

Raptor Materials, LLC.

Sample Delivery Group: L1660352
Samples Received: 09/28/2023
Project Number:
Description: P124 - Two Rivers

Report To: Garrett Varra
8120 Gage St
Frederick, CO 80516

Entire Report Reviewed By:



Kelly Mercer
Project Manager

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

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¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

SAMPLE SUMMARY

MW-12 L1660352-01 GW

Collected by
Garrett Varra

Collected date/time
09/27/23 13:35

Received date/time
09/28/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Gravimetric Analysis by Method 2540 C-2011	WG2145363	1	10/05/23 10:31	10/05/23 13:34	NTG	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2141219	1	09/28/23 20:41	09/28/23 20:41	GEB	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2142747	5	10/02/23 14:19	10/02/23 14:19	HMM	Mt. Juliet, TN
Mercury by Method 7470A	WG2142432	1	10/03/23 23:34	10/05/23 10:42	LAS	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG2141453	1	09/29/23 12:50	10/01/23 10:06	DJS	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2141464	1	10/01/23 10:20	10/03/23 23:16	JPD	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.



Kelly Mercer
Project Manager

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	681	J3	13.3	1	10/05/2023 13:34	WG2145363

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Nitrate as (N)	4.49		0.100	1	09/28/2023 20:41	WG2141219
Sulfate	218		25.0	5	10/02/2023 14:19	WG2142747

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	10/05/2023 10:42	WG2142432

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Arsenic,Dissolved	ND		0.0100	1	10/01/2023 10:06	WG2141453
Cadmium,Dissolved	ND		0.00200	1	10/01/2023 10:06	WG2141453
Chromium,Dissolved	ND		0.0100	1	10/01/2023 10:06	WG2141453
Copper,Dissolved	ND		0.0100	1	10/01/2023 10:06	WG2141453
Lead,Dissolved	ND		0.00600	1	10/01/2023 10:06	WG2141453
Manganese,Dissolved	0.147		0.0100	1	10/01/2023 10:06	WG2141453
Nickel,Dissolved	ND		0.0100	1	10/01/2023 10:06	WG2141453
Selenium,Dissolved	ND		0.0100	1	10/01/2023 10:06	WG2141453
Zinc,Dissolved	ND		0.0500	1	10/01/2023 10:06	WG2141453

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Manganese,Dissolved	0.142		0.00500	1	10/03/2023 23:16	WG2141464
Uranium,Dissolved	0.00887		0.00100	1	10/03/2023 23:16	WG2141464

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Method Blank (MB)

(MB) R3983291-1 10/05/23 13:34

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Dissolved Solids	U		10.0	10.0

L1660352-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1660352-01 10/05/23 13:34 • (DUP) R3983291-3 10/05/23 13:34

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Dissolved Solids	681	719	1	5.33	J3	5

L1661306-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1661306-01 10/05/23 13:34 • (DUP) R3983291-4 10/05/23 13:34

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Dissolved Solids	930	1030	1	9.82	J3	5

Laboratory Control Sample (LCS)

(LCS) R3983291-2 10/05/23 13:34

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/l	mg/l	%	%	
Dissolved Solids	8800	8630	98.1	77.3-123	

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3981341-1 09/28/23 09:09

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Nitrate as (N)	U		0.0480	0.100

L1660343-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1660343-06 09/28/23 17:56 • (DUP) R3981341-3 09/28/23 18:08

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Nitrate as (N)	1.11	1.07	1	3.91		15

L1660418-09 Original Sample (OS) • Duplicate (DUP)

(OS) L1660418-09 09/28/23 21:58 • (DUP) R3981341-6 09/28/23 22:10

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Nitrate as (N)	1.09	1.06	1	2.52		15

Laboratory Control Sample (LCS)

(LCS) R3981341-2 09/28/23 09:22

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/l	mg/l	%	%	
Nitrate as (N)	8.00	7.72	96.5	80.0-120	

L1660343-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1660343-06 09/28/23 17:56 • (MS) R3981341-4 09/28/23 18:46 • (MSD) R3981341-5 09/28/23 18:59

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Nitrate as (N)	8.00	1.11	8.62	8.76	93.9	95.7	1	80.0-120			1.61	15

L1660418-09 Original Sample (OS) • Matrix Spike (MS)

(OS) L1660418-09 09/28/23 21:58 • (MS) R3981341-7 09/28/23 22:23

	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Analyte	mg/l	mg/l	mg/l	%		%	
Nitrate as (N)	8.00	1.09	9.14	101	1	80.0-120	

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3981682-1 10/02/23 10:18

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Sulfate	U		0.594	5.00

L1660391-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1660391-04 10/02/23 15:14 • (DUP) R3981682-3 10/02/23 15:28

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Sulfate	1130	1090	10	4.02		15

Sample Narrative:

OS: Dilution due to matrix.

L1660412-11 Original Sample (OS) • Duplicate (DUP)

(OS) L1660412-11 10/02/23 21:24 • (DUP) R3981682-7 10/02/23 21:38

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Sulfate	12.1	12.1	1	0.172		15

Laboratory Control Sample (LCS)

(LCS) R3981682-2 10/02/23 11:54

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/l	mg/l	%	%	
Sulfate	40.0	39.9	99.7	80.0-120	

L1660391-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1660391-04 10/02/23 15:14 • (MS) R3981682-4 10/02/23 15:41 • (MSD) R3981682-5 10/02/23 15:55

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Sulfate	40.0	1130	942	923	0.000	0.000	10	80.0-120	V	V	2.05	15

Sample Narrative:

OS: Dilution due to matrix.



L1660412-11 Original Sample (OS) • Matrix Spike (MS)

(OS) L1660412-11 10/02/23 21:24 • (MS) R3981682-8 10/02/23 21:52

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>
Sulfate	40.0	12.1	47.3	88.1	1	80.0-120	

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R3982279-1 10/05/23 10:05

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Mercury	U		0.000100	0.000200

Laboratory Control Sample (LCS)

(LCS) R3982279-2 10/05/23 10:07

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/l	mg/l	%	%	
Mercury	0.00300	0.00312	104	80.0-120	

L1660702-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1660702-01 10/05/23 10:10 • (MS) R3982279-3 10/05/23 10:12 • (MSD) R3982279-4 10/05/23 10:15

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Mercury	0.00300	ND	0.00311	0.00316	104	105	1	75.0-125			1.79	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3980318-1 10/01/23 08:58

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic,Dissolved	U		0.00440	0.0100
Cadmium,Dissolved	U		0.000479	0.00200
Chromium,Dissolved	U		0.00140	0.0100
Copper,Dissolved	U		0.00368	0.0100
Lead,Dissolved	U		0.00299	0.00600
Manganese,Dissolved	U		0.000934	0.0100
Nickel,Dissolved	U		0.00161	0.0100
Selenium,Dissolved	U		0.00735	0.0100
Zinc,Dissolved	U		0.00652	0.0500

Laboratory Control Sample (LCS)

(LCS) R3980318-2 10/01/23 09:00

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic,Dissolved	1.00	0.984	98.4	80.0-120	
Cadmium,Dissolved	1.00	0.968	96.8	80.0-120	
Chromium,Dissolved	1.00	1.04	104	80.0-120	
Copper,Dissolved	1.00	1.01	101	80.0-120	
Lead,Dissolved	1.00	0.955	95.5	80.0-120	
Manganese,Dissolved	1.00	1.01	101	80.0-120	
Nickel,Dissolved	1.00	0.955	95.5	80.0-120	
Selenium,Dissolved	1.00	0.952	95.2	80.0-120	
Zinc,Dissolved	1.00	0.958	95.8	80.0-120	

L1659876-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1659876-05 10/01/23 09:03 • (MS) R3980318-4 10/01/23 09:08 • (MSD) R3980318-5 10/01/23 09:11

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic,Dissolved	1.00	ND	1.04	1.02	104	102	1	75.0-125			1.49	20
Cadmium,Dissolved	1.00	ND	1.00	0.995	100	99.5	1	75.0-125			0.507	20
Chromium,Dissolved	1.00	0.0271	1.07	1.05	105	102	1	75.0-125			2.59	20
Copper,Dissolved	1.00	ND	1.02	1.00	102	100	1	75.0-125			1.99	20
Lead,Dissolved	1.00	ND	0.979	0.974	97.9	97.4	1	75.0-125			0.549	20
Manganese,Dissolved	1.00	ND	1.01	0.996	101	98.9	1	75.0-125			1.86	20
Nickel,Dissolved	1.00	ND	0.985	0.972	98.5	97.2	1	75.0-125			1.26	20
Selenium,Dissolved	1.00	ND	0.989	0.979	98.9	97.9	1	75.0-125			0.987	20
Zinc,Dissolved	1.00	ND	0.971	0.964	97.1	96.4	1	75.0-125			0.741	20

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc

Method Blank (MB)

(MB) R3981571-1 10/03/23 22:21

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Manganese,Dissolved	U		0.000704	0.00500
Uranium,Dissolved	U		0.0000789	0.00100

Laboratory Control Sample (LCS)

(LCS) R3981571-2 10/03/23 22:24

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Manganese,Dissolved	0.0500	0.0516	103	80.0-120	
Uranium,Dissolved	0.0500	0.0502	100	80.0-120	

L1660391-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1660391-04 10/03/23 22:27 • (MS) R3981571-4 10/03/23 22:34 • (MSD) R3981571-5 10/03/23 22:37

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Manganese,Dissolved	0.0500	9.71	9.85	9.71	287	0.000	1	75.0-125	V	V	1.47	20
Uranium,Dissolved	0.0500	ND	0.0549	0.0541	108	106	1	75.0-125			1.49	20

1
Cp

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Tc

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Ss

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Cn

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Sr

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Qc

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GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

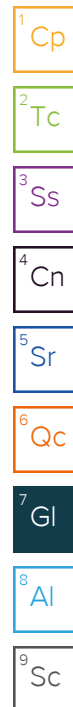
The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

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.
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
J3	The associated batch QC was outside the established quality control range for precision.
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.

