** ☐ Yes ☐ No
Number of sumps with volume less than 500 gallons_____
Use and contents_____
Is secondary containment incorporated into the design? ☐ Yes ☐ No

Number of sumps with volume greater than 500 gallons_____
Use and contents_____
Is secondary containment incorporated into the design? ☐ Yes ☐ No

- **Does the facility incorporate any underground lines other than electrical conduits, freshwater, natural gas for heating, or sanitary sewers?** ☐ Yes ☐ No
  If so, what do those buried lines contain?

_____

_____

THIS FORM IS DUE TO THE OIL CONSERVATION DIVISION BY JULY 15, 2011.

Questions? Please contact Glenn VonGonten at 505-476-3488 or Carl Chavez at 505-476-3490.

Thank you for your cooperation.

JAMI BAILEY
Director

NEW MEXICO
ENVIRONMENT DEPARTMENT

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Phone (505) 476-6000 Fax (505) 476-6030
www.env.nm.gov

SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

RYAN FLYNN
Cabinet Secretary
BUTCH TONGATE
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

November 9, 2015

Mr. Randy Schmaltz
Health, Safety, Environmental, and
Regulatory Director
Western Refining, Southwest, Inc.
Bloomfield Refinery
P.O. Box 159
Bloomfield, New Mexico 87413

RE: APPROVAL WITH MODIFICATIONS
REVISED ACCELERATED CORRECTIVE MEASURES COMPLETION REPORT FORMER DIESEL DISPENSER SYSTEM, SEPTEMBER 2015
WESTERN REFINING SOUTHWEST INC., BLOOMFIELD REFINERY
EPA ID# NMD089416416
HWB-WRB-13-007

Dear Mr. Schmaltz:

The New Mexico Environment Department (NMED) has received Western Refining Southwest, Inc., Bloomfield Refinery's (Western) *Revised Accelerated Corrective Measures Completion Report Former Diesel Dispenser System* (Report), dated September 30, 2015. NMED has reviewed the Report and hereby issues this Approval with the following modifications.

General Comments

The Report must convey the information from the investigation in a clear and concise manner consistent across all text, figures, and tables and be free of typographical errors to facilitate NMED's timely review, similar to reports submitted in the past. The following comments address NMED's concern regarding the Report.

Comment 1

In Section 4.1 (Soil Sample Field Screening and Logging Results), page 13, paragraph 3, Western states that "[t]he odor indications correspond to the three locations with the highest PID readings." However, Table 1 (Field Screening and Soil Sample Analytical Summary) reports only two samples, DD-08-28' and DD-11-28', with the highest PID readings and corresponding hydrocarbon odor. Sample DD-09-8' had no reported hydrocarbon odor. Revise Section 4.1 to resolve the discrepancies and provide a replacement page with the response letter.

Comment 2

Figures 1 (Site Location Map) and 2 (Dispenser System Layout) are missing a north arrow. Revise Figures 1 and 2 to include a north arrow. Also, revise all figures to include a date. Provide replacement figures with the response letter.

Comment 3

Western's Response to NMED's Notice of Disapproval, dated July 9, 2015, Comment 7 states that Figure 3 was added to the Report in order to "depict the final excavation limits to-scale, the soil sample locations, and their respective sample IDs." The scale of Figure 3 is such that the sample locations in the area of the Fueling Pad are difficult to discern. Revise Figure 3 to include a smaller scale inset map or diagram of the Fueling Pad that provides a clearer image of the sample locations and revise the text size and color of the sample location labels to ensure that the labels are clear and legible. In addition, Sample DD-08-28' is depicted on Figure 3 in two different locations. Revise Figure 3 to show the correct location of sample DD-08-28'. Include the replacement Figure 3 with the response letter.

Comment 4

The images in Appendix C (Photographs of Decommissioning Activities) do not include captions that adequately explain the images. Revise the image captions in Appendix C to include a description which summarizes the date, location, orientation, and key elements of the image. Images that are intended to depict the extent of localized contamination must point out the zone of contamination. Provide replacement images with the response letter.

Western must submit the revised figures, images, replacement pages, and response letter with the required information addressing all the comments from this Approval with Modifications to NMED by **December 30, 2015**.

If you have any questions regarding this letter, please contact Robert Murphy of my staff at (505) 476-6022.

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
N. Dhawan, NMED HWB
K. Van Horn, NMED HWB
L. Tsinnajinnie, NMED HWB
R. Murphy, NMED HWB
C. Chavez, NMEMNRD OCD
A. Hains, Western Refining Company, El Paso, Texas
K. Robinson, Western Refining Company, Bloomfield Refinery

File: HWB-WRB-13-007 and Reading 2015

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

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.

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

ENVIRONMENT

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

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

Date:
June 11, 2015

Contact:
Pamela R. Krueger

Phone:
713.953.4816

Email:
pam.krueger@arcadis-us.com

Our ref:
TX001155

Dear Mr. Denton:

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).

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).

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

- 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

ARCADIS

Table

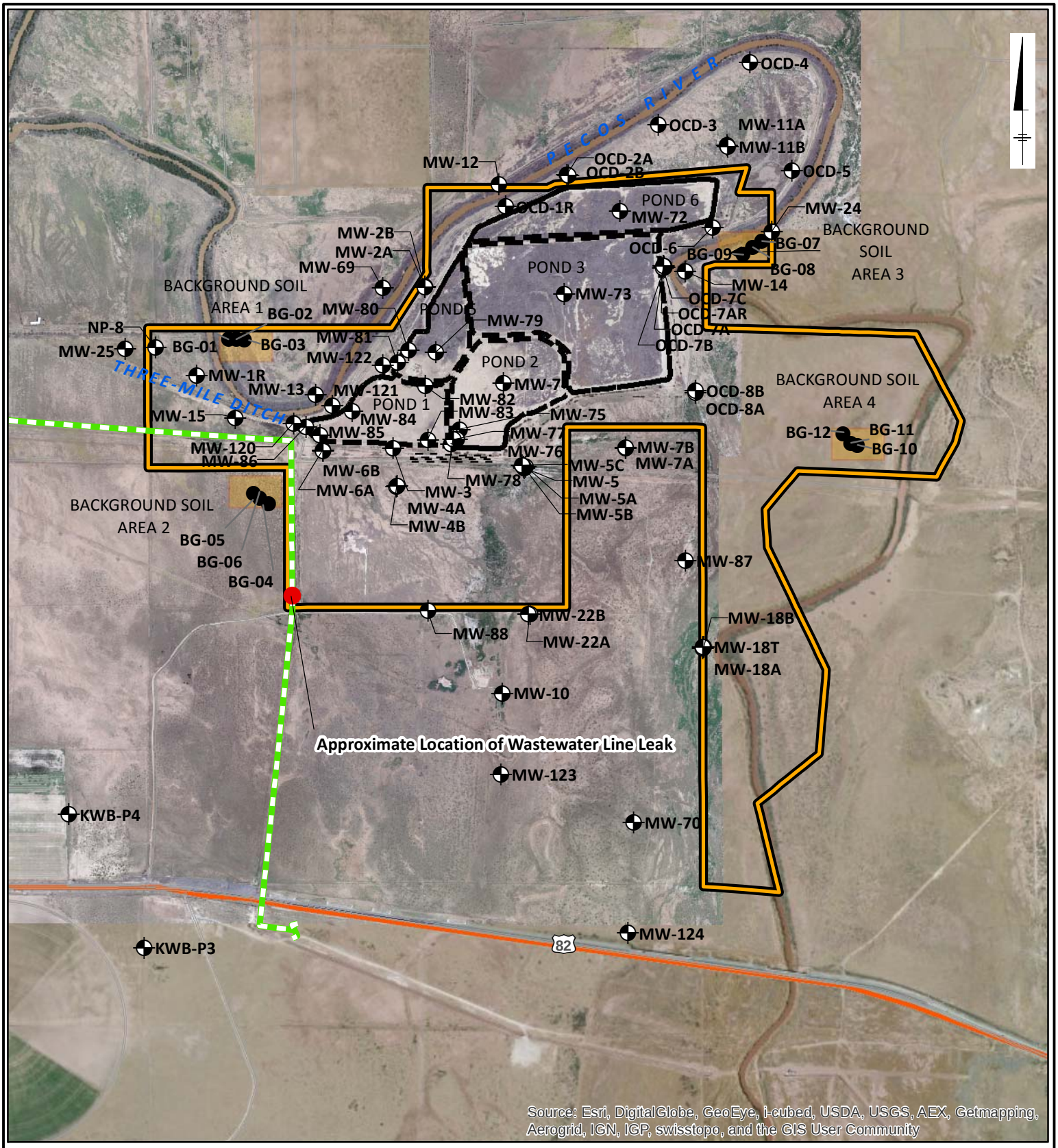
Table 1
Proposed Action Levels for Soil Delineation
Wastewater Line Leak, Artesia, NM

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

ARCADIS

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

ARCADIS

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 qualifers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

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

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

Sincerely,



Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

HALL ENVIRONMENTAL ANALYSIS LABORATORY

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.

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.

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.

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
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.

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

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Qualifiers:

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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.

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

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Qualifiers:

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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.

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:

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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.

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

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Qualifiers:

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Hall Environmental Analysis Laboratory, Inc.

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

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Qualifiers:

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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
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S	Spike Recovery outside accepted recovery limits		

Hall Environmental Analysis Laboratory, Inc.

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

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Qualifiers:

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Hall Environmental Analysis Laboratory, Inc.

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:

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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
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:

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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:

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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.	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-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.	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-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.
- 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: **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.	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-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.	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 **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.	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-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.	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

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: 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° 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 2 (<2 or >12 unless noted)

Adjusted? NO

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 °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.0	Good	Yes			

Chain-of-Custody Record

Client: Navajo Refining Co.	Turn-Around Time: ☐ Standar ☐ **Rush**
	Project Name: Quarterly WDW-1, 2, & 3 Inj Well
Mailing Address: P.O. Box 159 Artesia, NM 88211-0159	Project #: P.O. # 167796
Phone #: 575-748-3311	
email or Fax#: 575-746-5451	Project Manager: Dan Crawford
QA/QC Package: ☐ Standard ☐ Level 4 (Full Validation) ☐ Other ☐ EDD (Type)	Sampler: On Ice: ☒ Yes ☐ No Sample Temperature: 1.0

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

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

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1502959	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,I/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
2/23/15	0830	Liquid	WDW-1, 2, & 3 Effluent	3	Neat/H2SO4	-001	X						X
2/23/15	0830	Liquid	WDW-1, 2, & 3 Effluent	1	HNO3						X	X	
2/23/15	0830	Liquid	WDW-1, 2, & 3 Effluent	3	HCL			X					
2/23/15	0830	Liquid	WDW-1, 2, & 3 Effluent	2	Neat				X				
2/23/15	0830	Liquid	WDW-1, 2, & 3 Effluent	2	Neat					X			
2/23/15	0830	Liquid	Trip Blank	2	Neat	-002		X					
2/23/15	0830	Liquid	Temperature Blank	1	Neat	-0							

Date	Time	Relinquished by	Received by	Date	Time
2/23/15	0930	Elizabeth Salsberry			
		Elizabeth Salsberry		02/24/15	0800
Date:	Time:	Relinquished by:	Received by:	Date	Time

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 date 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

HOLLYFRONTIER
The HollyFrontier Companies

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	☑
Time Weighted Composite	☐
Flow Weighted Composite	☐

Parts / Sample Intervals	One

Physical Property	
Solid	☐
Liquid	☑
Sludge	☐

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)

				Preservatives								
Container	Size	Material	# of Containers	Neat (None)	HCL	HNO3	H2SO4	NaOH	Na2S2O3	NaHSO4	Other	Analysis and/or Method Requested
1			3	X			X					Specific Gravity,HCO3, CO3, Cl, SO4, TDS, pH, cond.,Fl, 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,I/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	☑
Refrigerated	☐
Other	☐

Shipping Media	
Ice	☑
Other	☐

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

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 (x) and the standard deviation (S) using the following parametric formula:

$$UTL = x + S\,\kappa$$

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 be to 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 be to 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 is 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 or 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 be to 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 be to 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 be to 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 be to 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 be to 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 be to 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 be to 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 be to 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 be to 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.

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

Boring	Area	Depth feet	Arsenic mg/kg	Barium mg/kg	Cadmium mg/kg		Chromium mg/kg	Copper mg/kg	Iron mg/kg	Lead mg/kg	Manganese mg/kg	Mercury 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.

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

Boring	Area	Depth feet	Nickel mg/kg	Selenium mg/kg		Silver mg/kg		Vanadium mg/kg	Zinc mg/kg	Chloride mg/kg	Fluoride mg/kg		Sulfate 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.

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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.