



Where does my sample go?

The ins and outs of Laboratory Sample Submission

**Karla Thaxton
Laboratory Director
MASI Labs**

5 Things to Consider

- 🧪 The Importance of the Chain of Custody
- 🧪 The Importance of sample containers and preservatives
- 🧪 The Importance of sampling
- 🧪 What happens once the sample gets to the lab
- 🧪 How to read reports

The Importance of Chain of Custody

What is a Chain of Custody and why is it important?

- Documents that a sample was sent and who sent it
- Communication of what you want to the lab



The Importance of Chain of Custody

MASI [®] Waste Water Analysis Request Sheet
 ENVIRONMENTAL LABORATORIES
 7940 Memorial Drive
 Plain City, OH 43064
 614-873-4654

Analysis Request (AR) Number Must Appear on Bottle:
 ** See reverse for important SDS information ** 137327

Project Name: _____
 Sample Type: Non-Potable () Sludge () Solid
 Client Name: Acme WWTP County: _____ PO#: _____
 Sampler Name: John Smith
 Sample Location: () Influent Effluent () Up Stream () Down Stream () Other _____
 Collection: () Grab 24Hr Composite () Other _____
 Collection Date: 4/25/23 Collection Time: 08:00

Misc. Testing		Metals
<input type="checkbox"/> 023 BOD, 5 Day	<input type="checkbox"/> 387 O&G Hexane 1664A	<input type="checkbox"/> 0006 Aluminum Al
<input checked="" type="checkbox"/> 033 CBOD, 5 Day	<input type="checkbox"/> 096 pH	<input type="checkbox"/> 909 Antimony Sb
<input type="checkbox"/> 034 Chloride	<input type="checkbox"/> 097 Phenol	<input type="checkbox"/> 1000 Arsenic As
<input type="checkbox"/> 036 Chlorine, Residual	<input type="checkbox"/> 100 Phosphorus, Total as P	<input type="checkbox"/> 1001 Barium Ba
<input type="checkbox"/> 037 Chlorine, Total	<input type="checkbox"/> 098 Phosphate, Ortho	<input type="checkbox"/> 1002 Beryllium Be
<input type="checkbox"/> 047 COD	<input type="checkbox"/> 116 Solids, Percent (%)	<input checked="" type="checkbox"/> 1003 Cadmium Cd
<input type="checkbox"/> 1229 COD, Low Level	<input type="checkbox"/> 117 Solids, Suspended (mg/l)	<input checked="" type="checkbox"/> 1005 Chrome Cr
<input type="checkbox"/> 054 Cyanide, Free	<input type="checkbox"/> 118 Solids, Total (mg/l)	<input type="checkbox"/> 0038 Chrome Hexavalent
<input type="checkbox"/> 1227 Cyanide, Low Level	<input type="checkbox"/> 119 Solids, Volatile (%)	<input checked="" type="checkbox"/> 1006 Copper Cu
<input checked="" type="checkbox"/> 055 Cyanide, Total	<input type="checkbox"/> 120 Solids, Volatile Susp (%)	<input type="checkbox"/> 868 Iron Fe
<input type="checkbox"/> 056 Dissolved Oxygen	<input type="checkbox"/> 121 Specific Gravity	<input type="checkbox"/> 870 Iron, Susp
<input type="checkbox"/> 219 E-Coli	<input type="checkbox"/> 290 SOUR	<input type="checkbox"/> 1008 Lead Pb
<input type="checkbox"/> 272 Fecal Coliform - MPN	<input type="checkbox"/> 114 TDS/TR	<input type="checkbox"/> 878 Manganese Mn
<input type="checkbox"/> 058 Fecal Coliform - CFU	<input type="checkbox"/> 094 T.IN	<input type="checkbox"/> 880 Manganese, Susp
<input type="checkbox"/> 066 Hardness	<input type="checkbox"/> 137 TKN	<input type="checkbox"/> 0082 Mercury Hg
<input type="checkbox"/> 081 MBAS	<input type="checkbox"/> 138 TOC (Phosphoric Acid)	<input type="checkbox"/> 1011 Molybdenum Mo
<input checked="" type="checkbox"/> 266 Nitrate+Nitrite (N+N)	<input type="checkbox"/> 139 TON-N	<input type="checkbox"/> 1012 Nickel Ni
<input checked="" type="checkbox"/> 091 Nitrogen Ammonia	<input checked="" type="checkbox"/> 1103 VOC <u>STEP 624</u> or 8260B	<input type="checkbox"/> 1013 Potassium K
<input type="checkbox"/> Other	<input type="checkbox"/> Other	<input type="checkbox"/> 1014 Selenium Se
<input type="checkbox"/> Other	<input type="checkbox"/> Other	<input type="checkbox"/> 1015 Silver Ag
<input type="checkbox"/> Other	<input type="checkbox"/> Other	<input type="checkbox"/> 1036 Thallium Tl
		<input type="checkbox"/> 1017 Zinc Zn
TCLP		
<input type="checkbox"/> TCLP Metals	<input type="checkbox"/> pH	<input type="checkbox"/> 1082 Mercury Low Level 1631E
<input type="checkbox"/> TCLP Pesticides M8081	<input type="checkbox"/> Flash Point, Closed Cup	<input type="checkbox"/> * See Special Sampling Instructions
<input type="checkbox"/> TCLP Herbicides M8151	<input type="checkbox"/> Paint Filter	<input type="checkbox"/> () No Sample Fee
<input type="checkbox"/> TCLP Vol Org. Compounds M8260		<input type="checkbox"/> 1088 QA/QC
<input type="checkbox"/> TCLP SemiVol Org. Compounds M8270		<input type="checkbox"/> 9050 MASI Use Only
<input type="checkbox"/> PCB 8082		

N: _____ Office Use: _____
 S: _____
 U: _____
 Total Containers: _____

Return as Chain of Custody () Yes or () No # _____ of sample containers
 Relinquished by: K. Shapton Date/Time: 4/25/23 15:
 Received by: _____ Date/Time: _____
 Received / Office/Lab: _____ Date/Time: _____
 COOLER: _____ Revised 04-14-23 DN



The Importance of Chain of Custody

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ENVIRONMENTAL
LABORATORIES
7940 Memorial Drive
Plain City, OH 43064
614-873-4654

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137327

** See reverse for important SDS information **

Project Name: _____

Sample Type:

Non-Potable

Sludge

Solid

Client #: _____

Client

Name:

Acme WWTP

County: _____

PO#: _____

Sampler Name:

John Smith

Sample Location: Influent

Effluent

Up Stream

Down Stream

Other _____

Collection:

Grab

24Hr Composite

Other _____

Collection Date:

4/25/23

Collection Time:

08:00



The Importance of Chain of Custody

N: _____	Office Use: _____ _____ _____	Return as Chain of Custody () Yes or () No # _____ of sample containers
S: _____		Relinquished by: <u>K. Inapton</u> Date/Time: <u>4/26/23 15.</u>
U: _____		Received by: _____ Date/Time: _____
Total Containers: _____		Received / Office/Lab: _____ Date/Time: _____
		COOLER: _____ Revised 04-14-23 DN

The Importance of Chain of Custody

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<input type="checkbox"/> TCLP SemiVol Org Compounds M8270		<input type="checkbox"/> 1088 OA/OC

**BTEX:
624 or
8280B ?**

**Hint:
Which is in
40 CFR 136?**



The Importance of Chain of Custody

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Cyanide:
Which?
Free, Total,
... ?



The Importance of Chain of Custody

23. Cyanide—Total mg/L	Automated UV digestion/distillation and colorimetry				Kelada-01. ⁵⁵
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Cyanide,
Total



Parameter	Methodology ⁵⁸	EPA ⁵²	Standard Methods ⁸⁴	ASTM	USGS/AOAC/Other
	Segmented Flow Injection, In-Line Ultraviolet Digestion, followed by gas diffusion amperometry			D7511-12(17)	
	Manual distillation with MgCl ₂ , followed by any of the following:	335.4, Rev. 1.0 (1993) ⁵⁷	4500-CN ⁻ B-2016 and C-2016	D2036-09(15)(A), D7284-13(17)	10-204-00-1-X ⁵⁶
	Flow Injection, gas diffusion amperometry			D2036-09(15)(A) D7284-13(17)	
	Titrimetric		4500-CN ⁻ D-2016	D2036-09(15)(A)	p. 22 ⁹
	Spectrophotometric, manual		4500-CN ⁻ E-2016	D2036-09(15)(A)	I-3300-85 ²
	Semi-Automated ²⁰	335.4, Rev. 1.0 (1993) ⁵⁷	4500-CN ⁻ N-2016		10-204-00-1-X ⁵⁶ , I-4302-85 ²
	Ion Chromatography			D2036-09(15)(A)	
	Ion Selective Electrode		4500-CN ⁻ F-2016	D2036-09(15)(A)	
24. Cyanide-Available, mg/L	Cyanide Amenable to Chlorination (CATC); Manual distillation with MgCl ₂ , followed by Titrimetric or Spectrophotometric		4500-CN ⁻ G-2016	D2036-09(15)(B)	
	Flow injection and ligand exchange, followed by gas diffusion amperometry ⁵⁹			D6888-16	OIA-1677-09 ⁴⁴
	Automated Distillation and Colorimetry (no UV digestion)				Kelada-01 ⁵⁵
24.A Cyanide-Free, mg/L	Flow Injection, followed by gas diffusion amperometry			D7237-15 (A)	OIA-1677-09 ⁴⁴

Cyanide,
Available

Cyanide, Free

- 18 – CN Total
- 5 – CN Available
- 3 – CN Free

Note: 9012B, total CN, is NOT part of 40 CFR



Importance of Chain of Custody

C.o.C. shows who got the sample, from where, and when

But it does more than that

The C.o.C. tells the lab *which tests you asked for*

Know your permit requirements



5 Things to Consider

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The Importance of Containers/Preservatives



EPA has specific requirements for what containers and preservatives to use

Be familiar with the requirements of the testing that you want done



Most Labs have reference material on their websites for containers, sampling instructions, and hold times

[Drinking Water Capabilities](#)



[Waste Water Capabilities](#)



Search:

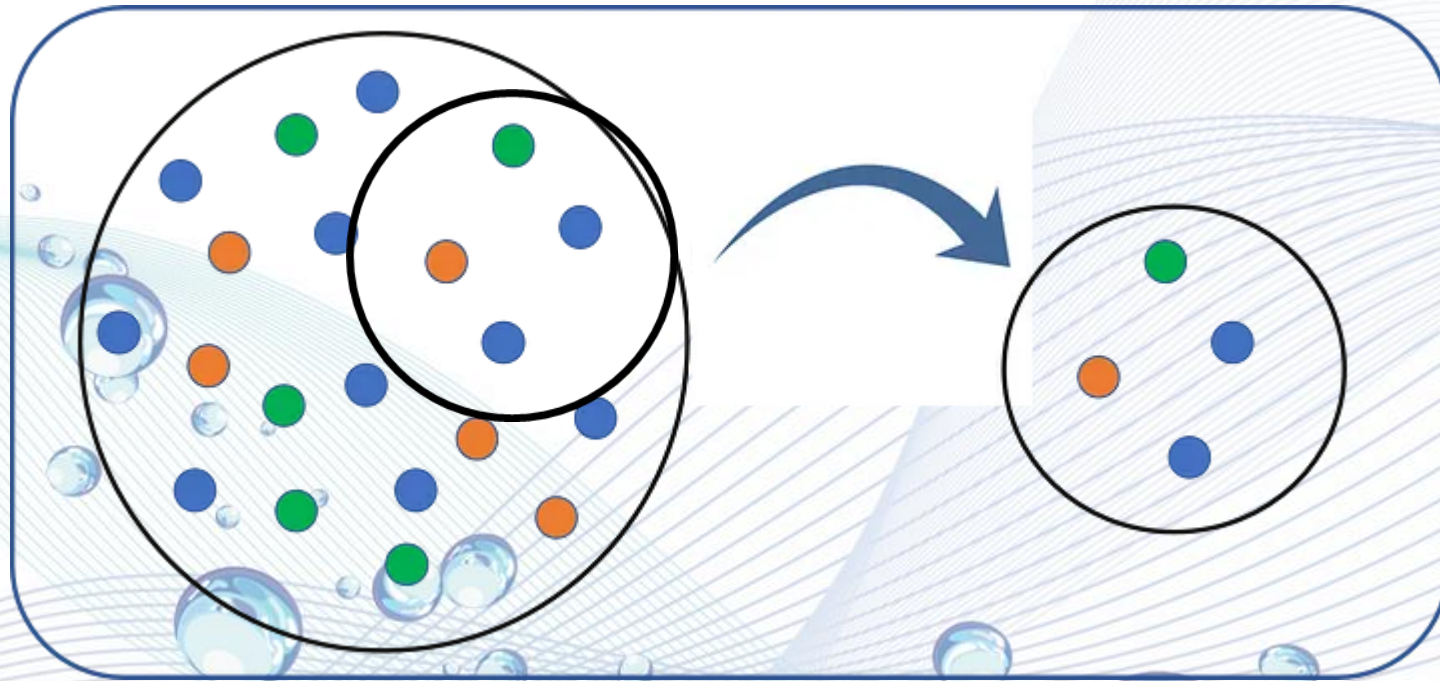
Test	Method	Bottle	Preservative	Hold Time	Special requirements
Alkalinity, Phen	SM 2320	250ml Plastic	Non Preserved	14 days	
Alkalinity, Stab	SM 2330	250ml Plastic	Non Preserved	14 days	
Alkalinity, Total	SM 2320 B	250ml Plastic	Non Preserved	14 days	
BOD, 5 Day	SM 5210 B	250ml Plastic	Non Preserved	48 hours	
CBOD, 5 Day	SM 5210 B	250ml Plastic	Non Preserved	48 hours	
Chloride	SM 4500Cl B	250ml Plastic	Non Preserved	28 days	
Chlorine, Free	SM 4500Cl G	250ml Plastic	Non Preserved	ASAP	
Chlorine, Residual	SM 4500Cl G	250ml Plastic	Non Preserved	ASAP	

5 Things to Consider

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- 🧪 How to read reports

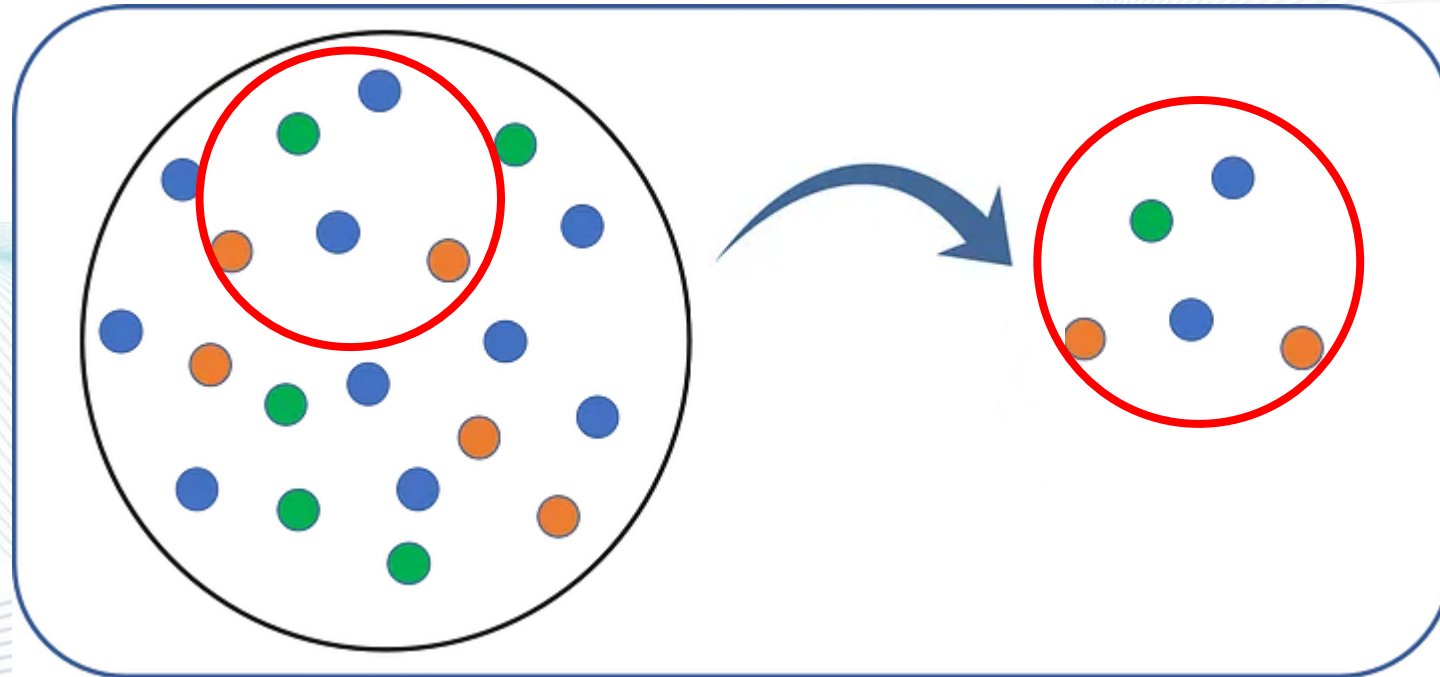
The Importance of Sampling

It all starts with sample collection



The Importance of Sampling

Where you take the sample could be critical



The Bottom Line: Different Sampling, Different Results

The Importance of Sampling

Get and read sampling instructions from your lab

- **Volatiles**
- LLHg
- PFAS



The Importance of Sampling

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The Importance of Sampling

Get and read sampling instructions from your lab

- Volatiles
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The Importance of Sampling

Tips for Sampling and Storage

- Fill container completely
- Store sample in a refrigerator
- Don't leave samples out in the weather
- Correct Bottles
- Short Hold Times

5 Things to Consider

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- 🧪 How to read reports

What happens to the sample once it gets to the lab?



Sample
Receiving

Quality Control


Laboratory
Analysis

Reporting

What happens to the sample once it gets to the lab?

Sample
Receiving

Quality Control



Laboratory
Analysis

Reporting

What happens to the sample once it gets to the lab?

Sample
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Quality Control

Laboratory
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What happens to the sample once it gets to the lab?

Sample
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Laboratory
Analysis

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What happens to the sample once it gets to the lab?

Sample
Receiving

Quality Control

Quality Assurance

Laboratory
Analysis

Reporting



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How do I read results?

MDL, RL, PQL, DL, QL, ML,????

Qualifiers

How do I read results?

Analyte	Permit Limit	Result	Units	Qual	Reporting Limit	MDL	Date/Time Prepared	Date/Time Analyzed	Analyst	Batch	Method
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Wet Chemistry Analysis

CBOD, 5 Day	300	140	mg/L		20		04/07/23 17:00	04/12/23 12:30	BLH	B303180	SM 5210 B 2016
Nitrogen, Ammonia		3.3	mg/L		0.2	0.03	04/10/23 11:01	04/13/23 12:28	BLH	B303192	EPA 350.1 1993
Phos, Total		2.18	mg/L		0.25	0.09	04/10/23 11:30	04/10/23 11:30	JOL	B303162	SM 4500P E 2011
Total Dissolved Solids/Total Filterable Residue		820	mg/L		10.0	4.0	04/11/23 15:35	04/11/23 15:35	JAC	B303238	SM 2540 C 2015
Solids, Suspended	300	108	mg/L		1		04/10/23 13:06	04/10/23 13:06	PJH/BLH	B303166	USGS I-3765-85

Metals Analysis

Cadmium, Total		0.3	ug/L	J	5	0.2	04/24/23 14:35	04/24/23 14:35	KRM	B303717	EPA 200.7 1994
Copper, Total	204	24	ug/L		5	1	04/24/23 14:35	04/24/23 14:35	KRM	B303717	EPA 200.7 1994
Lead, Total	61	ND	ug/L		20	4	04/24/23 14:35	04/24/23 14:35	KRM	B303717	EPA 200.7 1994
Mercury, Total	1	ND	ug/L		0.20	0.08	04/10/23 12:57	04/11/23 17:13	JMB	B303171	EPA 245.1 1994
Nickel, Total	185	4	ug/L	J	10	1	04/24/23 14:35	04/24/23 14:35	KRM	B303717	EPA 200.7 1994
Selenium, Total	28	ND	ug/L		30	7	04/24/23 14:35	04/24/23 14:35	KRM	B303717	EPA 200.7 1994
Silver, Total	10	0.8	ug/L	J	10	0.6	04/13/23 13:57	04/13/23 13:57	KRM	B303337	EPA 200.7 1994
Zinc, Total	644	103	ug/L		10	0.9	04/24/23 14:35	04/24/23 14:35	KRM	B303717	EPA 200.7 1994

Field Analysis

pH		7.82	su				04/07/23 08:07	04/07/23 08:07	SMO	B303138	SM 4500 H+ B 2011
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Field Analysis											
pH		7.82	su				04/07/23 08:07	04/07/23 08:07	SMO	B303138	SM 4500 H+ B 2011

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Copper, Total	204	24	ug/L		5	1	04/24/23 14:35	04/24/23 14:35	KRM	B303717	EPA 200.7 1994
Lead, Total	61	ND	ug/L		20	4	04/24/23 14:35	04/24/23 14:35	KRM	B303717	EPA 200.7 1994
Mercury, Total	1	ND	ug/L		0.20	0.08	04/10/23 12:57	04/11/23 17:13	JMB	B303171	EPA 245.1 1994
Nickel, Total	185	4	ug/L	J	10	1	04/24/23 14:35	04/24/23 14:35	KRM	B303717	EPA 200.7 1994
Selenium, Total	28	ND	ug/L		30	7	04/24/23 14:35	04/24/23 14:35	KRM	B303717	EPA 200.7 1994
Silver, Total	10	0.8	ug/L	J	10	0.6	04/13/23 13:57	04/13/23 13:57	KRM	B303337	EPA 200.7 1994
Zinc, Total	644	103	ug/L		10	0.9	04/24/23 14:35	04/24/23 14:35	KRM	B303717	EPA 200.7 1994
Field Analysis											
pH		7.82	su				04/07/23 08:07	04/07/23 08:07	SMO	B303138	SM 4500 H+ B 2011

How do I read results?

Analyte	Permit Limit	Result	Units	Qual	Reporting Limit	MDL	Date/Time Prepared	Date/Time Analyzed	Analyst	Batch	Method
Wet Chemistry Analysis											
CBOD, 5 Day	300	140	mg/L		20		04/07/23 17:00	04/12/23 12:30	BLH	B303180	SM 5210 B 2016
Nitrogen, Ammonia		3.3	mg/L		0.2	0.03	04/10/23 11:01	04/13/23 12:28	BLH	B303192	EPA 350.1 1993
Phos, Total		2.18	mg/L		0.25	0.09	04/10/23 11:30	04/10/23 11:30	JOL	B303162	SM 4500P E 2011
Total Dissolved Solids/Total Filterable Residue		820	mg/L		10.0	4.0	04/11/23 15:35	04/11/23 15:35	JAC	B303238	SM 2540 C 2015
Solids, Suspended	300	108	mg/L		1		04/10/23 13:06	04/10/23 13:06	PJH/BLH	B303166	USGS I-3765-85
Metals Analysis											
Cadmium, Total		0.3	ug/L	J	5	0.2	04/24/23 14:35	04/24/23 14:35	KRM	B303717	EPA 200.7 1994
Copper, Total	204	24	ug/L		5	1	04/24/23 14:35	04/24/23 14:35	KRM	B303717	EPA 200.7 1994
Lead, Total	61	ND	ug/L		20	4	04/24/23 14:35	04/24/23 14:35	KRM	B303717	EPA 200.7 1994
Mercury, Total	1	ND	ug/L		0.20	0.08	04/10/23 12:57	04/11/23 17:13	JMB	B303171	EPA 245.1 1994
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Selenium, Total	28	ND	ug/L		30	7	04/24/23 14:35	04/24/23 14:35	KRM	B303717	EPA 200.7 1994
Silver, Total	10	0.8	ug/L	J	10	0.6	04/13/23 13:57	04/13/23 13:57	KRM	B303337	EPA 200.7 1994
Zinc, Total	644	103	ug/L		10	0.9	04/24/23 14:35	04/24/23 14:35	KRM	B303717	EPA 200.7 1994
Field Analysis											
pH		7.82	su				04/07/23 08:07	04/07/23 08:07	SMO	B303138	SM 4500 H+ B 2011

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Field Analysis											
pH		7.82	su				04/07/23 08:07	04/07/23 08:07	SMO	B303138	SM 4500 H+ B 2011



How do I read results?

Notes and Definitions

Item	Definition
HOLD	Exceeds Recommended Holding Time
J	Analyte was positively identified, the associated numerical value is estimated.
mg/kg Dry	Sample results reported on a dry weight basis
ug/L	ppb/Part per Billion
mg/L	ppm/Part per Million
ND	Analyte NOT DETECTED at or above the minimum detection limit (MDL)
RPD	Relative Percent Difference
%REC	Percent Recovery
Source	Sample that was matrix spiked or duplicated

Notes:

1. Calculated analytes are based on raw data and may not reflect the rounding of the individual compounds.
2. Samples are analyzed using the information received on the request sheet and may not be analyzed when the parameters fall outside required guidelines.

5 Things to Consider

- 🧪 The Importance of the Chain of Custody
- 🧪 The Importance of sample containers and preservatives
- 🧪 The Importance of sampling
- 🧪 What happens once the sample gets to the lab
- 🧪 How to read reports

Final Thoughts

- 🧪 Communication with the Lab is very important
- 🧪 Sample Collection is key to quality results
- 🧪 Never Assume
- 🧪 Ask Questions



Thank you for your attention

Questions??

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