

June 14, 2021

Caerus Oil and Gas

Sample Delivery Group: L1362248
Samples Received: 06/05/2021
Project Number: J17E
Description: J17E Dumpline Release
Site: J17E
Report To: Brett Middleton
143 Diamond Avenue
Parachute, CO 81635

Entire Report Reviewed By:



Chris Ward
Project Manager

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Pace Analytical National

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TABLE OF CONTENTS

Cp: Cover Page	1
Tc: Table of Contents	2
Ss: Sample Summary	3
Cn: Case Narrative	4
Sr: Sample Results	5
20210603-J17E (CSTK01) L1362248-01	5
20210603-J17E (CSTK02) L1362248-02	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	12
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

20210603-J17E (CSTK01) L1362248-01 Solid

Collected by
DH

Collected date/time
06/03/21 15:30

Received date/time
06/05/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1683485	1	06/09/21 11:44	06/09/21 11:44	EL	Mt. Juliet, TN
Wet Chemistry by Method 7199	WG1685344	1	06/09/21 12:53	06/09/21 22:34	MCG	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG1685389	1	06/09/21 10:54	06/09/21 12:30	ARM	Mt. Juliet, TN
Wet Chemistry by Method 9050AMod	WG1685232	1	06/11/21 12:00	06/11/21 16:24	ARD	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1683347	1	06/08/21 06:30	06/08/21 23:36	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B-NE493 Ch 2	WG1683484	1	06/08/21 09:39	06/09/21 12:43	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1683348	5	06/08/21 06:27	06/08/21 17:39	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG1684207	1	06/07/21 11:52	06/08/21 08:54	JAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1684422	1	06/07/21 11:52	06/08/21 02:13	JAH	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015M	WG1684225	1	06/07/21 14:53	06/08/21 23:08	CAG	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1684231	1	06/07/21 19:41	06/08/21 00:13	AMG	Mt. Juliet, TN

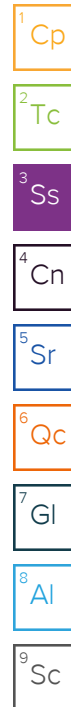
20210603-J17E (CSTK02) L1362248-02 Solid

Collected by
DH

Collected date/time
06/03/21 15:55

Received date/time
06/05/21 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1683485	1	06/09/21 11:47	06/09/21 11:47	EL	Mt. Juliet, TN
Wet Chemistry by Method 7199	WG1685344	1	06/09/21 12:53	06/09/21 22:39	MCG	Mt. Juliet, TN
Wet Chemistry by Method 9045D	WG1685389	1	06/09/21 10:54	06/09/21 12:30	ARM	Mt. Juliet, TN
Wet Chemistry by Method 9050AMod	WG1685232	1	06/11/21 12:00	06/11/21 16:24	ARD	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1683347	1	06/08/21 06:30	06/08/21 23:39	EL	Mt. Juliet, TN
Metals (ICP) by Method 6010B-NE493 Ch 2	WG1683484	1	06/08/21 09:39	06/09/21 12:46	EL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG1683348	5	06/08/21 06:27	06/08/21 17:43	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC) by Method 8015D/GRO	WG1684207	1	06/07/21 11:52	06/08/21 09:18	JAH	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1684422	1	06/07/21 11:52	06/08/21 02:32	JAH	Mt. Juliet, TN
Semi-Volatile Organic Compounds (GC) by Method 8015M	WG1684225	1	06/07/21 14:53	06/08/21 22:55	CAG	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1684231	1	06/07/21 19:41	06/08/21 00:33	AMG	Mt. Juliet, TN



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	1.88		1	06/09/2021 11:44	WG1683485

Wet Chemistry by Method 7199

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Hexavalent Chromium	U		0.255	1.00	1	06/09/2021 22:34	WG1685344

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	8.39	T8	1	06/09/2021 12:30	WG1685389

Sample Narrative:

L1362248-01 WG1685389: 8.39 at 23.4C

Wet Chemistry by Method 9050AMod

Analyte	Result umhos/cm	Qualifier	RDL umhos/cm	Dilution	Analysis date / time	Batch
Specific Conductance	486		10.0	1	06/11/2021 16:24	WG1685232

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Barium	1650		0.0852	0.500	1	06/08/2021 23:36	WG1683347
Cadmium	0.195	J	0.0471	0.500	1	06/08/2021 23:36	WG1683347
Nickel	14.0		0.132	2.00	1	06/08/2021 23:36	WG1683347
Selenium	U		0.764	2.00	1	06/08/2021 23:36	WG1683347

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

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Hot Water Sol. Boron	0.367		0.0167	0.200	1	06/09/2021 12:43	WG1683484

Metals (ICPMS) by Method 6020

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Arsenic	7.05		0.100	1.00	5	06/08/2021 17:39	WG1683348

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	0.0864	B J	0.0217	0.100	1	06/08/2021 08:54	WG1684207
(S) <i>a,a,a</i> -Trifluorotoluene(FID)	97.2			77.0-120		06/08/2021 08:54	WG1684207

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		0.000467	0.00100	1	06/08/2021 02:13	WG1684422
Toluene	U		0.00130	0.00500	1	06/08/2021 02:13	WG1684422
Ethylbenzene	U		0.000737	0.00250	1	06/08/2021 02:13	WG1684422
Xylenes, Total	U		0.000880	0.00650	1	06/08/2021 02:13	WG1684422

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

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

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
1,2,4-Trimethylbenzene	U		0.00158	0.00500	1	06/08/2021 02:13	WG1684422
1,3,5-Trimethylbenzene	U		0.00200	0.00500	1	06/08/2021 02:13	WG1684422
(S) Toluene-d8	107			75.0-131		06/08/2021 02:13	WG1684422
(S) 4-Bromofluorobenzene	97.2			67.0-138		06/08/2021 02:13	WG1684422
(S) 1,2-Dichloroethane-d4	90.3			70.0-130		06/08/2021 02:13	WG1684422

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

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	19.3	J3	1.61	4.00	1	06/08/2021 23:08	WG1684225
C28-C36 Motor Oil Range	25.8		0.274	4.00	1	06/08/2021 23:08	WG1684225
(S) o-Terphenyl	51.5			18.0-148		06/08/2021 23:08	WG1684225

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

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	U		0.00230	0.00600	1	06/08/2021 00:13	WG1684231
Acenaphthene	U		0.00209	0.00600	1	06/08/2021 00:13	WG1684231
Acenaphthylene	U		0.00216	0.00600	1	06/08/2021 00:13	WG1684231
Benzo(a)anthracene	U		0.00173	0.00600	1	06/08/2021 00:13	WG1684231
Benzo(a)pyrene	U		0.00179	0.00600	1	06/08/2021 00:13	WG1684231
Benzo(b)fluoranthene	U		0.00153	0.00600	1	06/08/2021 00:13	WG1684231
Benzo(g,h,i)perylene	U		0.00177	0.00600	1	06/08/2021 00:13	WG1684231
Benzo(k)fluoranthene	U		0.00215	0.00600	1	06/08/2021 00:13	WG1684231
Chrysene	U		0.00232	0.00600	1	06/08/2021 00:13	WG1684231
Dibenz(a,h)anthracene	U		0.00172	0.00600	1	06/08/2021 00:13	WG1684231
Fluoranthene	U		0.00227	0.00600	1	06/08/2021 00:13	WG1684231
Fluorene	U		0.00205	0.00600	1	06/08/2021 00:13	WG1684231
Indeno(1,2,3-cd)pyrene	U		0.00181	0.00600	1	06/08/2021 00:13	WG1684231
Naphthalene	U		0.00408	0.0200	1	06/08/2021 00:13	WG1684231
Phenanthrene	0.00241	U	0.00231	0.00600	1	06/08/2021 00:13	WG1684231
Pyrene	U		0.00200	0.00600	1	06/08/2021 00:13	WG1684231
1-Methylnaphthalene	U		0.00449	0.0200	1	06/08/2021 00:13	WG1684231
2-Methylnaphthalene	0.00676	U	0.00427	0.0200	1	06/08/2021 00:13	WG1684231
2-Chloronaphthalene	U		0.00466	0.0200	1	06/08/2021 00:13	WG1684231
(S) p-Terphenyl-d14	68.7			23.0-120		06/08/2021 00:13	WG1684231
(S) Nitrobenzene-d5	70.2			14.0-149		06/08/2021 00:13	WG1684231
(S) 2-Fluorobiphenyl	71.7			34.0-125		06/08/2021 00:13	WG1684231

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	1.84		1	06/09/2021 11:47	WG1683485

Wet Chemistry by Method 7199

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Hexavalent Chromium	U		0.255	1.00	1	06/09/2021 22:39	WG1685344

Wet Chemistry by Method 9045D

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	8.41	T8	1	06/09/2021 12:30	WG1685389

Sample Narrative:

L1362248-02 WG1685389: 8.41 at 23.5C

Wet Chemistry by Method 9050AMod

Analyte	Result umhos/cm	Qualifier	RDL umhos/cm	Dilution	Analysis date / time	Batch
Specific Conductance	352		10.0	1	06/11/2021 16:24	WG1685232

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Barium	1500		0.0852	0.500	1	06/08/2021 23:39	WG1683347
Cadmium	0.226	J	0.0471	0.500	1	06/08/2021 23:39	WG1683347
Nickel	11.6		0.132	2.00	1	06/08/2021 23:39	WG1683347
Selenium	U		0.764	2.00	1	06/08/2021 23:39	WG1683347

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

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Hot Water Sol. Boron	0.352		0.0167	0.200	1	06/09/2021 12:46	WG1683484

Metals (ICPMS) by Method 6020

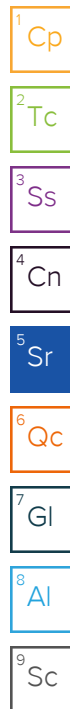
Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Arsenic	6.84		0.100	1.00	5	06/08/2021 17:43	WG1683348

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	0.122	B	0.0217	0.100	1	06/08/2021 09:18	WG1684207
(S) <i>a,a,a</i> -Trifluorotoluene(FID)	95.6			77.0-120		06/08/2021 09:18	WG1684207

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		0.000467	0.00100	1	06/08/2021 02:32	WG1684422
Toluene	U		0.00130	0.00500	1	06/08/2021 02:32	WG1684422
Ethylbenzene	U		0.000737	0.00250	1	06/08/2021 02:32	WG1684422
Xylenes, Total	0.00508	J	0.000880	0.00650	1	06/08/2021 02:32	WG1684422



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

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
1,2,4-Trimethylbenzene	0.00245	J	0.00158	0.00500	1	06/08/2021 02:32	WG1684422
1,3,5-Trimethylbenzene	0.00930		0.00200	0.00500	1	06/08/2021 02:32	WG1684422
(S) Toluene-d8	107			75.0-131		06/08/2021 02:32	WG1684422
(S) 4-Bromofluorobenzene	98.2			67.0-138		06/08/2021 02:32	WG1684422
(S) 1,2-Dichloroethane-d4	86.6			70.0-130		06/08/2021 02:32	WG1684422

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

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
C10-C28 Diesel Range	27.5		1.61	4.00	1	06/08/2021 22:55	WG1684225
C28-C36 Motor Oil Range	28.6		0.274	4.00	1	06/08/2021 22:55	WG1684225
(S) o-Terphenyl	61.0			18.0-148		06/08/2021 22:55	WG1684225

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

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Anthracene	U		0.00230	0.00600	1	06/08/2021 00:33	WG1684231
Acenaphthene	U		0.00209	0.00600	1	06/08/2021 00:33	WG1684231
Acenaphthylene	U		0.00216	0.00600	1	06/08/2021 00:33	WG1684231
Benzo(a)anthracene	U		0.00173	0.00600	1	06/08/2021 00:33	WG1684231
Benzo(a)pyrene	U		0.00179	0.00600	1	06/08/2021 00:33	WG1684231
Benzo(b)fluoranthene	U		0.00153	0.00600	1	06/08/2021 00:33	WG1684231
Benzo(g,h,i)perylene	U		0.00177	0.00600	1	06/08/2021 00:33	WG1684231
Benzo(k)fluoranthene	U		0.00215	0.00600	1	06/08/2021 00:33	WG1684231
Chrysene	U		0.00232	0.00600	1	06/08/2021 00:33	WG1684231
Dibenz(a,h)anthracene	U		0.00172	0.00600	1	06/08/2021 00:33	WG1684231
Fluoranthene	U		0.00227	0.00600	1	06/08/2021 00:33	WG1684231
Fluorene	U		0.00205	0.00600	1	06/08/2021 00:33	WG1684231
Indeno(1,2,3-cd)pyrene	U		0.00181	0.00600	1	06/08/2021 00:33	WG1684231
Naphthalene	0.0128	J	0.00408	0.0200	1	06/08/2021 00:33	WG1684231
Phenanthrene	0.00973		0.00231	0.00600	1	06/08/2021 00:33	WG1684231
Pyrene	U		0.00200	0.00600	1	06/08/2021 00:33	WG1684231
1-Methylnaphthalene	0.0247		0.00449	0.0200	1	06/08/2021 00:33	WG1684231
2-Methylnaphthalene	0.0430		0.00427	0.0200	1	06/08/2021 00:33	WG1684231
2-Chloronaphthalene	U		0.00466	0.0200	1	06/08/2021 00:33	WG1684231
(S) p-Terphenyl-d14	62.6			23.0-120		06/08/2021 00:33	WG1684231
(S) Nitrobenzene-d5	59.4			14.0-149		06/08/2021 00:33	WG1684231
(S) 2-Fluorobiphenyl	61.4			34.0-125		06/08/2021 00:33	WG1684231

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Method Blank (MB)

(MB) R3665405-1 06/09/21 21:30

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

L1361973-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1361973-05 06/09/21 21:53 • (DUP) R3665405-3 06/09/21 21:58

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

L1362430-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1362430-02 06/09/21 23:16 • (DUP) R3665405-8 06/09/21 23:21

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

Laboratory Control Sample (LCS)

(LCS) R3665405-2 06/09/21 21:37

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/kg	mg/kg	%	%	
Hexavalent Chromium	10.0	9.35	93.5	80.0-120	

L1362426-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1362426-01 06/09/21 22:45 • (MS) R3665405-4 06/09/21 22:50 • (MSD) R3665405-5 06/09/21 22:55

	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	U	13.6	13.9	68.1	69.7	1	75.0-125	J6	J6	2.31	20

L1362426-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1362426-01 06/09/21 22:45 • (MS) R3665405-6 06/09/21 23:00

	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Analyte	mg/kg	mg/kg	mg/kg	%		%	
Hexavalent Chromium	647	U	672	104	50	75.0-125	



L1360742-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1360742-04 06/09/21 12:30 • (DUP) R3665200-3 06/09/21 12:30

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	su	su		%		%
pH	1.48	1.45	1	2.05	J3	1

Sample Narrative:

OS: 1.48 at 23.3C

DUP: 1.45 at 23C

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

L1362248-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1362248-01 06/09/21 12:30 • (DUP) R3665200-4 06/09/21 12:30

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	su	su		%		%
pH	8.39	8.33	1	0.718		1

Sample Narrative:

OS: 8.39 at 23.4C

DUP: 8.33 at 23.4C

Laboratory Control Sample (LCS)

(LCS) R3665200-1 06/09/21 12:30

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	su	su	%	%	
pH	10.0	10.1	101	99.0-101	

Sample Narrative:

LCS: 10.05 at 22.4C

Method Blank (MB)

(MB) R3666312-1 06/11/21 16:24

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

L1361290-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1361290-01 06/11/21 16:24 • (DUP) R3666312-3 06/11/21 16:24

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	129	129	1	0.156		20

L1362392-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1362392-04 06/11/21 16:24 • (DUP) R3666312-4 06/11/21 16:24

Analyte	Original Result umhos/cm	DUP Result umhos/cm	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Specific Conductance	2010	2020	1	0.149		20

Laboratory Control Sample (LCS)

(LCS) R3666312-2 06/11/21 16:24

Analyte	Spike Amount umhos/cm	LCS Result umhos/cm	LCS Rec. %	Rec. Limits %	LCS Qualifier
Specific Conductance	268	274	102	85.0-115	

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R3664960-1 06/08/21 22:39

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Barium	U		0.0852	0.500
Cadmium	U		0.0471	0.500
Nickel	U		0.132	2.00
Selenium	U		0.764	2.00

Laboratory Control Sample (LCS)

(LCS) R3664960-2 06/08/21 22:42

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Barium	100	100	100	80.0-120	
Cadmium	100	95.4	95.4	80.0-120	
Nickel	100	99.0	99.0	80.0-120	
Selenium	100	93.0	93.0	80.0-120	

L1360364-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1360364-03 06/08/21 22:45 • (MS) R3664960-5 06/08/21 22:54 • (MSD) R3664960-6 06/08/21 22:57

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Barium	100	1250	1670	2060	424	810	1	75.0-125	V	J3 V	20.7	20
Cadmium	100	0.363	98.6	103	98.3	103	1	75.0-125			4.46	20
Nickel	100	21.5	125	132	104	111	1	75.0-125			5.55	20
Selenium	100	U	96.2	101	96.2	101	1	75.0-125			4.91	20

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

Method Blank (MB)

(MB) R3665113-1 06/09/21 11:56

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) R3665113-2 06/09/21 11:59 • (LCSD) R3665113-3 06/09/21 12:02

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	1.02	0.998	102	99.8	80.0-120			1.76	20

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R3664740-1 06/08/21 15:51

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/kg		mg/kg	mg/kg
Arsenic	U		0.100	1.00

Laboratory Control Sample (LCS)

(LCS) R3664740-2 06/08/21 15:54

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/kg	mg/kg	%	%	
Arsenic	100	104	104	80.0-120	

L1360364-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1360364-03 06/08/21 15:57 • (MS) R3664740-5 06/08/21 16:07 • (MSD) R3664740-6 06/08/21 16:11

	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	%	%		%			%	%
Arsenic	100	28.8	115	125	86.6	96.4	5	75.0-125			8.12	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3664634-2 06/08/21 07:39

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TPH (GC/FID) Low Fraction	0.0285	⬇	0.0217	0.100
(S) a,a,a-Trifluorotoluene(FID)	99.4			77.0-120

Laboratory Control Sample (LCS)

(LCS) R3664634-1 06/08/21 06:52

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
TPH (GC/FID) Low Fraction	5.50	5.41	98.4	72.0-127	
(S) a,a,a-Trifluorotoluene(FID)			109	77.0-120	

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R3664933-3 06/08/21 00:34

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000467	0.00100
Ethylbenzene	U		0.000737	0.00250
Toluene	U		0.00130	0.00500
1,2,4-Trimethylbenzene	U		0.00158	0.00500
1,3,5-Trimethylbenzene	U		0.00200	0.00500
Xylenes, Total	U		0.000880	0.00650
(S) Toluene-d8	109			75.0-131
(S) 4-Bromofluorobenzene	95.5			67.0-138
(S) 1,2-Dichloroethane-d4	90.5			70.0-130

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

(LCS) R3664933-1 06/07/21 23:18 • (LCSD) R3664933-2 06/07/21 23:37

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 %
Benzene	0.125	0.111	0.111	88.8	88.8	70.0-123			0.000	20
Ethylbenzene	0.125	0.117	0.115	93.6	92.0	74.0-126			1.72	20
Toluene	0.125	0.117	0.116	93.6	92.8	75.0-121			0.858	20
1,2,4-Trimethylbenzene	0.125	0.117	0.119	93.6	95.2	70.0-126			1.69	20
1,3,5-Trimethylbenzene	0.125	0.121	0.119	96.8	95.2	73.0-127			1.67	20
Xylenes, Total	0.375	0.359	0.355	95.7	94.7	72.0-127			1.12	20
(S) Toluene-d8				102	102	75.0-131				
(S) 4-Bromofluorobenzene				102	99.0	67.0-138				
(S) 1,2-Dichloroethane-d4				97.3	97.2	70.0-130				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3664877-1 06/08/21 20:45

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	0.290	J	0.274	4.00
(S) o-Terphenyl	67.1			18.0-148

Laboratory Control Sample (LCS)

(LCS) R3664877-2 06/08/21 20:58

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
C10-C28 Diesel Range	50.0	39.0	78.0	50.0-150	
(S) o-Terphenyl			88.9	18.0-148	

L1362248-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1362248-01 06/08/21 23:08 • (MS) R3664877-3 06/08/21 23:21 • (MSD) R3664877-4 06/08/21 23:34

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	49.4	19.3	59.5	74.2	81.4	110	1	50.0-150		J3	22.0	20
(S) o-Terphenyl					72.2	79.4		18.0-148				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3664330-2 06/07/21 23:53

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Anthracene	U		0.00230	0.00600
Acenaphthene	U		0.00209	0.00600
Acenaphthylene	U		0.00216	0.00600
Benzo(a)anthracene	U		0.00173	0.00600
Benzo(a)pyrene	U		0.00179	0.00600
Benzo(b)fluoranthene	U		0.00153	0.00600
Benzo(g,h,i)perylene	U		0.00177	0.00600
Benzo(k)fluoranthene	U		0.00215	0.00600
Chrysene	U		0.00232	0.00600
Dibenz(a,h)anthracene	U		0.00172	0.00600
Fluoranthene	U		0.00227	0.00600
Fluorene	U		0.00205	0.00600
Indeno(1,2,3-cd)pyrene	U		0.00181	0.00600
Naphthalene	U		0.00408	0.0200
Phenanthrene	U		0.00231	0.00600
Pyrene	U		0.00200	0.00600
1-Methylnaphthalene	U		0.00449	0.0200
2-Methylnaphthalene	U		0.00427	0.0200
2-Chloronaphthalene	U		0.00466	0.0200
(S) Nitrobenzene-d5	88.2			14.0-149
(S) 2-Fluorobiphenyl	90.8			34.0-125
(S) p-Terphenyl-d14	93.5			23.0-120

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Laboratory Control Sample (LCS)

(LCS) R3664330-1 06/07/21 23:34

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Anthracene	0.0800	0.0677	84.6	50.0-126	
Acenaphthene	0.0800	0.0662	82.8	50.0-120	
Acenaphthylene	0.0800	0.0697	87.1	50.0-120	
Benzo(a)anthracene	0.0800	0.0646	80.7	45.0-120	
Benzo(a)pyrene	0.0800	0.0564	70.5	42.0-120	
Benzo(b)fluoranthene	0.0800	0.0578	72.3	42.0-121	
Benzo(g,h,i)perylene	0.0800	0.0586	73.3	45.0-125	
Benzo(k)fluoranthene	0.0800	0.0610	76.3	49.0-125	
Chrysene	0.0800	0.0703	87.9	49.0-122	
Dibenz(a,h)anthracene	0.0800	0.0546	68.3	47.0-125	
Fluoranthene	0.0800	0.0722	90.3	49.0-129	

Laboratory Control Sample (LCS)

(LCS) R3664330-1 06/07/21 23:34

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Fluorene	0.0800	0.0689	86.1	49.0-120	
Indeno(1,2,3-cd)pyrene	0.0800	0.0560	70.0	46.0-125	
Naphthalene	0.0800	0.0622	77.8	50.0-120	
Phenanthrene	0.0800	0.0690	86.3	47.0-120	
Pyrene	0.0800	0.0680	85.0	43.0-123	
1-Methylnaphthalene	0.0800	0.0626	78.3	51.0-121	
2-Methylnaphthalene	0.0800	0.0580	72.5	50.0-120	
2-Chloronaphthalene	0.0800	0.0696	87.0	50.0-120	
(S) Nitrobenzene-d5			93.3	14.0-149	
(S) 2-Fluorobiphenyl			94.2	34.0-125	
(S) p-Terphenyl-d14			92.6	23.0-120	

L1362106-21 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1362106-21 06/08/21 04:30 • (MS) R3664330-3 06/08/21 04:50 • (MSD) R3664330-4 06/08/21 05:09

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Anthracene	0.0784	U	0.0544	0.0525	69.4	67.3	1	10.0-145			3.55	30
Acenaphthene	0.0784	U	0.0553	0.0553	70.5	70.9	1	14.0-127			0.000	27
Acenaphthylene	0.0784	U	0.0547	0.0567	69.8	72.7	1	21.0-124			3.59	25
Benzo(a)anthracene	0.0784	0.00498	0.0581	0.0615	74.1	78.8	1	10.0-139			5.69	30
Benzo(a)pyrene	0.0784	0.00521	0.0518	0.0550	66.1	70.5	1	10.0-141			5.99	31
Benzo(b)fluoranthene	0.0784	0.00938	0.0561	0.0613	59.6	66.6	1	10.0-140			8.86	36
Benzo(g,h,i)perylene	0.0784	0.00624	0.0524	0.0555	58.9	63.2	1	10.0-140			5.75	33
Benzo(k)fluoranthene	0.0784	0.00368	0.0528	0.0545	67.3	69.9	1	10.0-137			3.17	31
Chrysene	0.0784	0.00890	0.0669	0.0685	74.0	76.4	1	10.0-145			2.36	30
Dibenz(a,h)anthracene	0.0784	U	0.0441	0.0455	56.3	58.3	1	10.0-132			3.12	31
Fluoranthene	0.0784	0.0163	0.0941	0.0846	99.2	87.6	1	10.0-153			10.6	33
Fluorene	0.0784	U	0.0548	0.0574	69.9	73.6	1	11.0-130			4.63	29
Indeno(1,2,3-cd)pyrene	0.0784	0.00569	0.0496	0.0524	63.3	67.2	1	10.0-137			5.49	32
Naphthalene	0.0784	U	0.0545	0.0533	69.5	68.3	1	10.0-135			2.23	27
Phenanthrene	0.0784	0.0101	0.0792	0.0712	88.1	78.3	1	10.0-144			10.6	31
Pyrene	0.0784	0.0125	0.0778	0.0730	83.3	77.6	1	10.0-148			6.37	35
1-Methylnaphthalene	0.0784	U	0.0552	0.0555	65.4	66.1	1	10.0-142			0.542	28
2-Methylnaphthalene	0.0784	0.00440	0.0522	0.0508	61.0	59.5	1	10.0-137			2.72	28
2-Chloronaphthalene	0.0784	U	0.0563	0.0568	71.7	72.8	1	29.0-120			0.884	24
(S) Nitrobenzene-d5					77.1	78.5		14.0-149				
(S) 2-Fluorobiphenyl					78.3	80.8		34.0-125				
(S) p-Terphenyl-d14					74.5	76.4		23.0-120				

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.

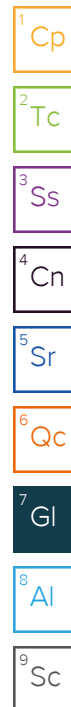
Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location.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

Abbreviations and Definitions

MDL	Method Detection Limit.
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.
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.
V	The sample concentration is too high to evaluate accurate spike recoveries.



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.



Condition:
NCF / OK