ENVIRONMENTAL METHODS LIST – USEPA

Method Detection Limits are calculated using USEPA procedure 40 CFR, Part 136, Appendix B

00ANALYTE	METHOD DESCRIPTION	SEAL METHOD	MDL	Range	EQUIVALENCE
ALKALINITY	Buffered methyl orange color reduction	EPA-100-A	6.5 mg $CaCO_3$/L	10 – 100 mg $CaCO_3$/L	EPA 310.2 (1974)
		EPA-101-A	8.0 mg $CaCO_3$/L	15 – 200 mg $CaCO_3$/L	
		EPA-102-A	16 mg $CaCO_3$/L	50 – 500 mg $CaCO_3$/L	
AMMONIA	Alkaline phenate method with hypochlorite and sodium nitroprusside (indophenol blue)	EPA-103-A	0.004 mg N/L	0.02 – 2.0 mg N/L	EPA 350.1, version 2 (1993) Std. Methods 4500-NH_3 G (19^{th},20^{th})
		EPA-129-C	0.04 mg N/L	0.2 – 10 mg N/L	
AMMONIA	Alkaline phenate method with hypochlorite and sodium nitroprusside (indophenol blue). This is a brackish method.	EPA-104-A	0.07 mg N/L	0.2 – 5.0 mg N/L	EPA 350.1, version 2 (1993) Std. Methods 4500-NH_3 G (19th,20^{th})
AMMONIA	Alkaline salicylate method with hypochlorite and sodium nitroprusside	EPA-148-C	0.002 mg N/L	0.02 – 1.0 mg N/L	EPA 350.1, version 2 (1993) Std. Methods 4500-NH_3 G (19th,20^{th})
		EPA-150-C	0.005 mg N/L	0.1 – 5.0 mg N/L	
		EPA-153-C	0.011 mg N/L	0.2 – 10 mg N/L	
CHLORIDE	Mercuric thiocyanate reaction in the presence of ferric nitrate	EPA-105-C	0.3 mg Cl/L	2.0 – 100 mg Cl/L	Std. Methods 4500-Cl^- E (18^{th},19^{th},20^{th})
		EPA-124-C	0.4 mg Cl/L	5.0 – 200 mg Cl/L	
CHROMIUM, Hexavalent	Hexavalent chromium reaction with diphenylcarbazide	EPA-108-C	0.0005 mg/L	0.003 – 0.5 mg Cr(VI)/L	Std, Methods 4500-Cr B (20^{th})
		EPA-109-A	0.011 mg/L	0.3 – 5.0 mg Cr(VI)/L	
COLOR	Platinum-cobalt standard comparison (480 nm)	EPA-140-A	2 Color Units	5 – 150 Color Units	Std. Methods 2120 B (18^{th},19^{th},20^{th})
COLOR	Platinum-cobalt standard comparison (450nm)	EPA-147-A	2 Color Units	2 – 150 Color Units	Std. Methods 2120 B (18^{th}, 19^{th}, 20^{th}) Std. Methods 2120 C (21^{st} ed).
CYANIDE	Chloramine-T with pyridine barbituric acid color reaction (Manual distillation required)	EPA-130-C	0.7 µg CN/L	2.0 – 250 µg CN/L	EPA 335.4, version 1 (1993) Std. Methods 4500-CN E (18^{th}, 19^{th}, 20^{th})
CYANIDE	Amenable to chlorination (Without distillation)	EPA-133-A	0.4 µg CN/L	2.0 – 300 µg CN/L	Std. Methods 4500-CN H (20^{th})

ENVIRONMENTAL METHODS LIST – USEPA

Method Detection Limits are calculated using USEPA procedure 40 CFR, Part 136, Appendix B

00ANALYTE	METHOD DESCRIPTION	SEAL METHOD	MDL	Range	EQUIVALENCE
HARDNESS, Total	Calmagite indicator reaction	EPA-106-C	10 mg $CaCO_3$/L	25 – 400 mg $CaCO_3$/L	EPA 130.1 (1971)
NITROGEN, Total Kjeldahl (TKN)	Kjeldahl digests (Hg catalyst) are reacted with alkaline salicylate in the presence of hypochlorite and sodium nitroprusside (Digestion required)	EPA-125-A	0.03 mg N/L	0.1 – 4.0 mg N/L	EPA 351.2, version 2 (1993)
		EPA-110-A	0.2 mg N/L	0.5 – 24 mg N/L	
NITROGEN, Total Kjeldahl (TKN)	Kjeldahl digests (Cu catalyst) are reacted with alkaline salicylate in the presence of hypochlorite and sodium nitroprusside (Digestion required)	EPA-111-A	0.07 mg N/L	0.2 – 4.0 mg N/L	EPA 351.2, version 2 (1993)
		EPA-136-A	0.12 mg N/L	0.5 – 25 mg N/L	
NITRATE + NITRITE	Cadmium coil reduction followed by sulfanilamide reaction in the presence of N-(1-naphthylethylenediamine) dihydrochloride	EPA-127-C	0.003 mg N/L	0.012 – 2.0 mg N/L	EPA 353.2, version 2 (1993) Std. Methods 4500-NO_3 F (18^{th}, 19^{th}, 20^{th})
		EPA-126-C	0.007 mg N/L	0.04 – 5.0 mg N/L	
		EPA-114-A	0.03 mg N/L	0.25 – 15 mg N/L	
NITRATE + NITRITE	Nitrate is chemically reduced to nitrite by alkaline hydrazine sulfate, in the presence of copper(II).	EPA-141-A	0.005 mg N/L	0.02 – 1.5 mg N/L	EPA 353.1(1978) Std. Methods 4500-NO_3–H (18^{th}, 19^{th}, 20^{th})
		EPA-142-A	0.03 mg N/L	0.2 – 5.0 mg N/L	
NITRATE + NITRITE	Cadmium coil reduction followed by sulfanilamide reaction in the presence of N-(1-naphthylethylenediamine) dihydrochloride (Imidazole buffer used)	EPA-132-A	0.004 mg N/L	0.012 – 2.0 mg N/L	N/A
NITRATE + NITRITE	Vanadium(III) chloride reduction followed by sulfanilamide reaction in the presence of N-(1-naphthylethylenediamine) dihydrochloride	EPA-160-A	0.004 mg N/L	0.025 – 1.0 mg N/L	40 CFR, Part 136.3
NITRITE	Sulfanilamide reaction in the presence of N-(1-naphthylethylenediamine) dihydrochloride	EPA-115-C	0.0008 mg N/L	0.015 – 1.5 mg N/L	EPA 353.2, version 2 (1993) Std. Methods 4500-NO_3 F (18^{th}, 19^{th}, 20^{th})
		EPA-137-A	0.0001 mg N/L	0.0009 – 0.2 mg N/L	
NITRITE	Sulfanilamide reaction in the presence of N-(1-naphthylethylenediamine) dihydrochloride (no buffer used)	EPA-116-C	0.0002 mg N/L	0.001 – 0.2 mg N/L	Std. Methods 4500-NO_2 B (18^{th}, 19^{th}, 20^{th})
		EPA-112-C	0.0005 mg N/L	0.015 – 1.5 mg N/L	

ENVIRONMENTAL METHODS LIST – USEPA

Method Detection Limits are calculated using USEPA procedure 40 CFR, Part 136, Appendix B

00ANALYTE	METHOD DESCRIPTION	SEAL METHOD	MDL	Range	EQUIVALENCE
PHENOLICS	Sample distillates are reacted with alkaline ferricyanide and 4-aminoantipyrine (Manual distillation required)	EPA-117-C	0.002 mg Phenol/L	0.005 – 0.25 mg Phenol/L	EPA 420.4, version 1 (1993)
PHOSPHATE, Ortho	Acidic molybdate/antimony with ascorbic acid reduction (phosphomolybdenum blue)	EPA-156-C	0.0004 mg P/L	0.003 – 0.2 mg P/L	EPA 365.1, version 2 (1993) Std. Methods 4500-P F (18^{th}, 19^{th}, 20^{th})
		EPA-118-C	0.0015 mg P/L	0.005 – 1.0 mg P/L	
		EPA-145-C	0.005 mg P/L	0.05 – 5 mg P/L	
		EPA-146-A	0.013 mg P/L	0.125 – 12.5 mg P/L	
PHOSPHORUS, Total (TP)	Acidic molybdate/antimony with ascorbic acid reduction (Manual persulfate digestion required)	EPA-119-A	0.003 mg P/L	0.01 – 1.0 mg P/L	EPA 365.1, version 2 (1993) Std. Methods 4500-P B, F (18^{th}, 19^{th}, 20^{th})
		EPA-134-A	0.006 mg P/L	0.05 – 5.0 mg P/L	
PHOSPHORUS, Total Kjeldahl (TKP)	Kjeldahl digests (Hg catalyst) are reacted with acidic molybdate/antimony with ascorbic acid reduction	EPA-120-A	0.007 mg P/L	0.04 – 3.2 mg P/L	EPA 365.4 (1983)
PHOSPHORUS, Total Kjeldahl (TKP)	Kjeldahl digests (Cu catalyst) are reacted with acidic molybdate/antimony with ascorbic acid reduction. Method range depends on digestion protocol	EPA-135-A	0.009 mg P/L	0.04 – 3.2 mg P/L	N/A
SILICA (Reactive silica)	Acidic molybdate, no reduction (molybdo-silicic acid)	EPA-121-A	0.1 mg silica/L	0.25 – 25 mg silica/L	Std. Methods 4500-SiO_2 C (20th)
SILICA (Reactive silica)	Acidic molybdate with ANSA reduction (silico-molybdenum blue)	EPA-122-C	0.0042 mg silica/L	0.1 – 10.0 mg silica/L	Std. Methods 4500-SiO_2 D (20^{th})
SULFATE	Barium chloride turbidimetric method	EPA-123-A	1.0 mg/L	5.0 – 40 mg/L	ASTM D516-90, 02
SULFATE	Barium chloride turbidimetric method with use of gelatin as suspension agent	EPA-165-A	0.09 mg/L	5.0 – 40 mg/L	ASTM D516-11

ISO METHODS LIST

Method Detection Limits are calculated using USEPA procedure 40 CFR, Part 136, Appendix B

ANALYTE	METHOD DESCRIPTION	SEAL METHOD	MDL	RANGE	EQUIVALENCE
AMMONIA	Alkaline salicylate method with hypochlorite and sodium nitroprusside	ISO-415-A	0.003 mg N/L	0.01 – 1.0 mg N/L	ISO 7150-1
CHLORIDE	Mercuric thiocyanate reaction in the presence of ferric nitrate	ISO-420-A	1.4 mg Cl/L	5 – 400 mg Cl/L	ISO 15682
COLOUR	Potassium hexachloroplatinate and cobalt chloride solution standard comparison (measured at 405 nm)	ISO-435-A	1 mg Pt/L	1 – 100 mg Pt/L	ISO 7887:2011(E)
FLUORIDE	Ce^{3+} and alizarin-3-methyliminodiacetic acid reaction in acidic solution	ISO-440-C	0.05 mg F/L	0.2 – 5.0 mg F/L	ISO/DTA 15923-2
NITRATE + NITRITE	Alkaline hydrazine sulfate reduction, in the presence of copper(II) followed by sulfanilamide reaction in the presence of N-(1-naphthylethylenediamine) dihydrochloride	ISO-405-A	0.008 mg N/L	0.1 – 6.0 mg N/L	ISO/DIS 15923-1
NITRATE + NITRITE	Cadmium coil reduction followed by sulfanilamide reaction in the presence of N-(1-naphthylethylenediamine) dihydrochloride	ISO-406-C	0.01 mg N/L	0.1 – 6.0 mg N/L	ISO/DIS 15923-1
NITRITE	Sulfanilamide reaction in the presence of N-(1-naphthylethylenediamine) dihydrochloride	ISO-401-A	0.0003 mg N/L	0.02 – 1.0 mg N/L	ISO/DIS 15923-1
PHOSPHATE	Acidic molybdate/antimony with ascorbic acid reduction (phosphomolybdenum blue)	ISO-410-A	0.002 mg P/L	0.006 – 1.0 mg P/L	ISO 6878
SILICATE	Acidic molybdate with ANSA reduction (silico-molybdenum blue)	ISO-430-A	0.016 mg Si/L	0.05 – 6.0 mg Si/L	ISO/DIS 15923-1
SULFATE	Barium chloride turbidimetric method with use of gelatin as suspension agent	ISO-425-A	0.42 mg/L	4.0 – 200 mg/L	ISO/DIS 15923-1

SEAWATER METHODS LIST

Method Detection Limits are calculated using USEPA procedure 40 CFR, Part 136, Appendix B

ANALYTE	METHOD DESCRIPTION	SEAL METHOD	MDL	RANGE	EQUIVALENCE
PHOSPHATE, Ortho	Acidic molybdate/antimony with ascorbic acid reduction (phosphomolybdenum blue)	SEA-156-C	0.015 µM (0.46 µg P/L)	0.1 – 7.0 µM (3.1 – 217 µg P/L)	EPA 365.1, version 2 (1993) Std. Methods 4500-P F (18^{th}, 19^{th}, 20^{th})
SILICA (Reactive silica)	Acidic molybdate with ANSA reduction (silico-molybdenum blue)	SEA-122-C	0.011 mg silica/L	0.1 – 10.0 mg silica/L	Std. Methods 4500-SiO_2 D (20^{th})

SPECIALTY METHODS LIST

Method Detection Limits are calculated using USEPA procedure 40 CFR, Part 136, Appendix B

ANALYTE	METHOD DESCRIPTION	SEAL METHOD	MDL	RANGE	EQUIVALENCE
ALUMINIUM	Pyrocatechol violet [α,α-bis(3,4-dihydroxyphenyl) toluene-2, α-sultone] reaction	UKAS-509-A	0.011 mg Al/L	0.025 – 1.0 mg Al/L	UK Blue Book Method
AMMONIA	Salicylate method with hypochlorite and sodium nitroprusside (indophenol blue)	SPC-904-C	0.072 mg N/L	4 – 50 mg N/L	ISO 11732:2005(E)
		UKAS-500-A	0.02 mg N/L	0.1 – 1.0 mg N/L	UK Blue Book Method
		UKAS-501-A	0.16 mg N/L	2.0 – 10 mg N/L	
		UKAS-502-A	0.32 mg N/L	10 – 50 mg N/L	
AMMONIA	Salicylate method with hypochlorite and sodium nitroprusside (indophenol blue) This is a brackish method.	UKAS-503-A	0.01 mg N/L	0.02 – 0.5 mg N/L	UK Blue Book Method
CALCIUM	Arsenazo III specifically binds to calcium forming a blue-colored complex	UKAS-590-A	1.0 mg Ca/L	2.0 – 200 mg Ca/L	
CHLORINE	Liberated iodine from potassium iodide reacts with N, N-diethyl-p-phenylene diamine	EPA-139-A	0.004 mg Cl_2/L	0.008 – 0.4 mg Cl_2/L	Std. Methods 4500-Cl G (18^{th},19^{th}, 20^{th})
CYANIDE	Chloramine-T with pyridine barbituric acid color reaction (Manual distillation required)	EPA-107-A	0.4 µg CN/L	2.0 – 300 µg CN/L	EPA 335.4, version 1 (1993) Std. Methods 4500-CN E (18^{th},19^{th},20^{th})
GLUCOSE	Enzymatic reaction with high purity glucose oxidase/peroxidase enzymes, a buffering species and reactants for colorimetric detection	EPA-162-A	0.001 g/L	0.004 – 0.2 g/L	
		EPA-163-A	0.005 g/L	0.06 – 0.6 g/L	
IRON (II)	Acidic 1,10-phenanthroline reaction	UKAS-504-A	0.004 mg Fe(II)/L	0.04 – 4.0 mg Fe(II)/L	UK Blue Book Method
IRON, Total	Reduction of ferric iron followed by acidic 1,10-phenanthroline reaction	EPA-149-A	0.02 mg Fe/L	0.5 – 10 mg Fe/L	Std. Methods 3500-Fe (1997 forward)
MANGANESE	Reaction with formaldoxime (hydroxylamine hydrochloride and formaldehyde) to form orange-red complex	EPA-164-A	0.012 mg Mn/L	0.04 – 5.0 mg Mn/L	

SPECIALTY METHODS LIST

Method Detection Limits are calculated using USEPA procedure 40 CFR, Part 136, Appendix B

ANALYTE	METHOD DESCRIPTION	SEAL METHOD	MDL	RANGE	EQUIVALENCE
MAGNESIUM	Magnesium ions react with xylidyl blue in an alkaline medium to form a water-soluble purple-red chelate	UKAS-591-A	0.25 mg Mg/L	0.2 – 20 mg Mg/L	
MOLYBDENUM	Alkali thiocyanate reacts with quinquevalent molybdenum which is reduced with stannous chloride and stabilized by 2-methoxyethanol	EPA-152-A	0.05 mg/L	0.2 – 5 mg/L	
PHOSPHATE, Ortho or PHOSPHORUS, Total (TP)	Acidic molybdate/antimony with ascorbic acid reduction (Manual persulfate digestion required)	EPA-128-A	0.005 mg P/L	0.32 – 20 mg P/L	EPA 365.1, version 2 (1993) Std. Methods 4500-P B, F (18^{th},19^{th},20^{th})
SULFIDE	Potassium dichrom converts N,N-Diethyl-p-phenylenediamine to the free radical which reacts with sulphide to produce ethylene blue	EUR-635-A	0.004 mg S^{2-}/L	0.03 – 1.0 mg S^{2-}/L	
SILICA	Acidic molybdate with reduction (silicomolybdenum blue)	UKAS-514-A	0.002 mg Si/L	0.025 – 0.5 mg Si/L	UK Blue Book Method
UREA (in fertilizer)	Reaction with p-dimethylaminobenzaldehyde	SPC-908-C	8.7 mg N/L	40 – 2000 mg N/L	
		SPC-909-C	3.6 mg N/L	10 – 500 mg N/L	

AGRICULTURE METHODS LIST

Method Detection Limits are calculated using USEPA procedure 40 CFR, Part 136, Appendix B

ANALYTE	METHOD DESCRIPTION	EXTRACT	SEAL METHOD	MDL	RANGE
AMMONIA	Alkaline phenate method with hypochlorite and sodium nitroprusside (indophenol blue)	2 M KCl	AGR-210-C	0.021 mg N/L	0.2 – 10 mg N/L
NITRATE + NITRITE	Cadmium coil reduction followed by sulfanilamide reaction in the presence of N-(1-naphthylethylenediamine) dihydrochloride	2 M KCl	AGR-231-A	0.015 mg N/L	0.06 – 5.0 mg N/L
			AGR-232-C	0.022 mg N/L	0.2 – 10 mg N/L
NITRATE + NITRITE	Cadmium coil reduction followed by sulfanilamide reaction in the presence of N-(1-naphthylethylenediamine) dihydrochloride	2 M KCl	AGR-231-A	0.015 mg N/L	0.06 – 5.0 mg N/L
PHOSPHATE, Ortho	Acidic molybdate/antimony with ascorbic acid reduction (phosphomolybdenum blue) for o-phosphate	Bray's P1 or P2, or similar extract	AGR-201-A	0.015 mg P/L	0.05 – 5.0 mg P/L
PHOSPHATE, Ortho	Acidic molybdate/antimony with ascorbic acid reduction (phosphomolybdenum blue) for o-phosphate	Modified Morgan's or similar acetate/acetic acid extract	AGR-202-A	0.01 mg P/L	0.2 – 8.0 mg P/L
PHOSPHATE, Ortho	Acidic molybdate/antimony with ascorbic acid reduction (phosphomolybdenum blue) for o-phosphate	Olsen 0.5 M sodium bicarbonate extract	AGR-203-A	0.01 mg P/L	0.1 – 5.0 mg P/L
PHOSPHATE, Ortho	Acidic molybdate/antimony with ascorbic acid reduction (phosphomolybdenum blue) for o-phosphate	2 M KCl	AGR-204-A	0.04 mg P/L	0.1 – 5.0 mg P/L
SULFATE	Barium chloride turbidimetric method	KH_2PO_4, or similar extraction	AGR-290-A Rev 1	0.75 mg SO_4/L	5.0 – 40 mg SO_4/L

SEAL Analytical is continually developing methods. Please note that others may exist.

If you do not see your chosen method on this list, please consult your SEAL Analytical Technical Support Team at:

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