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National Center for Testing & Innovation

ANALYTICAL REPORT

November 26, 2019

Caerus Oil and Gas

Sample Delivery Group:	L1161765
Samples Received:	11/16/2019
Project Number:	17F PRODUCED WATER R
Description:	17F Produced Water Release
Site:	17F
Report To:	Brett Middleton 143 Diamond Avenue Parachute, CO 81635

Entire Report Reviewed By: Chris Ward

Chris Ward
Project Manager

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20191114-17F (POC-01) L1161765-01 Solid

Collected by: Steve S. | Collected date/time: 11/14/19 14:05 | Received date/time: 11/16/19 08:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1382352	1	11/23/19 13:32	11/23/19 13:32	EL	Mt. Juliet, TN
Calculated Results	WG1384278	1	11/20/19 20:40	11/21/19 19:11	JIC	Mt. Juliet, TN
Wet Chemistry by Method 3060A/7196A	WG1384243	1	11/21/19 09:30	11/21/19 19:11	JIC	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG1382517	1	11/18/19 12:15	11/18/19 16:05	ANP	Mt. Juliet, TN
Wet Chemistry by Method 9050AMod	WG1383778	1	11/20/19 12:28	11/21/19 00:21	AKA	Mt. Juliet, TN
Mercury by Method 7471A	WG1384238	1	11/21/19 15:28	11/22/19 13:07	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1384278	1	11/20/19 20:40	11/21/19 08:15	CCE	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG1383788	1	11/18/19 09:40	11/21/19 08:45	ACG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1384837	1	11/18/19 09:40	11/22/19 03:02	ACG	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1384001	1	11/20/19 18:49	11/21/19 03:50	KME	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1384021	1	11/20/19 18:15	11/21/19 04:35	DMG	Mt. Juliet, TN

20191114-17F (ST-01) L1161765-02 Solid

Collected by: Steve S. | Collected date/time: 11/14/19 14:10 | Received date/time: 11/16/19 08:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1382352	1	11/23/19 13:35	11/23/19 13:35	EL	Mt. Juliet, TN
Calculated Results	WG1384278	1	11/20/19 20:40	11/21/19 19:12	JIC	Mt. Juliet, TN
Wet Chemistry by Method 3060A/7196A	WG1384243	1	11/21/19 09:30	11/21/19 19:12	JIC	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG1382517	1	11/18/19 12:15	11/18/19 16:05	ANP	Mt. Juliet, TN
Wet Chemistry by Method 9050AMod	WG1383778	1	11/20/19 12:28	11/21/19 00:21	AKA	Mt. Juliet, TN
Mercury by Method 7471A	WG1384238	1	11/21/19 15:28	11/22/19 13:09	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1384278	1	11/20/19 20:40	11/21/19 08:17	CCE	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG1383788	1	11/18/19 09:40	11/21/19 09:07	ACG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1384837	1	11/18/19 09:40	11/22/19 03:23	ACG	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1384001	1	11/20/19 18:49	11/21/19 04:03	KME	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1384021	1	11/20/19 18:15	11/21/19 04:56	DMG	Mt. Juliet, TN

20191114-17F (SP-01) L1161765-03 Solid

Collected by: Steve S. | Collected date/time: 11/14/19 14:15 | Received date/time: 11/16/19 08:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1382352	1	11/23/19 13:38	11/23/19 13:38	EL	Mt. Juliet, TN
Calculated Results	WG1384278	1	11/20/19 20:40	11/21/19 08:20	CCE	Mt. Juliet, TN
Wet Chemistry by Method 3060A/7196A	WG1384243	1	11/21/19 09:30	11/21/19 19:13	JIC	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG1382517	1	11/18/19 12:15	11/18/19 16:05	ANP	Mt. Juliet, TN
Wet Chemistry by Method 9050AMod	WG1383778	1	11/20/19 12:28	11/21/19 00:21	AKA	Mt. Juliet, TN
Mercury by Method 7471A	WG1384238	1	11/21/19 15:28	11/22/19 13:11	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1384278	1	11/20/19 20:40	11/21/19 08:20	CCE	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG1383788	1	11/18/19 09:40	11/21/19 09:29	ACG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1384837	1	11/18/19 09:40	11/22/19 03:43	ACG	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1384001	1	11/20/19 18:49	11/21/19 04:17	KME	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1384021	1	11/20/19 18:15	11/21/19 05:17	DMG	Mt. Juliet, TN

20191114-17F (POR-01) L1161765-04 Solid

Collected by: Steve S. | Collected date/time: 11/14/19 14:20 | Received date/time: 11/16/19 08:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1382352	1	11/23/19 13:41	11/23/19 13:41	EL	Mt. Juliet, TN
Calculated Results	WG1384278	1	11/20/19 20:40	11/21/19 08:23	CCE	Mt. Juliet, TN
Wet Chemistry by Method 3060A/7196A	WG1384243	1	11/21/19 09:30	11/21/19 19:13	JIC	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG1382517	1	11/18/19 12:15	11/18/19 16:05	ANP	Mt. Juliet, TN
Wet Chemistry by Method 9050AMod	WG1383778	1	11/20/19 12:28	11/21/19 00:21	AKA	Mt. Juliet, TN

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

20191114-17F (POR-01) L1161765-04 Solid

Collected by: Steve S.
Collected date/time: 11/14/19 14:20
Received date/time: 11/16/19 08:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1384238	1	11/21/19 15:28	11/22/19 13:13	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1384278	1	11/20/19 20:40	11/21/19 08:23	CCE	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG1384913	500	11/18/19 09:40	11/22/19 21:37	JAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1384837	40	11/18/19 09:40	11/22/19 04:03	ACG	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015	WG1384001	1	11/20/19 18:49	11/21/19 04:31	KME	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1384021	1	11/20/19 18:15	11/21/19 05:38	DMG	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, 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 Ward
Project Manager

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	0.929		1	11/23/2019 13:32	WG1382352

Calculated Results

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Chromium,Trivalent	10.6		1.00	1	11/21/2019 19:11	WG1384278

Wet Chemistry by Method 3060A/7196A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Chromium,Hexavalent	ND		2.00	1	11/21/2019 19:11	WG1384243

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	8.57	T8	1	11/18/2019 16:05	WG1382517

Sample Narrative:

L1161765-01 WG1382517: 8.57 at 20.6C

Wet Chemistry by Method 9050AMod

Analyte	Result umhos/cm	Qualifier	RDL umhos/cm	Dilution	Analysis date / time	Batch
Specific Conductance	133		10.0	1	11/21/2019 00:21	WG1383778

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0300	1	11/22/2019 13:07	WG1384238

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Arsenic	6.05		2.00	1	11/21/2019 08:15	WG1384278
Barium	402		0.500	1	11/21/2019 08:15	WG1384278
Cadmium	ND		0.500	1	11/21/2019 08:15	WG1384278
Chromium	10.6		1.00	1	11/21/2019 08:15	WG1384278
Copper	10.4		2.00	1	11/21/2019 08:15	WG1384278
Lead	9.47		0.500	1	11/21/2019 08:15	WG1384278
Nickel	15.2		2.00	1	11/21/2019 08:15	WG1384278
Selenium	ND		2.00	1	11/21/2019 08:15	WG1384278
Silver	ND		1.00	1	11/21/2019 08:15	WG1384278
Zinc	38.5		5.00	1	11/21/2019 08:15	WG1384278

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) Low Fraction	0.158	B	0.100	1	11/21/2019 08:45	WG1383788
(S) a,a,a-Trifluorotoluene(FID)	*98.3*		*77.0-120*		*11/21/2019 08:45*	WG1383788

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.00100	1	11/22/2019 03:02	WG1384837
Toluene	ND		0.00500	1	11/22/2019 03:02	WG1384837
Ethylbenzene	ND		0.00250	1	11/22/2019 03:02	WG1384837
Total Xylenes	ND		0.00650	1	11/22/2019 03:02	WG1384837
(S) Toluene-d8	*98.9*		*75.0-131*		*11/22/2019 03:02*	WG1384837
(S) 4-Bromofluorobenzene	*82.0*		*67.0-138*		*11/22/2019 03:02*	WG1384837
(S) 1,2-Dichloroethane-d4	*104*		*70.0-130*		*11/22/2019 03:02*	WG1384837

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	ND		4.00	1	11/21/2019 03:50	WG1384001
(S) o-Terphenyl	*40.6*		*18.0-148*		*11/21/2019 03:50*	WG1384001

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	ND		0.00600	1	11/21/2019 04:35	WG1384021
Acenaphthene	ND		0.00600	1	11/21/2019 04:35	WG1384021
Acenaphthylene	ND		0.00600	1	11/21/2019 04:35	WG1384021
Benzo(a)anthracene	ND		0.00600	1	11/21/2019 04:35	WG1384021
Benzo(a)pyrene	ND		0.00600	1	11/21/2019 04:35	WG1384021
Benzo(b)fluoranthene	ND		0.00600	1	11/21/2019 04:35	WG1384021
Benzo(g,h,i)perylene	ND		0.00600	1	11/21/2019 04:35	WG1384021
Benzo(k)fluoranthene	ND		0.00600	1	11/21/2019 04:35	WG1384021
Chrysene	ND		0.00600	1	11/21/2019 04:35	WG1384021
Dibenz(a,h)anthracene	ND		0.00600	1	11/21/2019 04:35	WG1384021
Fluoranthene	ND		0.00600	1	11/21/2019 04:35	WG1384021
Fluorene	ND		0.00600	1	11/21/2019 04:35	WG1384021
Indeno(1,2,3-cd)pyrene	ND		0.00600	1	11/21/2019 04:35	WG1384021
Naphthalene	ND		0.0200	1	11/21/2019 04:35	WG1384021
Phenanthrene	ND		0.00600	1	11/21/2019 04:35	WG1384021
Pyrene	ND		0.00600	1	11/21/2019 04:35	WG1384021
1-Methylnaphthalene	ND		0.0200	1	11/21/2019 04:35	WG1384021
2-Methylnaphthalene	ND		0.0200	1	11/21/2019 04:35	WG1384021
2-Chloronaphthalene	ND		0.0200	1	11/21/2019 04:35	WG1384021
(S) p-Terphenyl-d14	*89.1*		*23.0-120*		*11/21/2019 04:35*	WG1384021
(S) Nitrobenzene-d5	*65.4*		*14.0-149*		*11/21/2019 04:35*	WG1384021
(S) 2-Fluorobiphenyl	*73.6*		*34.0-125*		*11/21/2019 04:35*	WG1384021

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	13.1		1	11/23/2019 13:35	WG1382352

Calculated Results

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Chromium,Trivalent	9.51		1.00	1	11/21/2019 19:12	WG1384278

Wet Chemistry by Method 3060A/7196A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Chromium,Hexavalent	ND		2.00	1	11/21/2019 19:12	WG1384243

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	8.31	T8	1	11/18/2019 16:05	WG1382517

Sample Narrative:

L1161765-02 WG1382517: 8.31 at 20.1C

Wet Chemistry by Method 9050AMod

Analyte	Result umhos/cm	Qualifier	RDL umhos/cm	Dilution	Analysis date / time	Batch
Specific Conductance	2020		10.0	1	11/21/2019 00:21	WG1383778

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0300	1	11/22/2019 13:09	WG1384238

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Arsenic	4.22		2.00	1	11/21/2019 08:17	WG1384278
Barium	520		0.500	1	11/21/2019 08:17	WG1384278
Cadmium	ND		0.500	1	11/21/2019 08:17	WG1384278
Chromium	9.51		1.00	1	11/21/2019 08:17	WG1384278
Copper	11.7		2.00	1	11/21/2019 08:17	WG1384278
Lead	5.62		0.500	1	11/21/2019 08:17	WG1384278
Nickel	12.5		2.00	1	11/21/2019 08:17	WG1384278
Selenium	ND		2.00	1	11/21/2019 08:17	WG1384278
Silver	ND		1.00	1	11/21/2019 08:17	WG1384278
Zinc	24.6		5.00	1	11/21/2019 08:17	WG1384278

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) Low Fraction	0.142	B	0.100	1	11/21/2019 09:07	WG1383788
(S) a,a,a-Trifluorotoluene(FID)	*99.4*		*77.0-120*		*11/21/2019 09:07*	WG1383788

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.00100	1	11/22/2019 03:23	WG1384837
Toluene	ND		0.00500	1	11/22/2019 03:23	WG1384837
Ethylbenzene	ND		0.00250	1	11/22/2019 03:23	WG1384837
Total Xylenes	ND		0.00650	1	11/22/2019 03:23	WG1384837
(S) Toluene-d8	*101*		*75.0-131*		*11/22/2019 03:23*	WG1384837
(S) 4-Bromofluorobenzene	*82.1*		*67.0-138*		*11/22/2019 03:23*	WG1384837
(S) 1,2-Dichloroethane-d4	*105*		*70.0-130*		*11/22/2019 03:23*	WG1384837

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	9.43		4.00	1	11/21/2019 04:03	WG1384001
(S) o-Terphenyl	*42.9*		*18.0-148*		*11/21/2019 04:03*	WG1384001

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	ND		0.00600	1	11/21/2019 04:56	WG1384021
Acenaphthene	ND		0.00600	1	11/21/2019 04:56	WG1384021
Acenaphthylene	ND		0.00600	1	11/21/2019 04:56	WG1384021
Benzo(a)anthracene	ND		0.00600	1	11/21/2019 04:56	WG1384021
Benzo(a)pyrene	ND		0.00600	1	11/21/2019 04:56	WG1384021
Benzo(b)fluoranthene	ND		0.00600	1	11/21/2019 04:56	WG1384021
Benzo(g,h,i)perylene	ND		0.00600	1	11/21/2019 04:56	WG1384021
Benzo(k)fluoranthene	ND		0.00600	1	11/21/2019 04:56	WG1384021
Chrysene	ND		0.00600	1	11/21/2019 04:56	WG1384021
Dibenz(a,h)anthracene	ND		0.00600	1	11/21/2019 04:56	WG1384021
Fluoranthene	ND		0.00600	1	11/21/2019 04:56	WG1384021
Fluorene	ND		0.00600	1	11/21/2019 04:56	WG1384021
Indeno(1,2,3-cd)pyrene	ND		0.00600	1	11/21/2019 04:56	WG1384021
Naphthalene	ND		0.0200	1	11/21/2019 04:56	WG1384021
Phenanthrene	ND		0.00600	1	11/21/2019 04:56	WG1384021
Pyrene	ND		0.00600	1	11/21/2019 04:56	WG1384021
1-Methylnaphthalene	ND		0.0200	1	11/21/2019 04:56	WG1384021
2-Methylnaphthalene	ND		0.0200	1	11/21/2019 04:56	WG1384021
2-Chloronaphthalene	ND		0.0200	1	11/21/2019 04:56	WG1384021
(S) p-Terphenyl-d14	*88.6*		*23.0-120*		*11/21/2019 04:56*	WG1384021
(S) Nitrobenzene-d5	*60.4*		*14.0-149*		*11/21/2019 04:56*	WG1384021
(S) 2-Fluorobiphenyl	*70.8*		*34.0-125*		*11/21/2019 04:56*	WG1384021

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	40.3		1	11/23/2019 13:38	WG1382352

Calculated Results

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Chromium,Trivalent	10.9		1.00	1	11/21/2019 08:20	WG1384278

Wet Chemistry by Method 3060A/7196A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Chromium,Hexavalent	ND		2.00	1	11/21/2019 19:13	WG1384243

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	8.91	T8	1	11/18/2019 16:05	WG1382517

Sample Narrative:

L1161765-03 WG1382517: 8.91 at 20.1C

Wet Chemistry by Method 9050AMod

Analyte	Result umhos/cm	Qualifier	RDL umhos/cm	Dilution	Analysis date / time	Batch
Specific Conductance	2800		10.0	1	11/21/2019 00:21	WG1383778

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0300	1	11/22/2019 13:11	WG1384238

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Arsenic	3.40		2.00	1	11/21/2019 08:20	WG1384278
Barium	463		0.500	1	11/21/2019 08:20	WG1384278
Cadmium	ND		0.500	1	11/21/2019 08:20	WG1384278
Chromium	10.9		1.00	1	11/21/2019 08:20	WG1384278
Copper	8.98		2.00	1	11/21/2019 08:20	WG1384278
Lead	6.60		0.500	1	11/21/2019 08:20	WG1384278
Nickel	11.3		2.00	1	11/21/2019 08:20	WG1384278
Selenium	ND		2.00	1	11/21/2019 08:20	WG1384278
Silver	ND		1.00	1	11/21/2019 08:20	WG1384278
Zinc	34.1		5.00	1	11/21/2019 08:20	WG1384278

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) Low Fraction	1.53		0.100	1	11/21/2019 09:29	WG1383788
(S) a,a,a-Trifluorotoluene(FID)	*97.9*		*77.0-120*		*11/21/2019 09:29*	WG1383788

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.00298		0.00100	1	11/22/2019 03:43	WG1384837
Toluene	0.0147		0.00500	1	11/22/2019 03:43	WG1384837
Ethylbenzene	ND		0.00250	1	11/22/2019 03:43	WG1384837
Total Xylenes	0.0331		0.00650	1	11/22/2019 03:43	WG1384837
(S) Toluene-d8	*99.2*		*75.0-131*		*11/22/2019 03:43*	WG1384837
(S) 4-Bromofluorobenzene	*94.1*		*67.0-138*		*11/22/2019 03:43*	WG1384837
(S) 1,2-Dichloroethane-d4	*109*		*70.0-130*		*11/22/2019 03:43*	WG1384837

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	ND		4.00	1	11/21/2019 04:17	WG1384001
(S) o-Terphenyl	*39.4*		*18.0-148*		*11/21/2019 04:17*	WG1384001

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	ND		0.00600	1	11/21/2019 05:17	WG1384021
Acenaphthene	ND		0.00600	1	11/21/2019 05:17	WG1384021
Acenaphthylene	ND		0.00600	1	11/21/2019 05:17	WG1384021
Benzo(a)anthracene	ND		0.00600	1	11/21/2019 05:17	WG1384021
Benzo(a)pyrene	ND		0.00600	1	11/21/2019 05:17	WG1384021
Benzo(b)fluoranthene	ND		0.00600	1	11/21/2019 05:17	WG1384021
Benzo(g,h,i)perylene	ND		0.00600	1	11/21/2019 05:17	WG1384021
Benzo(k)fluoranthene	ND		0.00600	1	11/21/2019 05:17	WG1384021
Chrysene	ND		0.00600	1	11/21/2019 05:17	WG1384021
Dibenz(a,h)anthracene	ND		0.00600	1	11/21/2019 05:17	WG1384021
Fluoranthene	ND		0.00600	1	11/21/2019 05:17	WG1384021
Fluorene	ND		0.00600	1	11/21/2019 05:17	WG1384021
Indeno(1,2,3-cd)pyrene	ND		0.00600	1	11/21/2019 05:17	WG1384021
Naphthalene	ND		0.0200	1	11/21/2019 05:17	WG1384021
Phenanthrene	ND		0.00600	1	11/21/2019 05:17	WG1384021
Pyrene	ND		0.00600	1	11/21/2019 05:17	WG1384021
1-Methylnaphthalene	ND		0.0200	1	11/21/2019 05:17	WG1384021
2-Methylnaphthalene	ND		0.0200	1	11/21/2019 05:17	WG1384021
2-Chloronaphthalene	ND		0.0200	1	11/21/2019 05:17	WG1384021
(S) p-Terphenyl-d14	*82.7*		*23.0-120*		*11/21/2019 05:17*	WG1384021
(S) Nitrobenzene-d5	*65.6*		*14.0-149*		*11/21/2019 05:17*	WG1384021
(S) 2-Fluorobiphenyl	*62.1*		*34.0-125*		*11/21/2019 05:17*	WG1384021

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	77.5		1	11/23/2019 13:41	WG1382352

Calculated Results

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Chromium,Trivalent	12.5		1.00	1	11/21/2019 08:23	WG1384278

Wet Chemistry by Method 3060A/7196A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Chromium,Hexavalent	ND		2.00	1	11/21/2019 19:13	WG1384243

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	8.51	T8	1	11/18/2019 16:05	WG1382517

Sample Narrative:

L1161765-04 WG1382517: 8.51 at 20.5C

Wet Chemistry by Method 9050AMod

Analyte	Result umhos/cm	Qualifier	RDL umhos/cm	Dilution	Analysis date / time	Batch
Specific Conductance	3870		10.0	1	11/21/2019 00:21	WG1383778

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0300	1	11/22/2019 13:13	WG1384238

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Arsenic	3.09		2.00	1	11/21/2019 08:23	WG1384278
Barium	568		0.500	1	11/21/2019 08:23	WG1384278
Cadmium	ND		0.500	1	11/21/2019 08:23	WG1384278
Chromium	12.5		1.00	1	11/21/2019 08:23	WG1384278
Copper	12.0		2.00	1	11/21/2019 08:23	WG1384278
Lead	9.09		0.500	1	11/21/2019 08:23	WG1384278
Nickel	14.7		2.00	1	11/21/2019 08:23	WG1384278
Selenium	ND		2.00	1	11/21/2019 08:23	WG1384278
Silver	ND		1.00	1	11/21/2019 08:23	WG1384278
Zinc	43.7		5.00	1	11/21/2019 08:23	WG1384278

Volatile Organic Compounds (GC) by Method 8015D/GRO

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) Low Fraction	2570		50.0	500	11/22/2019 21:37	WG1384913
(S) a,a,a-Trifluorotoluene(FID)	*94.3*		*77.0-120*		*11/22/2019 21:37*	WG1384913

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	0.851		0.0400	40	11/22/2019 04:03	WG1384837
Toluene	9.55		0.200	40	11/22/2019 04:03	WG1384837
Ethylbenzene	2.96		0.100	40	11/22/2019 04:03	WG1384837
Total Xylenes	57.8		0.260	40	11/22/2019 04:03	WG1384837
(S) Toluene-d8	*100*		*75.0-131*		*11/22/2019 04:03*	WG1384837
(S) 4-Bromofluorobenzene	*98.8*		*67.0-138*		*11/22/2019 04:03*	WG1384837
(S) 1,2-Dichloroethane-d4	*107*		*70.0-130*		*11/22/2019 04:03*	WG1384837

Semi-Volatile Organic Compounds (GC) by Method 8015

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
TPH (GC/FID) High Fraction	279		4.00	1	11/21/2019 04:31	WG1384001
(S) o-Terphenyl	*51.8*		*18.0-148*		*11/21/2019 04:31*	WG1384001

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	ND		0.00600	1	11/21/2019 05:38	WG1384021
Acenaphthene	0.0112		0.00600	1	11/21/2019 05:38	WG1384021
Acenaphthylene	ND		0.00600	1	11/21/2019 05:38	WG1384021
Benzo(a)anthracene	ND		0.00600	1	11/21/2019 05:38	WG1384021
Benzo(a)pyrene	ND		0.00600	1	11/21/2019 05:38	WG1384021
Benzo(b)fluoranthene	ND		0.00600	1	11/21/2019 05:38	WG1384021
Benzo(g,h,i)perylene	ND		0.00600	1	11/21/2019 05:38	WG1384021
Benzo(k)fluoranthene	ND		0.00600	1	11/21/2019 05:38	WG1384021
Chrysene	ND		0.00600	1	11/21/2019 05:38	WG1384021
Dibenz(a,h)anthracene	ND		0.00600	1	11/21/2019 05:38	WG1384021
Fluoranthene	ND		0.00600	1	11/21/2019 05:38	WG1384021
Fluorene	0.0223		0.00600	1	11/21/2019 05:38	WG1384021
Indeno(1,2,3-cd)pyrene	ND		0.00600	1	11/21/2019 05:38	WG1384021
Naphthalene	0.421		0.0200	1	11/21/2019 05:38	WG1384021
Phenanthrene	0.0160		0.00600	1	11/21/2019 05:38	WG1384021
Pyrene	ND		0.00600	1	11/21/2019 05:38	WG1384021
1-Methylnaphthalene	0.379		0.0200	1	11/21/2019 05:38	WG1384021
2-Methylnaphthalene	1.06		0.0200	1	11/21/2019 05:38	WG1384021
2-Chloronaphthalene	ND		0.0200	1	11/21/2019 05:38	WG1384021
(S) p-Terphenyl-d14	*91.9*		*23.0-120*		*11/21/2019 05:38*	WG1384021
(S) Nitrobenzene-d5	*437*	J1	*14.0-149*		*11/21/2019 05:38*	WG1384021
(S) 2-Fluorobiphenyl	*80.8*		*34.0-125*		*11/21/2019 05:38*	WG1384021

Sample Narrative:

L1161765-04 WG1384021: Surrogate failure due to matrix interference

Method Blank (MB)

(MB) R3474779-1 11/21/19 19:01

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/kg		mg/kg	mg/kg
Chromium,Hexavalent	U		0.640	2.00

L1161765-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1161765-01 11/21/19 19:11 • (DUP) R3474779-7 11/21/19 19:11

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/kg	mg/kg		%		%
Chromium,Hexavalent	ND	0.000	1	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3474779-2 11/21/19 19:01

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/kg	mg/kg	%	%	
Chromium,Hexavalent	24.0	23.0	95.8	80.0-120	

L1161746-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1161746-01 11/21/19 19:02 • (MS) R3474779-3 11/21/19 19:02 • (MSD) R3474779-4 11/21/19 19:07

Analyte	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Chromium,Hexavalent	21.0	U	16.6	17.5	79.2	83.1	1	75.0-125			4.78	20

L1161746-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1161746-01 11/21/19 19:02 • (MS) R3474779-5 11/21/19 19:08

Analyte	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MS Rec.	Dilution	Rec. Limits	MS Qualifier
	mg/kg	mg/kg	mg/kg	%		%	
Chromium,Hexavalent	706	U	667	94.5	50	75.0-125	

L1161404-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1161404-02 11/18/19 16:05 • (DUP) R3473298-3 11/18/19 16:05

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.91	7.94	1	0.379		1

Sample Narrative:

OS: 7.91 at 20.4C

DUP: 7.94 at 19.3C

L1161789-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1161789-01 11/18/19 16:05 • (DUP) R3473298-4 11/18/19 16:05

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	8.66	8.75	1	1.03	J3	1

Sample Narrative:

OS: 8.66 at 20.7C

DUP: 8.75 at 20.3C

Laboratory Control Sample (LCS)

(LCS) R3473298-1 11/18/19 16:05

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	su	su	%	%	
pH	10.0	9.91	99.1	99.0-101	

Sample Narrative:

LCS: 9.91 at 19C

Method Blank (MB)

(MB) R3474350-1 11/21/19 00:21

Analyte	MB Result umhos/cm	MB Qualifier	MB MDL umhos/cm	MB RDL umhos/cm
Specific Conductance	U		10.0	10.0

L1161380-15 Original Sample (OS) • Duplicate (DUP)

(OS) L1161380-15 11/21/19 00:21 • (DUP) R3474350-3 11/21/19 00:21

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	364	360	1	1.10		20

L1161765-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1161765-03 11/21/19 00:21 • (DUP) R3474350-4 11/21/19 00:21

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	2800	2800	1	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3474350-2 11/21/19 00:21

Analyte	Spike Amount umhos/cm	LCS Result umhos/cm	LCS Rec. %	Rec. Limits %	LCS Qualifier
Specific Conductance	475	472	99.4	85.0-115	

Method Blank (MB)

(MB) R3475136-1 11/22/19 12:49

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Mercury	0.00600	J	0.00280	0.0300

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3475136-2 11/22/19 12:51 • (LCSD) R3475136-3 11/22/19 12:53

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	0.500	0.548	0.493	110	98.7	80.0-120			10.6	20

L1161923-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1161923-07 11/22/19 12:56 • (MS) R3475136-4 11/22/19 12:58 • (MSD) R3475136-5 11/22/19 13:04

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	0.500	0.0502	0.516	0.514	93.2	92.8	1	75.0-125			0.401	20

Method Blank (MB)

(MB) R3474485-1 11/21/19 07:35

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Arsenic	U		0.460	2.00
Barium	U		0.170	0.500
Cadmium	U		0.0700	0.500
Chromium	U		0.140	1.00
Copper	U		0.530	2.00
Lead	U		0.190	0.500
Nickel	U		0.490	2.00
Selenium	U		0.620	2.00
Silver	U		0.120	1.00
Zinc	U		0.590	5.00

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3474485-2 11/21/19 07:38 • (LCSD) R3474485-3 11/21/19 07:41

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 %
Arsenic	100	92.3	92.5	92.3	92.5	80.0-120			0.279	20
Barium	100	96.1	97.0	96.1	97.0	80.0-120			1.03	20
Cadmium	100	92.9	93.8	92.9	93.8	80.0-120			0.912	20
Chromium	100	94.1	95.0	94.1	95.0	80.0-120			0.884	20
Copper	100	92.8	93.5	92.8	93.5	80.0-120			0.758	20
Lead	100	92.8	93.8	92.8	93.8	80.0-120			1.07	20
Nickel	100	95.1	95.9	95.1	95.9	80.0-120			0.834	20
Selenium	100	93.5	94.8	93.5	94.8	80.0-120			1.43	20
Silver	20.0	17.5	17.6	87.4	88.1	80.0-120			0.793	20
Zinc	100	93.5	94.2	93.5	94.2	80.0-120			0.786	20

L1161780-17 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1161780-17 11/21/19 07:44 • (MS) R3474485-6 11/21/19 07:52 • (MSD) R3474485-7 11/21/19 07:55

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	122	10.3	130	132	98.3	99.6	1	75.0-125			1.21	20
Barium	122	72.9	180	182	87.7	89.1	1	75.0-125			0.960	20
Cadmium	122	0.802	124	126	101	103	1	75.0-125			1.84	20
Chromium	122	19.5	137	139	96.1	97.7	1	75.0-125			1.45	20
Copper	122	11.5	133	133	99.4	99.4	1	75.0-125			0.0479	20
Lead	122	28.4	149	147	98.5	97.6	1	75.0-125			0.745	20

L1161780-17 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1161780-17 11/21/19 07:44 • (MS) R3474485-6 11/21/19 07:52 • (MSD) R3474485-7 11/21/19 07:55

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 %
Nickel	122	11.0	133	135	100	102	1	75.0-125			1.45	20
Selenium	122	2.51	127	129	102	104	1	75.0-125			1.75	20
Silver	24.4	U	24.0	24.4	98.1	100	1	75.0-125			1.96	20
Zinc	122	334	265	303	0.000	0.000	1	75.0-125	J6	J6	13.5	20

Method Blank (MB)

(MB) R3474992-3 11/21/19 01:40

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TPH (GC/FID) Low Fraction	0.0527	J	0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	*103*			*77.0-120*

Laboratory Control Sample (LCS)

(LCS) R3474992-1 11/21/19 00:19

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
TPH (GC/FID) Low Fraction	5.50	4.48	81.5	72.0-127	
(S) a,a,a-Trifluorotoluene(FID)			*101*	*77.0-120*	

L1161383-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1161383-02 11/21/19 03:53 • (MS) R3474992-4 11/21/19 09:52 • (MSD) R3474992-5 11/21/19 10:16

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	4.95	1.72	3.36	3.38	33.1	33.5	1	10.0-151			0.593	28
(S) a,a,a-Trifluorotoluene(FID)					*99.3*	*99.7*		*77.0-120*				

Method Blank (MB)

(MB) R3475369-2 11/22/19 19:11

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TPH (GC/FID) Low Fraction	0.0311	J	0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	*100*			*77.0-120*

Laboratory Control Sample (LCS)

(LCS) R3475369-3 11/22/19 19:52

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
TPH (GC/FID) Low Fraction	5.50	5.10	92.7	72.0-127	
(S) a,a,a-Trifluorotoluene(FID)			*108*	*77.0-120*	

L1161765-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1161765-04 11/22/19 21:37 • (MS) R3475369-6 11/23/19 04:07 • (MSD) R3475369-7 11/23/19 04:28

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	2750	2570	4470	4570	69.1	72.7	500	10.0-151			2.21	28
(S) a,a,a-Trifluorotoluene(FID)					*109*	*108*		*77.0-120*				

Method Blank (MB)

(MB) R3475066-1 11/21/19 20:42

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000400	0.00100
Ethylbenzene	U		0.000530	0.00250
Toluene	U		0.00125	0.00500
Xylenes, Total	U		0.00478	0.00650
(S) Toluene-d8	*100*			*75.0-131*
(S) 4-Bromofluorobenzene	*83.3*			*67.0-138*
(S) 1,2-Dichloroethane-d4	*105*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3475066-2 11/21/19 21:35

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.125	0.122	97.6	70.0-123	
Ethylbenzene	0.125	0.123	98.4	74.0-126	
Toluene	0.125	0.0973	77.8	75.0-121	
Xylenes, Total	0.375	0.418	111	72.0-127	
(S) Toluene-d8			*100*	*75.0-131*	
(S) 4-Bromofluorobenzene			*107*	*67.0-138*	
(S) 1,2-Dichloroethane-d4			*101*	*70.0-130*	

Method Blank (MB)

(MB) R3474881-1 11/20/19 23:26

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TPH (GC/FID) High Fraction	U		0.769	4.00
(S) o-Terphenyl	*54.4*			*18.0-148*

Laboratory Control Sample (LCS)

(LCS) R3474881-2 11/20/19 23:40

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
TPH (GC/FID) High Fraction	50.0	37.1	74.2	50.0-150	
(S) o-Terphenyl			*49.1*	*18.0-148*	

Method Blank (MB)

(MB) R3474384-2 11/20/19 23:25

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Anthracene	U		0.000600	0.00600
Acenaphthene	U		0.000600	0.00600
Acenaphthylene	U		0.000600	0.00600
Benzo(a)anthracene	U		0.000600	0.00600
Benzo(a)pyrene	U		0.000600	0.00600
Benzo(b)fluoranthene	U		0.000600	0.00600
Benzo(g,h,i)perylene	U		0.000600	0.00600
Benzo(k)fluoranthene	U		0.000600	0.00600
Chrysene	U		0.000600	0.00600
Dibenz(a,h)anthracene	U		0.000600	0.00600
Fluoranthene	U		0.000600	0.00600
Fluorene	U		0.000600	0.00600
Indeno(1,2,3-cd)pyrene	U		0.000600	0.00600
Naphthalene	U		0.00200	0.0200
Phenanthrene	U		0.000600	0.00600
Pyrene	U		0.000600	0.00600
1-Methylnaphthalene	U		0.00200	0.0200
2-Methylnaphthalene	U		0.00200	0.0200
2-Chloronaphthalene	U		0.00200	0.0200
(S) Nitrobenzene-d5	*75.4*			*14.0-149*
(S) 2-Fluorobiphenyl	*81.2*			*34.0-125*
(S) p-Terphenyl-d14	*93.8*			*23.0-120*

Laboratory Control Sample (LCS)

(LCS) R3474384-1 11/20/19 23:04

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Anthracene	0.0800	0.0591	73.9	50.0-126	
Acenaphthene	0.0800	0.0607	75.9	50.0-120	
Acenaphthylene	0.0800	0.0635	79.4	50.0-120	
Benzo(a)anthracene	0.0800	0.0595	74.4	45.0-120	
Benzo(a)pyrene	0.0800	0.0526	65.8	42.0-120	
Benzo(b)fluoranthene	0.0800	0.0562	70.3	42.0-121	
Benzo(g,h,i)perylene	0.0800	0.0593	74.1	45.0-125	
Benzo(k)fluoranthene	0.0800	0.0631	78.9	49.0-125	
Chrysene	0.0800	0.0599	74.9	49.0-122	
Dibenz(a,h)anthracene	0.0800	0.0599	74.9	47.0-125	
Fluoranthene	0.0800	0.0604	75.5	49.0-129	

Laboratory Control Sample (LCS)

(LCS) R3474384-1 11/20/19 23:04

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Fluorene	0.0800	0.0606	75.8	49.0-120	
Indeno(1,2,3-cd)pyrene	0.0800	0.0612	76.5	46.0-125	
Naphthalene	0.0800	0.0579	72.4	50.0-120	
Phenanthrene	0.0800	0.0587	73.4	47.0-120	
Pyrene	0.0800	0.0578	72.3	43.0-123	
1-Methylnaphthalene	0.0800	0.0621	77.6	51.0-121	
2-Methylnaphthalene	0.0800	0.0582	72.8	50.0-120	
2-Chloronaphthalene	0.0800	0.0591	73.9	50.0-120	
(S) Nitrobenzene-d5			*77.5*	*14.0-149*	
(S) 2-Fluorobiphenyl			*79.7*	*34.0-125*	
(S) p-Terphenyl-d14			*89.0*	*23.0-120*	

L1161886-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1161886-01 11/20/19 23:45 • (MS) R3474384-3 11/21/19 00:06 • (MSD) R3474384-4 11/21/19 00:27

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 %
Anthracene	0.0800	ND	0.0634	0.0585	79.3	73.1	1	10.0-145			8.04	30
Acenaphthene	0.0800	ND	0.0639	0.0600	79.9	75.0	1	14.0-127			6.30	27
Acenaphthylene	0.0800	ND	0.0669	0.0630	83.6	78.8	1	21.0-124			6.00	25
Benzo(a)anthracene	0.0800	ND	0.0636	0.0584	79.5	73.0	1	10.0-139			8.52	30
Benzo(a)pyrene	0.0800	ND	0.0640	0.0578	80.0	72.3	1	10.0-141			10.2	31
Benzo(b)fluoranthene	0.0800	ND	0.0621	0.0567	77.6	70.9	1	10.0-140			9.09	36
Benzo(g,h,i)perylene	0.0800	ND	0.0651	0.0587	81.4	73.4	1	10.0-140			10.3	33
Benzo(k)fluoranthene	0.0800	ND	0.0638	0.0586	79.8	73.3	1	10.0-137			8.50	31
Chrysene	0.0800	ND	0.0621	0.0580	77.6	72.5	1	10.0-145			6.83	30
Dibenz(a,h)anthracene	0.0800	ND	0.0638	0.0597	79.8	74.6	1	10.0-132			6.64	31
Fluoranthene	0.0800	ND	0.0637	0.0590	79.6	73.8	1	10.0-153			7.66	33
Fluorene	0.0800	ND	0.0636	0.0602	79.5	75.3	1	11.0-130			5.49	29
Indeno(1,2,3-cd)pyrene	0.0800	ND	0.0651	0.0589	81.4	73.6	1	10.0-137			10.0	32
Naphthalene	0.0800	ND	0.0613	0.0583	76.6	72.9	1	10.0-135			5.02	27
Phenanthrene	0.0800	ND	0.0621	0.0579	77.6	72.4	1	10.0-144			7.00	31
Pyrene	0.0800	ND	0.0614	0.0558	76.8	69.8	1	10.0-148			9.56	35
1-Methylnaphthalene	0.0800	ND	0.0653	0.0600	81.6	75.0	1	10.0-142			8.46	28
2-Methylnaphthalene	0.0800	ND	0.0611	0.0568	76.4	71.0	1	10.0-137			7.29	28
2-Chloronaphthalene	0.0800	ND	0.0625	0.0580	78.1	72.5	1	29.0-120			7.47	24
(S) Nitrobenzene-d5					*84.1*	*80.8*		*14.0-149*				
(S) 2-Fluorobiphenyl					*86.8*	*83.0*		*34.0-125*				
(S) p-Terphenyl-d14					*97.4*	*93.2*		*23.0-120*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(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.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
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.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

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.
J1	Surrogate recovery limits have been exceeded; values are outside upper control limits.
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.
T8	Sample(s) received past/too close to holding time expiration.

Pace National 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.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

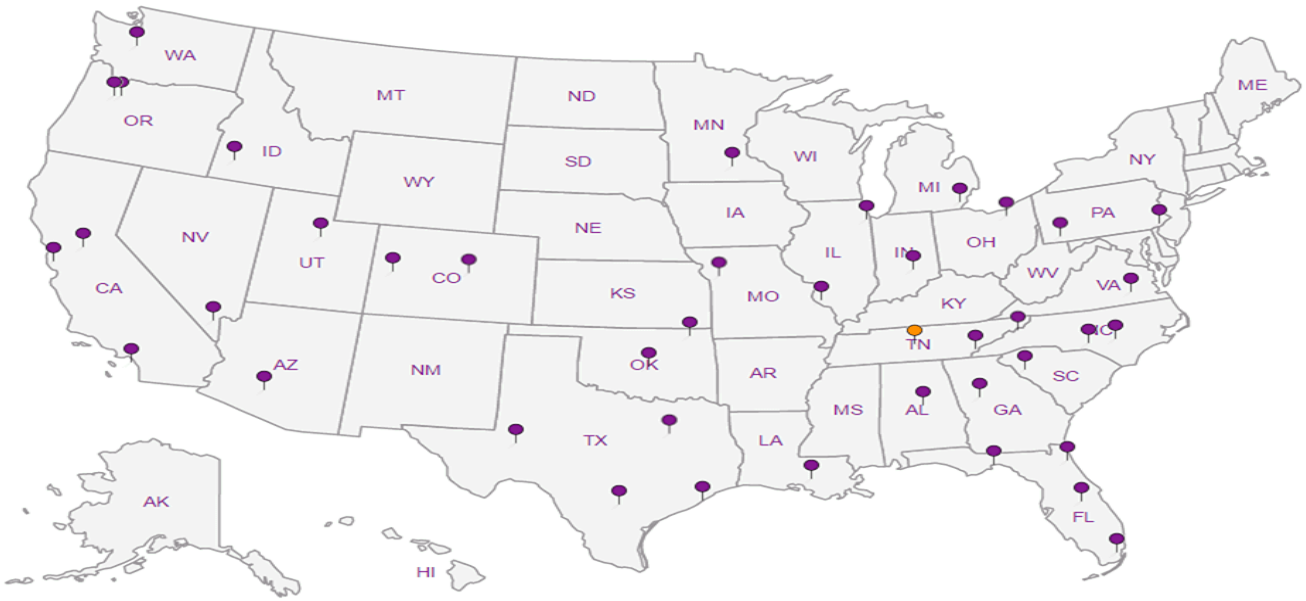
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National 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. Pace National performs all testing at our central laboratory.



Caerus Oil & Gas LLC
143 Diamond Avenue
Parachute, CO 81635
970-285-9606

Billing Information:
Same as above

Report to: **bmiddleton@caerusoilandgas.com**
Email To: **jjanicek@caerusoilandgas.com**

Project Description: 17F Produced Water Release
City/State Collected: Rulison, CO

Phone: see above
Fax:
Client Project #: 17F Produced Water Release
Lab Project #: 17F Produced Water Release

Collected by (print): Steve Sivigliano
Collected by (signature): Sta Sigli
Immediately Packed on Ice N ___ Y X
Site/Facility ID #: 17F
P.O. #: 17F Produced Water Release

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day
Quote #
Date Results Needed: **Standard TAT**

Chain of Custody Page 1 of 1

Pace Analytical®
National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L # 1161765
B144
Acctnum:
Template:
Prelogin:
TSR:
PB:
Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	TPH- GRO/DRO	BTEX	TABLE 910- PAH's	SAR, EC, pH	TABLE 910- Metals	Remarks	Sample # (lab only)
20191114-17F (BOC-01)	G	S	Surface	11-14-19	14:05	3	X	X	X	X	X		-01
20191114-17F (ST-01)	G	S		11-14-19	14:10	3	X	X	X	X	X		-02
20191114-17F (SP-01)	G	S		11-14-19	14:15	3	X	X	X	X	X		-03
20191114-17F (POR-01)	G	S		11-14-19	14:20	3	X	X	X	X	X		-04

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier __ _____
Tracking # N/A

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N
RAD SCREEN: <0.5 mR/hr

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
Sta Sigli	11-14-19	1400			
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:	
	11/15/19	1700		1.9-1=1.8 A 12	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:	Hold: Condition: NCF / OK
			Deborah Pinkston	11/16/19 8:30	