

Environmental Parameters - Reporting and Method Detection Limits



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Reporting Limits and Calculated Method Detection Limits as per US EPA CFR Appendix B

MDL (Method Detection Limit) = the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero.

MDL = T-value x Standard Deviation

RL (Reporting Limit) = the lowest concentration reported after taking into account various analytical procedures, interferences or error. The RL is usually 1 to 5 times higher than the MDL, and in most cases was used to calculate the MDLs in this document. The RL is often a subjective measurement and varies from laboratory to laboratory. The RLs, MDLs and calculation procedures will vary according to regional/national regulations.

Parameter	RL Expected Value (EV) ¹	Average (AVG)	Standard Deviation (STDEV)	Sampling Size (n)	Degrees of Freedom (n-1)	T-Value ³ (99%)	Calculated MDL
Acidity ²	1.50ppm ⁴	1.56ppm	0.150ppm	10	9	2.8214	0.42ppm
Alkalinity	1.00ppm	1.07ppm	0.070ppm	20	19	2.5395	0.18ppm
Ammonia (ISE)	0.10ppm	0.11ppm	0.016ppm	10	9	2.8214	0.05ppm
Ammonia (Standard Addition)	0.50ppm	0.53ppm	0.035ppm	10	9	2.8214	0.10ppm
Calcium (ISE)	1.00ppm	1.14ppm	0.121ppm	46	45	2.4121	0.29ppm
Chloride (Titration)	1.00ppm	1.19ppm	0.100ppm	10	9	2.8214	0.28ppm
Chloride (ISE)	0.05ppm	0.06ppm	0.003ppm	10	9	2.8214	0.01ppm
Color	2.00CU	2.10CU	0.050CU	5	4	3.7470	0.19CU
Conductivity	1.49µS	1.88µS	0.230µS	10	9	2.8214	0.65µS
Cyanide	0.13ppm	0.13ppm	0.021ppm	16	15	2.6025	0.055ppm
Fluoride	0.02ppm	0.02ppm	0.002ppm	39	38	2.4286	0.005ppm
Nitrate (ISE)	0.14ppm	0.15ppm	0.017ppm	9	8	2.8965	0.05ppm

Detection Limits Notes:

⁴Please note that in order to obtain the above MDLs, proper analytical techniques and MANTECH recommended procedures including sample volume and reagent concentrations are to be used. Varying sample matrices may generate different results.

¹The RLs for each parameter were defined as the lowest standard concentration reported on the Application Note other than for orthophosphate and sulfide. Statistical data for calculating the MDLs were taken from the Quality Control Charts.

²The RL, Average and STDEV have all been estimated for Acidity as the Application Note was generated in 2006. An RL and MDL study utilizing current MANTECH technology and software has yet to be completed. However, current endusers for acidity include private environmental laboratories, United States EPA and PADEF.

³T-values obtained from reference tables, 99% confidence, n-1 degrees of freedom

References:

1. MDL procedure obtained from US EPA 40 CFR Appendix B to Part 136 - Definition and Procedure for the Determination of the Method Detection Limit obtained from <http://cfv.vlex.com/vid/136-method-detection-limit-revision-19813275>

2. T-values obtained from http://www.stattools.net/tTest_Tab.php



Environmental Parameters - Reporting and Method Detection Limits



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Reporting Limits and Calculated Method Detection Limits as per US EPA CFR Appendix B (continued)

Parameter	RL Expected Value (EV) ¹	Average (AVG)	Standard Deviation (STDEV)	Sampling Size (n)	Degrees of Freedom (n-1)	T-Value ² (99%)	Calculated MDL
Residual Chlorine (ISE)	0.02ppm	0.02ppm	0.001ppm	10	9	2.8214	0.003ppm
Residual Chlorine (Titration)	0.20ppm	0.21ppm	0.008ppm	10	9	2.8214	0.02ppm
Residual Chlorine (Back Titration)	0.20ppm	0.20ppm	0.029ppm	10	9	2.8214	0.08ppm
Silver (Titration)	0.50ppm	0.47ppm	0.118ppm	10	9	2.8214	0.33ppm
Sulfide (Photometric)	5.00ppm	4.46ppm	1.185ppm	14	13	2.6503	3.14ppm
Sulfide (Potentiometric)	10.00ppm	10.36ppm	1.823ppm	10	9	2.8214	5.14ppm
Sulfite	0.80ppm	0.98ppm	0.120ppm	9	8	2.8965	0.35ppm
Total Hardness (Photometric)	10.00ppm	9.25ppm	0.367ppm	10	9	2.8214	1.04ppm
Total Hardness (Potentiometric)	2.00ppm	2.46ppm	0.165ppm	16	15	2.6025	0.43ppm
Total Hardness (Potentiometric - TRIS Buffer)	1.00ppm	1.46ppm	0.350ppm	10	9	2.8214	0.99ppm
Calcium Hardness (Potentiometric Speciated - TRIS Buffer)	2.05ppm	2.08ppm	0.100ppm	10	9	2.8214	0.28ppm
Magnesium Hardness (Potentiometric Speciated - TRIS Buffer)	0.30ppm	0.19ppm	0.040ppm	10	9	2.8214	0.11ppm
Turbidity	0.10NTU	0.06NTU	0.019NTU	10	9	2.8214	0.05NTU

Detection Limits Notes:

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