

Analytical Methods List
The Environmental Analytical Lab
Montana State University

Instrument	Analysis	Method(s) Used *	Reporting Limit
Lachat QuickChem 8500	Nitrate + nitrite (2M KCl extracts)	QuikChem 12-107-04-1-J	0.025 ppm N
	Nitrate + nitrite (water)	QuikChem 10-107-04-1-J	0.10 ppm N
	Ammonia (water, 2M KCl, 0.01M CaCl ₂ , 0.5M K ₂ SO ₄ extracts)	QuikChem 90-107-06-3-A	0.10 ppm N
	Phosphorous (Olsen's extract)	QuikChem 12-115-01-1-Q	0.10 ppm P
	Orthophosphate (Bray or Melich extract)	QuikChem 12-115-01-1-N	0.40 ppm P
	Orthophosphate (water)	QuikChem 10-115-01-1-A	0.01 ppm P
ThermoFisher Dionex IC-2100 (AS18 column)	Br, Cl, F, NO ₃ -N, NO ₂ -N, o-PO ₄ -P, SO ₄	EPA 300.1	0.020 ppm F, 0.020 ppm Cl, 0.04 ppm Br, 0.01 NO ₂ -N, 0.01 ppm NO ₃ -N, 0.04 ppm o-phosphate-P, 0.04 ppm SO ₄
Seal QuAAtro Segmented Flow Analyzer	NO ₃ -N	QuAAtro Q-035-04 Rev. 4	30 ppb NO ₃ -N
	NO ₂ -N	QuAAtro Q-030-04 Rev. 2	7 ppb NO ₂ -N
	PO ₄	QuAAtro Q-031-04 Rev. 1	1 ppb PO ₄ -P
	NH ₃		2 ppb NH ₃ -N
SpectroBLUE ICP-OES	Elements	USGS I-4471-97	
Shimadzu TOC- CSH (with TN Module)	Total carbon, inorganic carbon, non-purgeable organic carbon in water (high temperature catalytic combustion)	ASTM D7573	0.1 ppm C
	Total nitrogen in water (high temperature catalytic combustion)	ASTM D8083	0.1 ppm N
CEM Microwave Digester	Water	Standard Methods 3030K EPA Method 3015a	
	Soil	EPA 3051a	
	Biological tissue, vegetation	EPA 3052	

**Methods may be modified to fit needs of user/project, instrument capability, and standards available in the EAL. If method modification is an issue with your data requirements, please discuss with the EAL prior to submitting samples.*

Soil Analytical Methods

Analysis	Method/Reference*
pH (1:2 water)	EPA 9045D
% Moisture (oven dry/ gravimetric)	C.A. Black, editor, 1965. Methods of Soil Analysis. Part 1. Physical and Mineralogical Properties. Agron. Monogr. 9.1. ASA, SSSA, Madison, WI.
Extract (Olsen's, KCl, H ₂ O)	D.L. Sparks, A.L. Page, P.A. Helmke, R.H. Loeppert, editors, 1996. Methods of Soil Analysis Part 3—Chemical Methods. SSSA Book Ser. 5.3. SSSA, ASA, Madison, WI.
Extract for ICP (DTPA- TEA, pH= 7 ammonium acetate)	D.L. Sparks, A.L. Page, P.A. Helmke, R.H. Loeppert, editors, 1996. Methods of Soil Analysis Part 3—Chemical Methods. SSSA Book Ser. 5.3. SSSA, ASA, Madison, WI.
Sieving	C.A. Black, editor, 1965. Methods of Soil Analysis. Part 1. Physical and Mineralogical Properties. Agron. Monogr. 9.1. ASA, SSSA, Madison, WI.
Particle size	C.A. Black, editor, 1965. Methods of Soil Analysis. Part 1. Physical and Mineralogical Properties. Agron. Monogr. 9.1. ASA, SSSA, Madison, WI.

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