

WATER

List of Acronyms

E200.7	Inductively Coupled Plasma (ICP - Analytical Method)	MDL	Method Detection Limit
		MPN	Most Probable Number
E200.8	Inductively Coupled Plasma - Mass Spectrometry (ICP-MS - Analytical Method)	NaOH	Sodium Hydroxide
		NPDES	National Pollutant Discharge Elimination System
E200.9	Stabilized Temperature Graphite Atomic Absorption Spectroscopy (STGFAA - Analytical Method)	NR	Not Regulated
A	Standard Methods	NTU	Nephelometric Turbidity Units
ASTM	American Society for Testing & Materials	OH	Hydroxide
BOD	Biochemical Oxygen Demand	PCBs	Polychlorinated Biphenyls
CaCO ₃	Calcium Carbonate	pCi/L	Picocuries per Liter
CO ₃	Carbonate	ppb	parts per billion
CFU	Colony Forming Units	ppm	parts per million
COD	Chemical Oxygen Demand	PQLs	Practical Quantitation Limits If the sample is contaminated, it may require dilution prior to analysis. The PQL of diluted samples will be correspondingly higher.
DBCP	1, 2-Dibromo-3-chloropropane	PVC	Polyvinyl Chloride
DOC	Dissolved Organic Carbon	TDS	Total Dissolved Solids
E or EPA	US Environmental Protection Agency	TKN	Total Kjeldahl Nitrogen
GC/FID	Gas Chromatograph/Flame Ionization Detector	TOC	Total Organic Carbon
H ₂ SO ₄	Sulfuric Acid	TOX	Total Organic Halogens
HCl	Hydrochloric Acid	TPH	Total Petroleum Hydrocarbons
HCO ₃	Bicarbonate	TSS	Total Suspended Solids
HNO ₃	Nitric Acid	VOA	Volatile Organic Analysis
ICP	Inductively Coupled Plasma	VOCs	Volatile Organic Chemicals
ICP-MS	Inductively Coupled Plasma - Mass Spectrophotometer	VSS	Volatile Suspended Solids
MCL	Maximum Contaminant Level	WAD	Weak Acid Dissociable
MCLG	Maximum Contamination Level Goals		

The analytical methods listed above are typically referenced for drinking water and clean water regulations.

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METALS	METHOD	REPORTING LIMIT	UNIT
Total Metals Digestion	E200.2	-	-
Filtering or preserving samples on receipt at the laboratory, as appropriate - per fraction			
Aluminum	E200.7/E200.8	0.03	mg/L
Antimony	E200.7/E200.8	0.001	mg/L
Arsenic	E200.8/A3114B	0.001	mg/L
Arsenic, III & V speciation	E1632A Mod.	0.005	mg/L
Barium	E200.7/E200.8	0.05	mg/L
Beryllium	E200.7/E200.8	0.001	mg/L
Bismuth	E200.7/E200.8	0.01	mg/L
Boron	E200.7/E200.8	0.05	mg/L
Cadmium	E200.7/E200.8	0.001	mg/L
Calcium	E200.7/E200.8	1	mg/L
Chromium	E200.7/E200.8	0.005	mg/L
Chromium, Hexavalent (Cr ⁺⁶)	A 3500 Cr B/D	0.01	mg/L
Cobalt	E200.7/E200.8	0.005	mg/L
Copper	E200.7/E200.8	0.005	mg/L
Gallium	E200.8	0.01	mg/L
Gold	E200.7/E200.8	0.01	mg/L
Iron	E200.7/E200.8	0.02	mg/L
Iron, Ferrous (Fe II)	E200.7	0.1	mg/L
Iron, Ferric (Fe III)	Calculated from iron and Iron, Ferrous		
Lead	E200.7/E200.8	0.001	mg/L
Lithium	E200.8	0.1	mg/L
Magnesium	E200.7/E200.8	1	mg/L
Manganese	E200.7/E200.8	0.001	mg/L
Mercury	E200.8	0.0001	mg/L
Mercury	E245.2/E245.1/SW7470	0.0001	mg/L
Mercury, low level	E245.2/E245.1/E200.8/SW7470	0.00001	mg/L
<i>Please contact your Project Manager to discuss our low level capabilities</i>			

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METALS	METHOD	REPORTING LIMIT	UNIT
Total Metals Digestion	E200.2	-	-
Filtering or preserving samples on receipt at the laboratory, as appropriate - per fraction			
Mercury, ultra low level	E245.7	5	ng/L
For Ultra low-level mercury by method 245.7, both a trip blank and field blank are required for each set of samples. Both the trip blank and field blank will be analyzed and charged at \$50 each.			
Molybdenum	E200.7/E200.8	0.001	mg/L
Nickel	E200.7/E200.8	0.005	mg/L
Potassium	E200.7/E200.8	1	mg/L
Rubidium	E200.8	0.01	mg/L
Selenium	E200.7/E200.8/A 3114B	0.001	mg/L
Selenium, IV & VI speciation	A 3114 B Mod.	0.005	mg/L
Silicon	E200.7/E200.8	0.1	mg/L
Silver	E200.7/E200.8	0.001	mg/L
Sodium	E200.7/E200.8	1	mg/L
Strontium	E200.7/E200.8	0.01	mg/L
Tellurium	E200.7/E200.8	0.01	mg/L
Thallium	E200.7/E200.8	0.0005	mg/L
Tin	E200.7/E200.8	0.05	mg/L
Titanium	E200.7/E200.8	0.005	mg/L
Tungsten	E200.7/E200.8	0.01	mg/L
Uranium	E200.7/E200.8	0.0003	mg/L
Vanadium	E200.7/E200.8	0.01	mg/L
Zinc	E200.7/E200.8	0.01	mg/L
Zirconium	E200.7/E200.8	0.005	mg/L
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NON-METALS	METHOD	REPORTING LIMIT	UNIT
Acidity, Total as CaCO ₃	A2310B	4	mg/L
Alkalinity, total as CaCO ₃ , includes bicarbonate as HCO ₃ , Carbonate as CO ₃ , and hydroxide as OH	A 2320 B	4	mg/L
Ammonia (see Nitrogen, Ammonia)	-	-	-
Asbestos	E600/4/80-005 (TEM)	1	mf/L(million fibers/liter)
Biochemical Oxygen Demand (BOD)	A5210B	2	mg/L
Biochemical Oxygen Demand, Carbonaceous	A5210 B	2	mg/L
Bromate	E300.0	0.005	mg/L
Bromide	E300.0	0.5	mg/L
Chemical Oxygen Demand (COD)	E410.4	5	mg/L
Chloride	E300.0/A 4500 CL B	1	mg/L
Chlorine, Residual	A4500CL2-G /E330.5 Mod.	0.1	mg/L
Chlorophyll a	A 10200 H	0.1	mg/m ³
Color	A 2120 B	1	Color Units
Conductance, Specific @ 25°C	E120.1/A 2510 B	5	µmhos/cm
Corrosivity (Ca, Alkalinity, pH, TDS)	Calculation	-	-
Cyanates	A 4500 CN L	0.1	mg/L
Cyanide, Amenable to Chlorination	A4500-CN-G	0.005	mg/L
Cyanide, Free (Electrode)	A 4500 CN F/ Electrode Manufacturer	0.2	mg/L
Cyanide, Total	Kelada mod / E335.4	0.005	mg/L
Cyanide, Weak Acid Dissociable	ASTM D2036	0.005	mg/L
Cyanide, Thiocyanate as N	A 4500 CN M.	0.2	mg/L
Ethylene Glycol	ASTM D2982 Mod.	10	P/A
Foaming Agents	A5540C or LaMotte DS-1	1	mg/L
Foaming Agents, low level	A5540C	0.1	Mg/L
Formaldehyde	NIOSH 3500 Mod.	0.25	mg/L
Fluoride	A4500-F C	0.1	mg/L

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NON-METALS, continued	METHOD	REPORTING LIMIT	UNIT
Hardness, Total as CaCO ₃	A 2340 B	1	mg/L
Iodide	E300.0	0.1	mg/L
Methane, ethane, ethene	GC-FID/ Kampbell (SW 8015 Mod.)	0.001	mg/L
Nitrogen: Ammonia as N	A 4500 NH ₃ H	0.05	mg/L
Nitrogen: Nitrate plus Nitrite as N	E353.2	0.01	mg/L
Nitrogen: Nitrate as N	E353.2/E300.0	0.01	mg/L
Nitrogen: Nitrate as N, low level	E353.2	-	mg/L
Nitrogen: Nitrite as N	E353.2/E300.0/A 4500 NO ₂ B	0.01	mg/L
Nitrogen: Nitrite as N, low level	E353.2/A 4500 NO ₂ B	-	mg/L
Nitrogen: Total Kjeldahl as N	A 4500 N org	0.5	mg/L
Nitrogen, Total	Total Nitrogen = Nitrate plus Nitrite as N + Total Kjeldahl Nitrogen		
Nitrogen, Total (persulfate - includes TKN, NO ₃ , and NO ₂)	A 4500 N-C	0.04	mg/L
Nitrogen, Organic	Organic Nitrogen = Total Kjeldahl Nitrogen - Ammonia Nitrogen		
Odor	A 2150B	0	
Oil & Grease, Gravimetric-Freon extractable	E413.1	1	mg/L
Oil and Grease, IR	E413.2	0.1	mg/L
Oil & Grease, Gravimetric-Hexane extractable	E1664A / A 5520 B	1	mg/L
Oil & Grease Sulfur corrected w/Copper	E1664-Cu	5	mg/L
Organic Carbon, Total (TOC)	SW9060	2	mg/L
Organic Carbon, Total (TOC), low level, public water	A 5310 C	0.5	mg/L
Organic Carbon, Dissolved (DOC)	A 5310 B/A 5310 C	2	mg/L
pH	E150.2/A 4500 H B	0.1	s.u.
Oxidation-Reduction Potential	A 2580	1	mV
Phenolics, Total	E420.4	0.01	mg/L
Phenolics, Total (distillation)	E420.1	0.01	mg/L
Phosphorus, Hydrolyzable	E365.1	0.01	mg/L
Phosphorus, Ortho	E365.1	0.005	mg/L
Phosphorus, Ortho, low level	E365.1	-	mg/L
Phosphorus, Total Organic	E365.1	0.01	mg/L

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NON-METALS, continued	METHOD	REPORTING LIMIT	UNIT
Phosphorus, Total	E365.1	0.005	mg/L
Phosphorus, Total, low level	E365.1	-	mg/L
Residue, Non-Filterable Total Suspended Solids (TSS)	A2540D	10	mg/L
Residue, Non-Filterable Total Suspended Solids (TSS), low level	A2540D	1	mg/L
Residue, Total	A2540B	10	mg/L
Residue, Total Filtered Total Dissolved Solids (TDS)	A 2540 C	10	mg/L
Residue, Volatile Volatile Suspended Solids (VSS) @ 550°	E160.4	10	mg/L
Residue, Settleable Matter	E160.5	0.5	mL/L
Resistivity	E120.1	0.046	ohm- meters
Silica	E200.7	0.1	mg/L
Specific Gravity	A 2710 F		unitless
Sulfate	E300.0/A4500-SO4 E	1	mg/L
Sulfide, Iodine Titrimetric	4500-S2-F	1	mg/L
Sulfide, Methylene Blue Colorimetric	4500-S2-D	0.04	mg/L
Sulfite	4500-S2-B	2	mg/L
Surfactants (MBAS, Foaming Agents)	A5540C or LaMotte DS-1	1	mg/L
Surfactants, low level (MBAS, Foaming Agents)	A5540C	0.1	mg/L
Tannins and Lignins	A 5550	0.1	mg/L
Total Petroleum Hydrocarbons	E418.1	0.1	mg/L
Total Petroleum Hydrocarbons by TCEQ (Texas only)	1005	1	mg/L
Total Organic Halogens (TOX)	SW 9020B	0.01	mg/L
TPH, Gravimetric-Hexane extractable	E1664A / A 5520 B	5	mg/L
TPH, Sulfur corrected w/Copper	E1664-Cu	5	mg/L
Turbidity	E180.1 / A2130B	0.1	NTU

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RADIOCHEMISTRY	METHOD	REPORTING LIMIT ⁽¹⁾	UNIT
Gamma Emitting Radionuclides	E901.1	-	pCi/L
Gross Alpha Radioactivity	E900.0	1.0	pCi/L
Gross Beta Radioactivity	E900.0	2.0	pCi/L
Gross Alpha and Beta	E900.0	1.0/2.0	pCi/L
Gross Radium Alpha (minus Radon & Uranium)	E900.1	1.0	pCi/L
²¹⁰ Lead	E909.0	1.0	pCi/L
²¹⁰ Polonium	E912.0	1.0	pCi/L
²²⁶ Radium (Alpha Emitting Isotopes)	E903.0	0.2	pCi/L
²²⁸ Radium	RA-05	1.0	pCi/L
²²² Radon	ASTM D5072-92	100	pCi/L
Radioactive Strontium	E905.0	10	pCi/L
Isotopic Thorium (²²⁸ Th, ²³⁰ Th, ²³² Th)	E908.0	0.2	pCi/L
²³⁰ Thorium	E908.0	0.2	pCi/L
Tritium	E906.0	1200	pCi/L
Isotopic Uranium (²³⁴ U, ²³⁵ U, ²³⁸ U)	A7500-U-C	0.2	pCi/L
Uranium by fluorescence	E908.0	0.2	pCi/L
Uranium by ICP-MS	E200.8	0.0003	mg/L
Uranium by ICP-MS, low level	E200.8	-	mg/L

For information on radiochemical analyses of drinking water,
please refer to the *Radiochemistry* section,
Item #2 **RADIOCHEMICAL ANALYSES - Drinking Water**

NOTES:

⁽¹⁾ Some reporting limits are dependant on sample size.

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BACTERIA	METHOD	REPORTING LIMIT	UNIT
E. coli, quantitative	9223B	1	MPN/100ml
E. coli, membrane filtration count	E1603	1	CFU/100mL
Fecal Coliforms, membrane filtration count	A 9222 D	1	CFU/100mL
Fecal Coliforms, sludge, membrane filtration count	A 9222 D	1	CFU/g
Fecal Coliforms, sludge	A 9221 E	2	MPN/g
Fecal Coliforms, water	A 9221 E	2	MPN/100ml
Enterococci ¹	Enterolert	1	MPN/100ml
Enterococci, membrane filtration count ¹	E1600	1	CFU/100mL
Total Coliforms/E.coli, present/absent	A 9223 B	1	P/A
Total Coliforms, present/absent (Pools & Spas)	A 9221 D	1	P/A
Total Coliforms/E.coli, quantitative	A9223B Colilert Quantitray	1	MPN/100ml
Total Coliforms, membrane filtration count	A 9222 B	1	CFU/100mL
Heterotrophic Plate Count	A 9215 E / SimPlate	2	MPN/mL
Sulfate Reducing Bacteria	Indicating ampule - Can take up to 28 days to complete	10	CFU/mL
Iron Bacteria	A 9240 B/ Biological Activity Reaction Test (BART) – Can take up to 10 days to complete	1	CFU/mL
Slime Forming Bacteria	Indicator – Can take up to 8 days to complete	10	CFU/mL

NOTE: Weekend and holiday rate by quote

1. Must schedule a week in advance.

WATER PARAMETER GROUPINGS

1. DOMESTIC WATER ANALYSIS

Parameter	Suitability Tolerances, mg/L	Parameter	Suitability Tolerances, mg/L
Potassium	-	Total Dissolved Solids	1500
Sodium	250	Alkalinity	-
Calcium	-	Conductivity	-
Magnesium	-	pH	6.50-8.50 s.u.
Sulfate	250	Nitrate + Nitrite as N	10.0
Chloride	250	-	-
Hardness	See Notes	-	-

Sampling: 1-1-liter plastic bottle, unpreserved. Store at 4-6°C.

Holding Time: Various - refer to Sampling and Preservation table located in the back of this section

Note:

Irrigation Classification and Livestock Suitability available with this analysis at no additional charge.

Suitability recommendations are taken from various state and federal guidelines. There are no regulations in place that provide limitations for private water wells.

EPA recommends that people on low salt diets or who have high blood pressure limit their sodium to 20 mg/L.

Calcium and magnesium expressed as calcium carbonate. These elements do not adversely affect water quality but may have a detrimental effect on plumbing fixtures and appliances, such as water heaters.

Soft water:	0-49 mg/L	or	1-3 grains/gallon
Medium-Hard water:	50-149 mg/L	or	3-9 grains/gallon
Hard water:	150-249 mg/L	or	9-15 grains/gallon
Very Hard water:	250-299 mg/L	or	15-18 grains/gallon
Extremely Hard water:	>300 mg/L	or	>18 grains/gallon

2. LIVESTOCK SUITABILITY

Parameter	Suitability Tolerances, mg/L	Parameter	Suitability Tolerances, mg/L
Nitrate + Nitrite as N	100	Sulfate	3000-5000
pH	6.50-8.50 s.u.	Total Dissolved Solids (see notes)	5000-7000

Sampling: 1-500 mL plastic bottle, unpreserved. Store at 4-6°C.

Holding Time: Various - refer to Sampling and Preservation table located in the back of this section

Note:

Poultry will experience decreased performance using water with TDS above 1,000 mg/L. Livestock, compared to humans, can tolerate higher concentrations of minerals in their drinking water. Sudden changes in livestock water quality (low to high concentrations) have proven fatal to some animals.

3. IRRIGATION CLASSIFICATION

Conductivity	Magnesium	Sodium Adsorption Ratio
Calcium	Sodium	-

Sampling: 1-250 mL plastic bottle, unpreserved.

Holding Time: Various - refer to Sampling and Preservation table located in the back of this section

WATER PARAMETER GROUPINGS

4. TOTAL COLIFORM BACTERIA ANALYSIS

Sampling:	1-sterile sample container received from laboratory. Maintain at normal water temperature or Store at 4-6°C.
Holding Time:	30 hours
Note:	The analysis takes 24 hours to complete. Weekend and holiday rate by quote.

5. DRINKING WATER COMPLETE RADIOCHEMICAL ANALYSIS

	Gross Alpha particle activity
	²²⁶ Radium particle activity
	²²⁸ Radium particle activity
Sampling:	2-1000 mL plastic, preserved with HNO ₃ (red capped ampule). Sample location – within the distribution system.
Holding Time:	6 months
Note:	Drinking water regulations require the analysis of gross alpha particle activity. When the Gross Alpha particle activity exceeds 5 pCi/L, the same or an equivalent sample shall be analyzed for ²²⁶ Radium. If the concentration of ²²⁶ Radium exceeds 3 pCi/L, the same or equivalent sample shall be analyzed for ²²⁸ Radium. Refer to the Radiochemical Section for additional information.

6. LEAD AND COPPER RULE

Sampling:	Collect the first 1-liter after the water has stood motionless in the pipes for at least six hours. The laboratory will preserve with HNO ₃ (red capped ampule) within 14 days of sampling. Sample location – within the distribution system.
Holding Time:	6 months
Note:	The EPA has established Maximum Contamination Limit Goals (MCLG) of 0 for lead and 1.3 mg/L for copper. Action levels are 0.015 mg/L for lead and 1.3 mg/L for copper measured in the 90 th percentile at consumers' taps.

7. SAFE DRINKING WATER ACT PHASE II AND V

INORGANICS – METALS			
METALS, total	EPA MCL, mg/L (ppm)	METALS, total	EPA MCL, mg/L (ppm)
Antimony	0.006	Chromium	0.1
Arsenic	0.01	Mercury	0.002
Barium	2	Nickel	-
Beryllium	0.004	Selenium	0.05
Cadmium	0.005	Thallium	0.002
Sodium ⁽¹⁾	-	-	-
Sampling:	1-1 L plastic, preserved with HNO ₃ (red capped ampule). Sample location - entry point to distribution after treatment.		
Holding Time:	All metals except Mercury – 6 months; Mercury – 28 days.		
Note:	⁽¹⁾ Sodium is only tested in selected states. Speak to an ELI Project Manager for more information.		

WATER PARAMETER GROUPINGS

7. SAFE DRINKING WATER ACT PHASE II AND V (continued)

INORGANICS – CYANIDE	
EPA MCL	0.2 mg/L (ppm)
Sampling:	1-500 mL plastic, preserved with NaOH (green capped ampule) to pH <12. Store at 4-6°C. Sample location - entry point to distribution after treatment.
Holding Time:	14 days
Note:	Cyanide is not required for Montana public water supplies.

INORGANICS – NITRATE PLUS NITRITE AS N	
EPA MCL	10 mg/L (ppm)
Sampling:	1-500 mL plastic, preserve with H ₂ SO ₄ (yellow capped ampule) to pH < 2. Store at 4-6°C. Sample location - entry point to distribution after treatment.
Holding Time:	28 days

INORGANICS – NON-METALS	
NON-METALS	EPA MCL, mg/L (ppm)
Fluoride	4.0
Sampling:	1-500 mL plastic, unpreserved. Store at 4-6°C. Sample location - entry point to distribution after treatment.
Holding Time:	28 days

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WATER PARAMETER GROUPINGS

7. SAFE DRINKING WATER ACT PHASE II AND V (continued)

VOLATILE ORGANIC CONTAMINANTS (VOC) – METHOD E524.2			
REGULATED VOC'S	EPA MCL, µg/L	REGULATED VOC'S	EPA MCL, µg/L
Benzene	5	Styrene	100
Carbon tetrachloride	5	Tetrachloroethene	5
Chlorobenzene	100	Toluene	1000
1,2-Dichlorobenzene	600	1,2,4-Trichlorobenzene	70
1,4-Dichlorobenzene	75	1,1,1-Trichloroethane	200
1,2-Dichloroethane	5	1,1,2-Trichloroethane	5
1,1-Dichloroethene	7	Trichloroethene	5
cis-1,2-Dichloroethene	70	Vinyl chloride	2
trans-1,2-Dichloroethene	100	m+p-Xylenes	-
1,2-Dichloropropane	5	o-Xylene	-
Ethylbenzene	700	Total Xylenes	10000
Methylene chloride	5	-	-
TRIHALOMETHANES	EPA MCL, µg/L	TRIHALOMETHANES	EPA MCL, µg/L
Bromodichloromethane	-	Chlorodibromomethane	-
Bromoform	-	Chloroform	-
Total Trihalomethanes	80	-	-
OTHER EPA LISTED VOC'S	EPA MCL, µg/L	OTHER EPA LISTED VOC'S	EPA MCL, µg/L
Bromobenzene	NR	1,3-Dichloropropane	NR
Bromochloromethane	NR	cis-1,3-Dichloropropene	NR
Bromomethane	NR	trans-1,3-Dichloropropene	NR
n-Butylbenzene	NR	2,2-Dichloropropane	NR
sec-Butylbenzene	NR	Hexachlorobutadiene	NR
tert-Butylbenzene	NR	Isopropylbenzene	NR
Chloroethane	NR	p-Isopropyltoluene	NR
Chloromethane	NR	Trichlorofluoromethane	NR
2-Chlorotoluene	NR	Naphthalene	NR
4-Chlorotoluene	NR	n-Propylbenzene	NR
1,2-Dibromo-3-chloropropane (DBCP)	0.02 <small>(See Note)</small>	1,1,1,2-Tetrachloroethane	NR
1,2-Dibromoethane (EDB)	0.01 <small>(See Note)</small>	1,1,2,2-Tetrachloroethane	NR
Dibromomethane	NR	Methyl-t-butyl ether	NR
1,3-Dichlorobenzene	NR	1,2,3-Trichlorobenzene	NR
Dichlorodifluoromethane	NR	1,2,3-Trichloropropane	NR
1,1-Dichloroethane	NR	1,2,4-Trimethylbenzene	NR
1,1-Dichloropropene	NR	1,3,5-Trimethylbenzene	-
Sampling:	3-40 mL VOA vials preserved with 5-10 drops of HCl (smaller blue capped ampule) to pH <2, add ascorbic acid to chlorinated samples. The vial must be completely full with no air bubbles. Store at 4-6°C. Sample location - entry point to distribution after treatment.		
Holding Time:	14 days		
Note:	For regulatory compliance, DBCP and EDB should be analyzed by EPA method 504.1, which has lower PQLs.		

WATER PARAMETER GROUPINGS

7. SAFE DRINKING WATER ACT PHASE II AND V (continued)

LOW LEVEL EDB AND DBCP – METHOD E504.1 <small>(See Note)</small>			
LOW LEVEL EDB AND DBCP	EPA MCL, µg/L	LOW LEVEL EDB AND DBCP	EPA MCL, µg/L
1,2-Dibromo-3-chloropropane (DBCP)	0.02	1,2-Dibromoethane (EDB)	0.01
<p>Sampling: 3-40 mL VOA vials, add 3 mg sodium thiosulfate to chlorinated and non-chlorinated samples. The vials must be completely full with no air bubbles. Store at 4-6°C. Sample location - entry point to distribution after treatment.</p> <p>Holding Time: 14 days</p> <p>Note: Currently not required in the State of Montana</p>			

HERBICIDES – METHOD E515.4			
HERBICIDES	EPA MCL, µg/L	HERBICIDES	EPA MCL, µg/L
Dalapon	200	Picloram	500
Dicamba	NR	2,4-D	70
Dinoseb	7.0	2,4,5-TP	50
Pentachlorophenol	1.0	-	-
<p>Sampling: 1-250 mL Amber Glass with Sodium Sulfite. Store at 4-6°C.</p> <p>Holding Time: 14 days to extraction; 28 days to analysis</p>			

WATER PARAMETER GROUPINGS

7. SAFE DRINKING WATER ACT PHASE II AND V (continued)

PESTICIDES – METHOD E525.2 – Drinking Water List			
PESTICIDES	EPA MCL, µg/L	PESTICIDES	EPA MCL, µg/L
Alachlor	2	Methoxychlor	40
Aldrin	NR	Metolachlor	NR
Atrazine	3	Metribuzin	NR
Benzo(a)pyrene	0.2	Propachlor	NR
Butachlor	NR	Simazine	4
Chlordane	2	Toxaphene	3
bis(2-ethylhexyl)adipate	400		
bis(2-ethylhexyl)phthalate	6	<i>For all Aroclor PCBs detected</i>	0.5
Dieldrin	NR	Aroclor-1016	--
Endrin	2	Aroclor-1221	--
Heptachlor	0.4	Aroclor-1232	--
Heptachlor Epoxide	0.2	Aroclor-1242	--
Hexachlorobenzene	1	Aroclor-1248	--
Hexachlorocyclopentadiene	50	Aroclor-1254	--
Gamma-BHC (Lindane)	0.2	Aroclor-1260	--
Sampling:	2-1000 mL glass bottles, preserved with HCl (blue capped ampule) to pH <2, add sodium sulfite to chlorinated samples. Dechlorinate before adding the HCl. Store at 4-6°C. Sample location - entry point to distribution after treatment.		
Holding Time:	14 days to extraction; Sample extracts may be stored at 4°C for up to 30 days after sample extraction		
Note:	The State of Montana Pesticides List is identified on page Organics-14		

CARBAMATE PESTICIDES – METHOD E531.1			
CARBAMATE PESTICIDES	EPA MCL, µg/L	CARBAMATE PESTICIDES	EPA MCL, µg/L
Aldicarb	3	Carbofuran	40
Aldicarb Sulfone	2	3-Hydroxycarbofuran	NR
Aldicarb Sulfoxide	4	Methomyl	NR
Carbaryl	NR	Oxamyl	200
Sampling:	2-40 mL VOA vials containing 1.2 mL monochloroacetic acid, add sodium thiosulfate to chlorinated samples. Do not rinse the sample bottles as it contains the buffer. Store at 4-6°C. Sample location - entry point to distribution after treatment.		
Holding Time:	28 days		

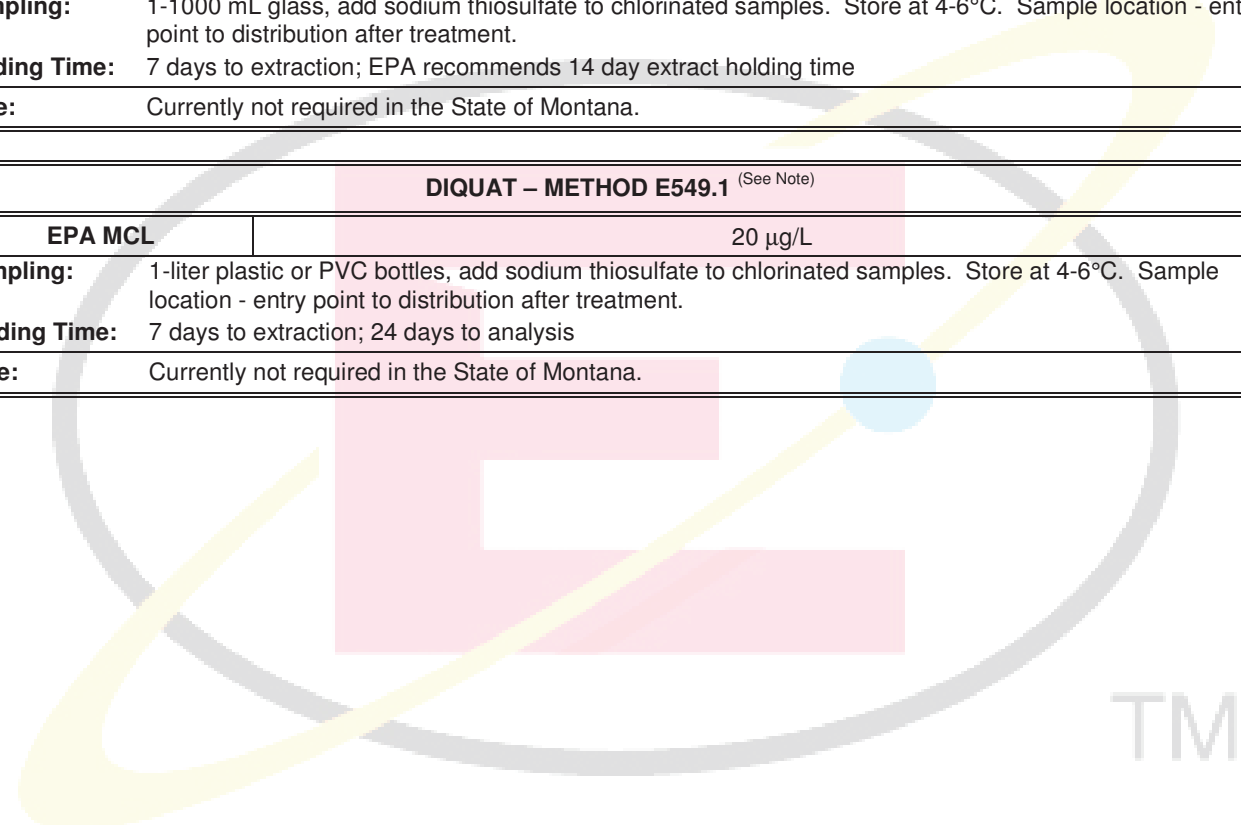
WATER PARAMETER GROUPINGS

7. SAFE DRINKING WATER ACT PHASE II AND V (continued)

GLYPHOSATE – METHOD E547 <small>(See Note)</small>	
EPA MCL	700 µg/L
Sampling:	2-40 mL VOA vials, add sodium thiosulfate to chlorinated samples. Store at 4-6°C. Sample location - entry point to distribution after treatment.
Holding Time:	14 days
Note:	Currently not required in the State of Montana.

ENDOTHALL- METHOD E548.1 <small>(See Note)</small>	
EPA MCL	100 µg/L
Sampling:	1-1000 mL glass, add sodium thiosulfate to chlorinated samples. Store at 4-6°C. Sample location - entry point to distribution after treatment.
Holding Time:	7 days to extraction; EPA recommends 14 day extract holding time
Note:	Currently not required in the State of Montana.

DIQUAT – METHOD E549.1 <small>(See Note)</small>	
EPA MCL	20 µg/L
Sampling:	1-liter plastic or PVC bottles, add sodium thiosulfate to chlorinated samples. Store at 4-6°C. Sample location - entry point to distribution after treatment.
Holding Time:	7 days to extraction; 24 days to analysis
Note:	Currently not required in the State of Montana.



WATER PARAMETER GROUPINGS

8. LANDFILL GROUNDWATER ANALYSIS (40 CFR Part 258) ⁽¹⁾

Appendix I - Constituents for Detection Monitoring – Inorganics (Metals, Minerals, Demand, and Nutrients)				
Antimony	Chloride	Copper	Nickel	Sulfate
Arsenic	Chromium	Cyanide	Nitrate + Nitrite	Thallium
Barium	Cobalt	Iron	pH	Vanadium
Beryllium	COD	Lead	Selenium	Zinc
Cadmium	Conductivity	Mercury	Silver	
Sampling:	1-500 mL plastic bottle, unfiltered, preserved with H ₂ SO ₄ (yellow capped ampule). Store at 4-6°C – Nutrients & Demand. 1-500 mL plastic bottle, unfiltered, unpreserved. Store at 4-6°C – Minerals & Demand. 1-500 mL plastic bottle, filtered, preserved with HNO ₃ (red capped ampule) – Metals. 1-500 mL plastic bottle, unfiltered, preserved with NaOH (green capped ampule). Store at 4-6°C – Cyanide.			
Holding Time:	Various - refer to Sampling and Preservation table located in the back of this section			
Appendix I - Constituents for Detection Monitoring – Purgeable Organics (VOCs), Method SW 8260B				
Sampling:	3-40 mL VOA vials, completely full with no air bubbles. Preserved with 5-10 drops with HCl (blue capped ampule) to pH <2. Add ascorbic acid to chlorinated samples. Store at 4-6°C.			
Holding Time:	14 days			

Appendix II - Assessment Monitoring - Inorganics (Metals, Sulfide, and Cyanide)	
Sampling:	1-500 mL plastic bottle, unfiltered, preserved with Zinc Acetate (purple capped ampule) and NaOH (green capped ampule) to pH > 9. Bottle must be filled completely full with no headspace. Store at 4-6°C. – Sulfide 1-500 mL plastic bottle, filtered, preserved with HNO ₃ (red capped ampule). - Metals 1-500 mL plastic bottle, unfiltered, preserved with NaOH (green capped ampule). Store at 4-6°C. - Cyanide
Holding Time:	Various - refer to Sampling and Preservation table located in the back of this section
Appendix II - Assessment Monitoring - Organochlorine Pesticides and PCBs, Method SW 8081A and SW 8082	
Sampling:	2-1 liter glass, unpreserved. Store at 4-6°C.
Holding Time:	7 days to extraction, 40 days to analysis
Appendix II - Assessment Monitoring - Chlorinated Herbicides, Method SW 8151A	
Sampling:	2-1 liter glass, unpreserved. Store at 4-6°C.
Holding Time:	7 days to extraction, 40 days to analysis
Appendix II - Assessment Monitoring – Purgeable Organics (VOCs), Method SW 8260B	
Sampling:	3-40 mL VOA vials, completely full with no air bubbles. Preserved with 2 drops of HCl (blue capped ampule) to pH <2. Store at 4-6°C.
Holding Time:	14 days
Appendix II - Assessment Monitoring - Acrolein, EPA Method SW 8260B	
Sampling:	3-40 mL VOA vials. Unpreserved (raw), chilled to 6°C and analyzed within 3 days of collection. Or, pH adjusted to 4-5 with HCL, chilled to 6°C, and analyzed within 14 days. Add ascorbic acid to chlorinated samples. The vials must be completely full with no air bubbles. Store at 4-6°C.
Holding Time:	14 days
Appendix II - Assessment Monitoring - Semi-Volatile Organics (SVOC), Method SW 8270C	
Sampling:	2-1 liter glass, unpreserved. Store at 4-6°C.
Holding Time:	7 days to extraction, 40 days to analysis

⁽¹⁾Each state may have different requirements. Please contact an Energy Laboratory representative for more information.

WATER PARAMETER GROUPINGS

9. PRIORITY POLLUTANTS

Category	Method		
Volatiles Short List Volatiles Acrolein/Acrylonitrile	E624 E624		
Sampling: 3-40 mL glass/teflon VOA vials. Add 3-5 drops of HCl. For Acrolein take an additional 3-40 mL VOA vials. Unpreserved (raw) and <u>analyzed within 3 days of collection</u> . Or, pH adjusted to 4-5 with HCL, and analyzed within 14 days. Contact the laboratory prior to sampling to arrange for this analysis. Add sodium thiosulfate or ascorbic acid to chlorinated samples. The vials must be completely full with no air bubbles. Store at 6°C. Holding Time: 14 days (3 days for unpreserved Acrolein)			
Pesticides/PCBs	E608		
Sampling: 1-1000 mL glass bottle. Add ascorbic acid to chlorinated samples. The vials must be completely full with no air bubbles. Store at 4-6°C. Holding Time: 7 days to extraction, then 40 days to analysis			
Semi-Volatiles Acid Compounds Base Neutrals 2,3,7,8-TCDD	E625 E625 E625 screening		
Sampling: 4-1000 mL glass bottles. Add 40 mg sodium thiosulfate to chlorinated samples. Store at 4-6°C. Holding Time: 7 days to extraction, then 40 days to analysis			
Inorganics			
Metals, Totals			
Antimony	Cadmium	Lead	Selenium
Arsenic	Chromium	Mercury	Silver
Beryllium	Copper	Nickel	Thallium
-	-	-	Zinc
Sampling: 1-250 mL plastic bottle. Preserve with HNO ₃ (red capped ampule). Holding Time: All metals except Mercury – 6 months; Mercury – 28 days.			
Cyanide, Total			
Sampling: 1-250 mL plastic bottle. Preserve with NaOH (green capped ampule). Holding Time: 14 days			
Phenolics (E420.4)			
Sampling: 1-250 mL glass bottle. Preserve with H ₂ SO ₄ (yellow capped ampule), 2 drops/vial. Holding Time: 28 days			

WATER PARAMETER GROUPINGS

10. METALS SCAN

Aluminum	Cadmium	Iron	Nickel	Sodium
Antimony	Calcium	Lead	Phosphorus	Strontium
Barium	Chromium	Magnesium	Potassium	Thallium
Beryllium	Cobalt	Manganese	Silicon	Titanium
Boron	Copper	Molybdenum	Silver	Vanadium
-	-	-	-	Zinc
Sampling: 1-250 mL plastic bottle preserved with HNO ₃ (red capped ampule).				
Holding Time: 6 months				
ICP Scan: Analyzed in water by ICP to a 0.1 mg/L reporting limit. (Calcium, Magnesium, Sodium, Potassium 5 mg/L reporting limit.)				
ICP-MS Scan: A semi-quantitative analysis of water by ICP-MS. This includes 65 elements from lithium at 7 atomic mass units (amu) through uranium (238 amu). Semi-quantitative measurements are made at the sub parts per billion concentration range. Not included are scandium, yttrium, indium, bismuth, and gold.				

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RECOMMENDATIONS FOR SAMPLING AND PRESERVATION OF WATERS

MEASUREMENT	Volume Required (mL)	Container P=Plastic G=Glass	PRESERVATIVE	HOLDING TIME
Preservative ampules: HNO ₃ – nitric acid (red cap), H ₂ SO ₄ - sulfuric acid (yellow cap), HCl - hydrochloric acid (blue cap), H ₃ PO ₄ - phosphoric acid (white cap), NaOH - sodium hydroxide (green cap), or zinc acetate (purple cap).				
Major minerals, including the following: Potassium, Sodium, Calcium, Magnesium, Sulfate, Chloride, Bicarbonate, Carbonate, pH, Specific Conductance, Total Dissolved Solids	500	P or G	Cool, ≤ 6°C	see holding times for each individual parameter, below
METALS				
Dissolved Metals	250	P or G	Filter (0.45 micron), then add HNO ₃ to pH <2	6 months
Total Metals	250	P or G	HNO ₃ to pH <2	6 months
Chromium ⁺⁶	200	P or G	Cool, ≤ 6°C	24 hours
Ferrous Iron (Fe II - requires field filtering)	100	P or G	Filter (0.45 micron), then add HNO ₃ to pH <2	6 months
Mercury	100	P or G	same as tot. or diss. Metals	28 days
NON-METALLICS				
Acidity	100	P or G	Cool, ≤ 6°C	14 days
Alkalinity	100	P or G	Cool, ≤ 6°C	14 days
Biochemical Oxygen Demand (BOD)	1000	P or G	Cool, ≤ 6°C	48 hours
Bromide	100	P or G	None Required	28 days
Carbonaceous BOD	1000	P or G	Cool, ≤ 6°C	48 hours
Chemical Oxygen Demand (COD)	50	P or G	H ₂ SO ₄ to pH <2, Cool, ≤ 6°C	28 days
Chloride	50	P or G	None Required	28 days
Chlorine	50	P or G	None Required	15 minutes
Chlorophyll a	1000	P or G	Cool, ≤ 6°C, keep in the dark	NA
Color	50	P or G	Cool, ≤ 6°C	48 hours
Conductance	100	P or G	Cool, ≤ 6°C	28 days
Cyanates	250	P	NaOH to pH >12, Cool, ≤ 6°C	14 days
Cyanides	500	P or G	NaOH to pH >12, Cool, ≤ 6°C	14 days
Ethylene Glycol	500	P or G	Cool, ≤ 6°C	NA
Formaldehyde	100	P or G	Cool, ≤ 6°C	NA

RECOMMENDATIONS FOR SAMPLING AND PRESERVATION OF WATERS, continued

MEASUREMENT	Volume Required (mL)	Container P=Plastic G=Glass	PRESERVATIVE	HOLDING TIME
NON-METALLICS continued				
Fluoride	50	P or G	None Required	28 days
Iodide	100	P or G	None Required	28 days
Hardness	100	P or G	Cool, $\leq 6^{\circ}\text{C}$	6 months
Methane	40 mL VOA vial-no headspace-4 drops H_2SO_4			NA
Nitrogen, Ammonia	50	P or G	H_2SO_4 to pH <2, Cool, $\leq 6^{\circ}\text{C}$	28 days
Nitrogen, Total Kjeldahl	500	P or G	H_2SO_4 to pH <2, Cool, $\leq 6^{\circ}\text{C}$	28 days
Nitrogen, Nitrate plus Nitrite	50	P or G	H_2SO_4 to pH <2, Cool, $\leq 6^{\circ}\text{C}$	28 days
Nitrogen, Nitrate	50	P or G	Cool, $\leq 6^{\circ}\text{C}$	48 hours
Nitrogen, Nitrite	50	P or G	Cool, $\leq 6^{\circ}\text{C}$	48 hours
Nitrogen, Total (Persulfate Method)	50	P or G	Cool, $\leq 6^{\circ}\text{C}$	NA
Oil and Grease	2 - 1000	G	H_2SO_4 to pH <2, Cool, $\leq 6^{\circ}\text{C}$	28 days
Organic Carbon	125	G	H_3PO_4 to pH <2, Cool, $\leq 6^{\circ}\text{C}$	28 days
Organic Carbon, Public Water Supply	250	G	H_3PO_4 to pH <2, Cool, $\leq 6^{\circ}\text{C}$	28 days
pH	25	P or G	None Required	15 minutes
Phenolics by E420.4	250	G	H_2SO_4 to pH <2, Cool, $\leq 6^{\circ}\text{C}$	28 days
Phenols by E420.1 distillation	2 - 1000	G	H_2SO_4 to pH <2, Cool, $\leq 6^{\circ}\text{C}$	28 days
Phosphorus, Hydrolyzable	250	P or G	H_2SO_4 to pH <2, Cool, $\leq 6^{\circ}\text{C}$	28 days
Phosphorus, Ortho	250	P or G	Filter within 15 minutes, Cool, $\leq 6^{\circ}\text{C}$	48 hours
Phosphorus, Total	250	P or G	H_2SO_4 to pH <2, Cool, $\leq 6^{\circ}\text{C}$	28 days
Residue, Filterable Total Dissolved Solids (TDS)	500	P or G	Cool, $\leq 6^{\circ}\text{C}$	7 days
Residue, Non-filterable Total Suspended Solids (TSS)	1000	P or G	Cool, $\leq 6^{\circ}\text{C}$	7 days
Residue, Total	100	P or G	Cool, $\leq 6^{\circ}\text{C}$	7 days
Residue, Volatile Volatile Suspended Solids (VSS)	100	P or G	Cool, $\leq 6^{\circ}\text{C}$	7 days
Settleable Matter	1000	P or G	Cool, $\leq 6^{\circ}\text{C}$	48 hours

RECOMMENDATIONS FOR SAMPLING AND PRESERVATION OF WATERS, continued

MEASUREMENT	Volume Required (mL)	Container P=Plastic G=Glass	PRESERVATIVE	HOLDING TIME
NON-METALLICS continued				
Sulfate	100	P or G	Cool, $\leq 6^{\circ}\text{C}$	28 days
Sulfide	250	P or G	Add 2 mL zinc acetate, zero headspace, NaOH to pH > 9, Cool, $\leq 6^{\circ}\text{C}$	7 days
Sulfite	100	P or G	1 mL of EDTA	15 minutes
Surfactants (Foaming Agents)	500	P or G	Cool, $\leq 6^{\circ}\text{C}$	48 hours
Tannins & Lignins	25	P or G	Cool, $\leq 6^{\circ}\text{C}$	14 days
Thiocyanates	100	P or G	HNO_3 to pH < 2	NA
Total Petroleum Hydrocarbons (TPH)	2 - 1000	G	H_2SO_4 to pH < 2, Cool, $\leq 6^{\circ}\text{C}$	28 days
Total Petroleum Hydrocarbons (TPH) by TCEQ 1005	3-VOA vials with zero headspace	G	HCl to pH < 2, Cool, $\leq 6^{\circ}\text{C}$	14 days
Turbidity	100	P or G	Cool, $\leq 6^{\circ}\text{C}$	48 hours
BACTERIA				
Total Coliform Bacteria	100	Sterile	Cool, < 10°C	30 hours
Fecal Coliform Bacteria	100	Sterile	Cool, < 10°C	8 hours
E. Coli	100	Sterile	Cool, < 10°C	8 hours
Heterotrophic Plate Count	100	Sterile	Cool, < 10°C	8 hours
Sulfate Reducing Bacteria	100	Sterile	Cool, < 10°C	48 hours
Iron Bacteria	100	Sterile	Cool, < 10°C	3 days
RADIOCHEMISTRY				
Gross Alpha / Beta	2 – 1000	P or G	HNO_3 to pH < 2	6 months
²¹⁰ Pb	2 – 1000			
²¹⁰ Po	2 – 1000			
²²⁶ Ra	2 – 1000			
²²⁸ Ra	2 – 1000			
²³⁰ Th	2 – 1000			
Uranium	2 - 1000	G	Cool, $\leq 6^{\circ}\text{C}$	8 days
²²² Rn	3-VOA vials with zero headspace			