

Caerus Oil and Gas

Sample Delivery Group: L1676616
Samples Received: 11/10/2023
Project Number:
Description: OP33 P+A Investigation
Site: OP33
Report To: Jake J. / Brett M. / Blair R. / Andy V.
143 Diamond Avenue
Parachute, CO 81635

Entire Report Reviewed By:



Chris Ward
Project Manager

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 Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

Pace Analytical National12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

Cp: Cover Page	1
Tc: Table of Contents	2
Ss: Sample Summary	3
Cn: Case Narrative	4
Sr: Sample Results	5
20231109-OP33-(FC-FL)@4 L1676616-01	5
20231109-OP33-(FC-WH-KEINATH 33-9)@5 L1676616-02	7
Qc: Quality Control Summary	9
Wet Chemistry by Method 7199	9
Wet Chemistry by Method 9045D	10
Wet Chemistry by Method 9050AMod	11
Metals (ICP) by Method 6010B-NE493 Ch 2	13
Metals (ICPMS) by Method 6020	14
Volatile Organic Compounds (GC) by Method 8015D/GRO	15
Volatile Organic Compounds (GC/MS) by Method 8260B	16
Semi-Volatile Organic Compounds (GC) by Method 8015M	17
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	18
Gl: Glossary of Terms	20
Al: Accreditations & Locations	21
Sc: Sample Chain of Custody	22

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

SAMPLE SUMMARY

20231109-OP33-(FC-FL)@4 L1676616-01 Solid

Collected by
Trevor Lakin

Collected date/time
11/09/23 11:29

Received date/time
11/10/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG2171642	1	11/17/23 13:05	11/17/23 13:05	JTM	Mt. Juliet, TN
Wet Chemistry by Method 7199	WG2170360	1	11/13/23 14:50	11/20/23 06:35	SET	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG2170170	1	11/13/23 10:08	11/13/23 13:08	ARD	Mt. Juliet, TN
Wet Chemistry by Method 9050AMod	WG2170234	1	11/14/23 07:15	11/14/23 11:27	NTG	Mt. Juliet, TN
Metals (ICP) by Method 6010B-NE493 Ch 2	WG2171645	1	11/16/23 12:38	11/16/23 21:08	JTM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2169616	5	11/13/23 16:29	11/13/23 20:23	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG2171208	25	11/13/23 08:26	11/14/23 21:24	ADM	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG2172428	1	11/13/23 08:26	11/18/23 01:06	JHH	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015M	WG2170615	1	11/14/23 17:41	11/15/23 04:29	JAS	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG2169996	1	11/13/23 16:28	11/14/23 16:23	ALM	Mt. Juliet, TN

20231109-OP33-(FC-WH-KEINATH 33-9)@5 L1676616-02 Solid

Collected by
Trevor Lakin

Collected date/time
11/09/23 11:03

Received date/time
11/10/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG2171642	1	11/17/23 13:16	11/17/23 13:16	JTM	Mt. Juliet, TN
Wet Chemistry by Method 7199	WG2170360	1	11/13/23 14:50	11/20/23 06:40	SET	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG2170170	1	11/13/23 10:08	11/13/23 13:08	ARD	Mt. Juliet, TN
Wet Chemistry by Method 9050AMod	WG2170247	1	11/14/23 07:15	11/14/23 09:55	NTG	Mt. Juliet, TN
Metals (ICP) by Method 6010B-NE493 Ch 2	WG2171645	1	11/16/23 12:38	11/16/23 21:11	JTM	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2169616	5	11/13/23 16:29	11/13/23 20:48	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG2171208	25	11/13/23 08:26	11/14/23 21:44	ADM	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG2172428	1	11/13/23 08:26	11/18/23 01:25	JHH	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015M	WG2170615	1	11/14/23 17:41	11/15/23 02:35	JAS	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG2169996	1	11/13/23 16:28	11/14/23 16:41	ALM	Mt. Juliet, TN

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

CASE NARRATIVE

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	0.410		1	11/17/2023 13:05	WG2171642

Wet Chemistry by Method 7199

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Hexavalent Chromium	ND	J4	1.00	1	11/20/2023 06:35	WG2170360

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.54	T8	1	11/13/2023 13:08	WG2170170

Sample Narrative:

L1676616-01 WG2170170: 8.54 at 20.3C

Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Specific Conductance	264		10.0	1	11/14/2023 11:27	WG2170234

Sample Narrative:

L1676616-01 WG2170234: at 25C

Metals (ICP) by Method 6010B-NE493 Ch 2

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Hot Water Sol. Boron	0.201		0.200	1	11/16/2023 21:08	WG2171645

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	2.67		1.00	5	11/13/2023 20:23	WG2169616
Barium	470		2.50	5	11/13/2023 20:23	WG2169616
Cadmium	ND		1.00	5	11/13/2023 20:23	WG2169616
Copper	13.0		5.00	5	11/13/2023 20:23	WG2169616
Lead	18.2		2.00	5	11/13/2023 20:23	WG2169616
Nickel	9.76		2.50	5	11/13/2023 20:23	WG2169616
Selenium	ND		2.50	5	11/13/2023 20:23	WG2169616
Silver	ND		0.500	5	11/13/2023 20:23	WG2169616
Zinc	36.5		25.0	5	11/13/2023 20:23	WG2169616

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
TPH (GC/FID) Low Fraction	ND		2.50	25	11/14/2023 21:24	WG2171208
(S) a,a,a-Trifluorotoluene(FID)	96.6		77.0-120		11/14/2023 21:24	WG2171208

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.00100	1	11/18/2023 01:06	WG2172428
Toluene	ND		0.00500	1	11/18/2023 01:06	WG2172428
Ethylbenzene	ND		0.00250	1	11/18/2023 01:06	WG2172428
Xylenes, Total	ND		0.00650	1	11/18/2023 01:06	WG2172428
1,2,4-Trimethylbenzene	ND		0.00500	1	11/18/2023 01:06	WG2172428
1,3,5-Trimethylbenzene	ND		0.00500	1	11/18/2023 01:06	WG2172428
(S) Toluene-d8	100		75.0-131		11/18/2023 01:06	WG2172428
(S) 4-Bromofluorobenzene	106		67.0-138		11/18/2023 01:06	WG2172428
(S) 1,2-Dichloroethane-d4	95.9		70.0-130		11/18/2023 01:06	WG2172428

Semi-Volatile Organic Compounds (GC) by Method 8015M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	30.6		4.00	1	11/15/2023 04:29	WG2170615
C28-C36 Motor Oil Range	60.2		4.00	1	11/15/2023 04:29	WG2170615
(S) o-Terphenyl	59.0		18.0-148		11/15/2023 04:29	WG2170615

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Acenaphthene	ND		0.00600	1	11/14/2023 16:23	WG2169996
Anthracene	ND		0.00600	1	11/14/2023 16:23	WG2169996
Benzo(a)anthracene	ND		0.00600	1	11/14/2023 16:23	WG2169996
Benzo(b)fluoranthene	ND		0.00600	1	11/14/2023 16:23	WG2169996
Benzo(k)fluoranthene	ND		0.00600	1	11/14/2023 16:23	WG2169996
Benzo(a)pyrene	ND		0.00600	1	11/14/2023 16:23	WG2169996
Chrysene	ND		0.00600	1	11/14/2023 16:23	WG2169996
Dibenz(a,h)anthracene	ND		0.00600	1	11/14/2023 16:23	WG2169996
Fluoranthene	ND		0.00600	1	11/14/2023 16:23	WG2169996
Fluorene	ND		0.00600	1	11/14/2023 16:23	WG2169996
Indeno(1,2,3-cd)pyrene	ND		0.00600	1	11/14/2023 16:23	WG2169996
1-Methylnaphthalene	ND		0.0200	1	11/14/2023 16:23	WG2169996
2-Methylnaphthalene	ND		0.0200	1	11/14/2023 16:23	WG2169996
Naphthalene	ND		0.0200	1	11/14/2023 16:23	WG2169996
Pyrene	ND		0.00600	1	11/14/2023 16:23	WG2169996
(S) p-Terphenyl-d14	64.9		23.0-120		11/14/2023 16:23	WG2169996
(S) Nitrobenzene-d5	46.8		14.0-149		11/14/2023 16:23	WG2169996
(S) 2-Fluorobiphenyl	49.1		34.0-125		11/14/2023 16:23	WG2169996

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	0.381		1	11/17/2023 13:16	WG2171642

Wet Chemistry by Method 7199

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Hexavalent Chromium	ND	J4	1.00	1	11/20/2023 06:40	WG2170360

Wet Chemistry by Method 9045D

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	8.74	T8	1	11/13/2023 13:08	WG2170170

Sample Narrative:

L1676616-02 WG2170170: 8.74 at 21C

Wet Chemistry by Method 9050AMod

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Specific Conductance	175		10.0	1	11/14/2023 09:55	WG2170247

Sample Narrative:

L1676616-02 WG2170247: at 25C

Metals (ICP) by Method 6010B-NE493 Ch 2

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Hot Water Sol. Boron	0.226		0.200	1	11/16/2023 21:11	WG2171645

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic	3.03		1.00	5	11/13/2023 20:48	WG2169616
Barium	145		2.50	5	11/13/2023 20:48	WG2169616
Cadmium	ND		1.00	5	11/13/2023 20:48	WG2169616
Copper	10.4		5.00	5	11/13/2023 20:48	WG2169616
Lead	7.85		2.00	5	11/13/2023 20:48	WG2169616
Nickel	9.51		2.50	5	11/13/2023 20:48	WG2169616
Selenium	ND		2.50	5	11/13/2023 20:48	WG2169616
Silver	ND		0.500	5	11/13/2023 20:48	WG2169616
Zinc	29.1		25.0	5	11/13/2023 20:48	WG2169616

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
TPH (GC/FID) Low Fraction	ND		2.50	25	11/14/2023 21:44	WG2171208
(S) a,a,a-Trifluorotoluene(FID)	97.9		77.0-120		11/14/2023 21:44	WG2171208

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

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	11/18/2023 01:25	WG2172428
Toluene	ND		0.00500	1	11/18/2023 01:25	WG2172428
Ethylbenzene	ND		0.00250	1	11/18/2023 01:25	WG2172428
Xylenes, Total	ND		0.00650	1	11/18/2023 01:25	WG2172428
1,2,4-Trimethylbenzene	ND		0.00500	1	11/18/2023 01:25	WG2172428
1,3,5-Trimethylbenzene	ND		0.00500	1	11/18/2023 01:25	WG2172428
(S) Toluene-d8	105		75.0-131		11/18/2023 01:25	WG2172428
(S) 4-Bromofluorobenzene	114		67.0-138		11/18/2023 01:25	WG2172428
(S) 1,2-Dichloroethane-d4	97.0		70.0-130		11/18/2023 01:25	WG2172428

Semi-Volatile Organic Compounds (GC) by Method 8015M

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	ND		4.00	1	11/15/2023 02:35	WG2170615
C28-C36 Motor Oil Range	ND		4.00	1	11/15/2023 02:35	WG2170615
(S) o-Terphenyl	51.5		18.0-148		11/15/2023 02:35	WG2170615

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

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Acenaphthene	ND		0.00600	1	11/14/2023 16:41	WG2169996
Anthracene	ND		0.00600	1	11/14/2023 16:41	WG2169996
Benzo(a)anthracene	ND		0.00600	1	11/14/2023 16:41	WG2169996
Benzo(b)fluoranthene	ND		0.00600	1	11/14/2023 16:41	WG2169996
Benzo(k)fluoranthene	ND		0.00600	1	11/14/2023 16:41	WG2169996
Benzo(a)pyrene	ND		0.00600	1	11/14/2023 16:41	WG2169996
Chrysene	ND		0.00600	1	11/14/2023 16:41	WG2169996
Dibenz(a,h)anthracene	ND		0.00600	1	11/14/2023 16:41	WG2169996
Fluoranthene	ND		0.00600	1	11/14/2023 16:41	WG2169996
Fluorene	ND		0.00600	1	11/14/2023 16:41	WG2169996
Indeno(1,2,3-cd)pyrene	ND		0.00600	1	11/14/2023 16:41	WG2169996
1-Methylnaphthalene	ND		0.0200	1	11/14/2023 16:41	WG2169996
2-Methylnaphthalene	ND		0.0200	1	11/14/2023 16:41	WG2169996
Naphthalene	ND		0.0200	1	11/14/2023 16:41	WG2169996
Pyrene	ND		0.00600	1	11/14/2023 16:41	WG2169996
(S) p-Terphenyl-d14	58.8		23.0-120		11/14/2023 16:41	WG2169996
(S) Nitrobenzene-d5	56.0		14.0-149		11/14/2023 16:41	WG2169996
(S) 2-Fluorobiphenyl	50.1		34.0-125		11/14/2023 16:41	WG2169996

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Method Blank (MB)

(MB) R4002109-1 11/20/23 04:47

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Hexavalent Chromium	U		0.255	1.00

L1676591-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1676591-07 11/20/23 05:04 • (DUP) R4002109-3 11/20/23 05:10

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

L1676652-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1676652-02 11/20/23 07:11 • (DUP) R4002109-8 11/20/23 07:16

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

Laboratory Control Sample (LCS)

(LCS) R4002109-2 11/20/23 04:54

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/kg	mg/kg	%	%	
Hexavalent Chromium	10.0	14.2	142	80.0-120	J4

L1676591-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1676591-08 11/20/23 05:15 • (MS) R4002109-5 11/20/23 05:25 • (MSD) R4002109-6 11/20/23 05:30

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Hexavalent Chromium	20.0	ND	14.8	13.4	74.0	67.1	1	75.0-125	J6	J6	9.74	20

L1676591-08 Original Sample (OS) • Matrix Spike (MS)

(OS) L1676591-08 11/20/23 05:15 • (MS) R4002109-7 11/20/23 05:36

	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Analyte	mg/kg	mg/kg	mg/kg	%		%	
Hexavalent Chromium	646	ND	212	32.8	50	75.0-125	J6

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

L1676591-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1676591-04 11/13/23 13:08 • (DUP) R3999104-2 11/13/23 13:08

	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
Analyte	su	su		%		%
pH	8.64	8.65	1	0.116		1

Sample Narrative:

OS: 8.64 at 20.2C

DUP: 8.65 at 20.3C

L1676608-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1676608-01 11/13/23 13:08 • (DUP) R3999104-3 11/13/23 13:08

	Original Result	DUP Result	Dilution	DUP RPD	<u>DUP Qualifier</u>	DUP RPD Limits
Analyte	pH	su		%		%
pH	8.95	8.92	1	0.336		1

Sample Narrative:

OS: 8.95 at 20.7C

DUP: 8.92 at 20.8C

Laboratory Control Sample (LCS)

(LCS) R3999104-1 11/13/23 13:08

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	<u>LCS Qualifier</u>
Analyte	su	su	%	%	
pH	10.0	10.0	100	99.0-101	

Sample Narrative:

LCS: 10.01 at 19.5C

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R3999463-1 11/14/23 11:27

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

Sample Narrative:
BLANK: at 25C

L1676590-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1676590-04 11/14/23 11:27 • (DUP) R3999463-3 11/14/23 11:27

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	142	141	1	0.565		20

Sample Narrative:
OS: at 25C
DUP: at 25C

L1676604-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1676604-03 11/14/23 11:27 • (DUP) R3999463-4 11/14/23 11:27

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	2080	2080	1	0.0960		20

Sample Narrative:
OS: at 25C
DUP: at 25C

Laboratory Control Sample (LCS)

(LCS) R3999463-2 11/14/23 11:27

Analyte	Spike Amount umhos/cm	LCS Result umhos/cm	LCS Rec. %	Rec. Limits %	LCS Qualifier
Specific Conductance	327	327	100	85.0-115	

Sample Narrative:
LCS: at 25C

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3999404-1 11/14/23 09:55

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

Sample Narrative:

BLANK: at 25C

L1676616-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1676616-02 11/14/23 09:55 • (DUP) R3999404-3 11/14/23 09:55

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	175	180	1	2.88		20

Sample Narrative:

OS: at 25C

DUP: at 25C

L1676876-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1676876-05 11/14/23 09:55 • (DUP) R3999404-4 11/14/23 09:55

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	121	119	1	1.08		20

Sample Narrative:

OS: at 25C

DUP: at 25C

Laboratory Control Sample (LCS)

(LCS) R3999404-2 11/14/23 09:55

Analyte	Spike Amount umhos/cm	LCS Result umhos/cm	LCS Rec. %	Rec. Limits %	LCS Qualifier
Specific Conductance	327	346	106	85.0-115	

Sample Narrative:

LCS: at 25C

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Method Blank (MB)

(MB) R4001200-1 11/16/23 20:35

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Hot Water Sol. Boron	U		0.0167	0.200

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

(LCS) R4001200-2 11/16/23 20:37 • (LCSD) R4001200-3 11/16/23 20:40

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 %
Hot Water Sol. Boron	1.00	1.03	1.02	103	102	80.0-120			0.226	20

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc

Method Blank (MB)

(MB) R3999274-1 11/13/23 19:53

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Arsenic	U		0.100	1.00
Barium	0.445	J	0.152	2.50
Cadmium	U		0.0855	1.00
Copper	U		0.133	5.00
Lead	U		0.0990	2.00
Nickel	U		0.197	2.50
Selenium	U		0.180	2.50
Silver	U		0.0865	0.500
Zinc	U		0.740	25.0

Laboratory Control Sample (LCS)

(LCS) R3999274-2 11/13/23 19:56

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic	100	96.4	96.4	80.0-120	
Barium	100	95.4	95.4	80.0-120	
Cadmium	100	98.4	98.4	80.0-120	
Copper	100	97.2	97.2	80.0-120	
Lead	100	97.0	97.0	80.0-120	
Nickel	100	96.8	96.8	80.0-120	
Selenium	100	100	100	80.0-120	
Silver	20.0	19.2	96.1	80.0-120	
Zinc	100	91.0	91.0	80.0-120	

L1676645-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1676645-02 11/13/23 19:59 • (MS) R3999274-5 11/13/23 20:09 • (MSD) R3999274-6 11/13/23 20:13

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 %
Arsenic	100	7.34	94.6	95.1	87.3	87.8	5	75.0-125			0.525	20
Barium	100	222	273	259	50.6	37.4	5	75.0-125	J6	J6	4.97	20
Cadmium	100	ND	92.2	91.9	91.9	91.6	5	75.0-125			0.393	20
Copper	100	11.4	100	98.9	88.6	87.5	5	75.0-125			1.13	20
Lead	100	10.2	96.6	99.6	86.4	89.4	5	75.0-125			3.01	20
Nickel	100	12.9	99.6	99.0	86.7	86.1	5	75.0-125			0.570	20
Selenium	100	ND	88.9	88.7	88.3	88.1	5	75.0-125			0.229	20
Silver	20.0	ND	18.1	18.3	90.3	91.6	5	75.0-125			1.40	20
Zinc	100	33.7	117	117	83.2	82.8	5	75.0-125			0.277	20

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc

Method Blank (MB)

(MB) R4000177-3 11/14/23 12:07

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TPH (GC/FID) Low Fraction	U		0.543	2.50
(S) a,a,a-Trifluorotoluene(FID)	95.0			77.0-120

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

(LCS) R4000177-1 11/14/23 10:50 • (LCSD) R4000177-2 11/14/23 11:09

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	5.52	5.27	100	95.8	72.0-127			4.63	20
(S) a,a,a-Trifluorotoluene(FID)				100	101	77.0-120				

L1676608-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1676608-01 11/14/23 20:46 • (MS) R4000177-4 11/14/23 23:01 • (MSD) R4000177-5 11/14/23 23:21

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	138	ND	128	125	91.4	89.2	25	10.0-151			2.37	28
(S) a,a,a-Trifluorotoluene(FID)					103	103		77.0-120				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R4002371-3 11/18/23 00:09

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000467	0.00100
Toluene	U		0.00130	0.00500
Ethylbenzene	U		0.000737	0.00250
Xylenes, Total	U		0.000880	0.00650
1,2,4-Trimethylbenzene	U		0.00158	0.00500
1,3,5-Trimethylbenzene	U		0.00200	0.00500
(S) Toluene-d8	98.8			75.0-131
(S) 4-Bromofluorobenzene	103			67.0-138
(S) 1,2-Dichloroethane-d4	98.8			70.0-130

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

(LCS) R4002371-1 11/17/23 22:53 • (LCSD) R4002371-2 11/17/23 23:12

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	0.125	0.140	0.134	112	107	70.0-123			4.38	20
Toluene	0.125	0.128	0.126	102	101	75.0-121			1.57	20
Ethylbenzene	0.125	0.131	0.128	105	102	74.0-126			2.32	20
Xylenes, Total	0.375	0.367	0.392	97.9	105	72.0-127			6.59	20
1,2,4-Trimethylbenzene	0.125	0.122	0.122	97.6	97.6	70.0-126			0.000	20
1,3,5-Trimethylbenzene	0.125	0.121	0.123	96.8	98.4	73.0-127			1.64	20
(S) Toluene-d8				99.7	98.9	75.0-131				
(S) 4-Bromofluorobenzene				105	104	67.0-138				
(S) 1,2-Dichloroethane-d4				99.0	99.4	70.0-130				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R4000111-1 11/15/23 01:46

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-C36 Motor Oil Range	U		0.274	4.00
(S) o-Terphenyl	61.3			18.0-148

Laboratory Control Sample (LCS)

(LCS) R4000111-2 11/15/23 01:59

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
C10-C28 Diesel Range	50.0	29.2	58.4	50.0-150	
(S) o-Terphenyl			56.6	18.0-148	

L1676636-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1676636-01 11/15/23 13:07 • (MS) R4000222-1 11/15/23 13:20 • (MSD) R4000222-2 11/15/23 13:33

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	48.2	ND	36.4	45.6	43.8	63.7	5	50.0-150	J6	J3	22.4	20
(S) o-Terphenyl					39.3	55.0		18.0-148				

Sample Narrative:

OS: Cannot run at lower dilution due to viscosity of extract

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Method Blank (MB)

(MB) R3999716-2 11/14/23 14:04

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Acenaphthene	U		0.00209	0.00600
Anthracene	U		0.00230	0.00600
Benzo(a)anthracene	U		0.00173	0.00600
Benzo(b)fluoranthene	U		0.00153	0.00600
Benzo(k)fluoranthene	U		0.00215	0.00600
Benzo(a)pyrene	U		0.00179	0.00600
Chrysene	U		0.00232	0.00600
Dibenz(a,h)anthracene	U		0.00172	0.00600
Fluoranthene	0.00274	U	0.00227	0.00600
Fluorene	U		0.00205	0.00600
Indeno(1,2,3-cd)pyrene	U		0.00181	0.00600
1-Methylnaphthalene	U		0.00449	0.0200
2-Methylnaphthalene	U		0.00427	0.0200
Naphthalene	U		0.00408	0.0200
Pyrene	U		0.00200	0.00600
(S) p-Terphenyl-d14	72.4			23.0-120
(S) Nitrobenzene-d5	56.4			14.0-149
(S) 2-Fluorobiphenyl	60.6			34.0-125

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Laboratory Control Sample (LCS)

(LCS) R3999716-1 11/14/23 13:46

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Acenaphthene	0.0800	0.0634	79.3	50.0-120	
Anthracene	0.0800	0.0628	78.5	50.0-126	
Benzo(a)anthracene	0.0800	0.0684	85.5	45.0-120	
Benzo(b)fluoranthene	0.0800	0.0668	83.5	42.0-121	
Benzo(k)fluoranthene	0.0800	0.0635	79.4	49.0-125	
Benzo(a)pyrene	0.0800	0.0619	77.4	42.0-120	
Chrysene	0.0800	0.0711	88.9	49.0-122	
Dibenz(a,h)anthracene	0.0800	0.0666	83.3	47.0-125	
Fluoranthene	0.0800	0.0723	90.4	49.0-129	
Fluorene	0.0800	0.0659	82.4	49.0-120	
Indeno(1,2,3-cd)pyrene	0.0800	0.0737	92.1	46.0-125	
1-Methylnaphthalene	0.0800	0.0620	77.5	51.0-121	
2-Methylnaphthalene	0.0800	0.0591	73.9	50.0-120	
Naphthalene	0.0800	0.0592	74.0	50.0-120	
Pyrene	0.0800	0.0757	94.6	43.0-123	

Laboratory Control Sample (LCS)

(LCS) R3999716-1 11/14/23 13:46

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
(S) p-Terphenyl-d14			81.2	23.0-120	
(S) Nitrobenzene-d5			59.2	14.0-149	
(S) 2-Fluorobiphenyl			60.6	34.0-125	

L1676608-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1676608-01 11/14/23 15:31 • (MS) R3999716-3 11/14/23 15:48 • (MSD) R3999716-4 11/14/23 16:06

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 %
Acenaphthene	0.0760	ND	0.0374	0.0471	49.2	62.0	1	14.0-127			23.0	27
Anthracene	0.0760	ND	0.0371	0.0458	48.8	60.3	1	10.0-145			21.0	30
Benzo(a)anthracene	0.0760	ND	0.0437	0.0529	57.5	69.6	1	10.0-139			19.0	30
Benzo(b)fluoranthene	0.0760	ND	0.0380	0.0475	50.0	62.5	1	10.0-140			22.2	36
Benzo(k)fluoranthene	0.0760	ND	0.0403	0.0481	53.0	63.3	1	10.0-137			17.6	31
Benzo(a)pyrene	0.0760	ND	0.0443	0.0539	58.3	70.9	1	10.0-141			19.6	31
Chrysene	0.0760	ND	0.0462	0.0541	60.8	71.2	1	10.0-145			15.8	30
Dibenz(a,h)anthracene	0.0760	ND	0.0431	0.0511	56.7	67.2	1	10.0-132			17.0	31
Fluoranthene	0.0760	ND	0.0393	0.0500	51.7	65.8	1	10.0-153			24.0	33
Fluorene	0.0760	ND	0.0381	0.0473	50.1	62.2	1	11.0-130			21.5	29
Indeno(1,2,3-cd)pyrene	0.0760	ND	0.0444	0.0547	58.4	72.0	1	10.0-137			20.8	32
1-Methylnaphthalene	0.0760	ND	0.0386	0.0487	50.8	64.1	1	10.0-142			23.1	28
2-Methylnaphthalene	0.0760	ND	0.0366	0.0455	48.2	59.9	1	10.0-137			21.7	28
Naphthalene	0.0760	ND	0.0410	0.0490	53.9	64.5	1	10.0-135			17.8	27
Pyrene	0.0760	ND	0.0416	0.0529	54.7	69.6	1	10.0-148			23.9	35
(S) p-Terphenyl-d14					67.4	71.2		23.0-120				
(S) Nitrobenzene-d5					49.5	53.3		14.0-149				
(S) 2-Fluorobiphenyl					50.8	53.5		34.0-125				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

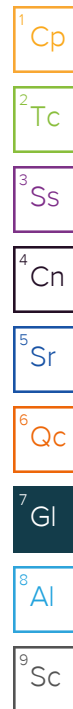
The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

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

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
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.
T8	Sample(s) received past/too close to holding time expiration.



ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey--NELAP	TN002
California	2932	New Mexico ¹	TN00003
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	LA000356
Kentucky ^{1,6}	KY90010	South Carolina	84004002
Kentucky ²	16	South Dakota	n/a
Louisiana	AI30792	Tennessee ^{1,4}	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas ⁵	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
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

* 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 Analytical.



Hold:	Condition: NCE / OK
-------	------------------------