

Method Detection Limits (MDL) Requirements for West Virginia Laboratory Certification Program

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1.0 Scope

This policy outlines the requirements to conduct Method Detection Limit (MDL) studies for analytes, parameters, or tests associated with certification of environmental laboratories in accordance with 47 CSR 32, *Environmental Laboratories Certification and Standards of Performance*.

2.0 Method Detection Limit (MDL)

- 2.1 Method Detection Limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte. (40 CFR 136, Appendix B)
- 2.2 47 CSR 32, Subparagraph 5.1.3.a.D states: “Where applicable, method detection limits must be determined for all categories and parameters. The method found in 40 CFR Part 136, Appendix B must be used for this calculation.”
- 2.3 MDLs should either be determined or verified once during each twelve month period. Any exception to this policy must be approved in writing by WV DEP Quality Assurance Program staff.

3.0 Analytes, parameters, or tests exempt from the MDL requirement. The verifications and/or demonstrations identified for these analytes, parameters, or tests must be conducted once during each twelve month period.

3.1 Conductivity

- 3.1.a A MDL is not applicable to conductivity.
- 3.1.b 47 CSR 32, Paragraph 5.2.2.d states: “The linearity of conductivity meters must be checked over the range of the instrument using at least five concentrations of standard solutions yearly. The cell constant, k, is to be determined from this data. The meter must be calibrated using at least one standard with each use. The results of these calibrations must be recorded in a log book.”
- 3.1.c The laboratory must document each analyst’s ability to determine the conductivity of a sample $\pm 10\%$ at 20 $\mu\text{mhos/cm}$.
 - 3.1.c.1 This can be demonstrated by preparing a traceable, 20 $\mu\text{mho/cm}$ solution. Measurement of conductivity on the 20 $\mu\text{mho/cm}$ solution should produce a result of 18 – 22 $\mu\text{mho/cm}$. If the reading is not acceptable, perform maintenance, recalibrate the instrument, and retest the solution until a satisfactory result is

obtained. The laboratory must keep a record of the documentation on file for each analyst.

3.2 Temperature

- 3.2.a A MDL is not applicable to temperature.
- 3.2.b 47 CSR 32, Subdivision 4.2.7 states: “All temperature measuring devices will be graduated in one degree Celsius (or 2 degrees Fahrenheit) increments and readable to 0.5 degrees Celsius (1 degree Fahrenheit) for all analyses except fecal coliform analysis; in which case glass or metal thermometers are to be readable to 0.2 degrees Celsius.”
- 3.2.c 47 CSR 32, Paragraph 4.2.7.c states: “Liquid column in glass and electronic type thermometers without a current manufacturer’s certificate of accuracy must be verified as accurate annually. All other types, to include Automatic Temperature Compensation (ATC) devices, must be verified as accurate quarterly. Verification must be accomplished by comparison to a certified thermometer traceable to a National Institute for Standards Testing thermometer.”
- 3.2.d 47 CSR 32, Paragraph 4.2.7.d states: “Each temperature measuring device must be uniquely identified. The results of accuracy verifications must be documented. The corrected temperature must be recorded whenever temperatures are required to be recorded.”
- 3.2.e 47 CSR 32, Paragraph 5.2.2.g states: “The accuracy of all thermometers used to monitor temperatures will be verified by comparing the readings of such thermometers with the readings of a certified thermometer.”
- 3.2.f The environmental laboratory must comply with Subdivisions 3.2.b through 3.2.e.

3.4 Turbidity

- 3.4.a A MDL is not applicable to turbidity.
- 3.4.b The laboratory must document each analyst’s ability to determine the turbidity of a sample $\pm 10\%$ at 1 NTU.
- 3.4.c Prepare a traceable, 1 NTU standard. Measurement of turbidity on the 1 NTU solution should produce a result of 0.9 – 1.1 NTU. If the reading is not acceptable, perform maintenance, recalibrate the instrument, and retest the solution until a satisfactory result is obtained. The laboratory must keep a record of the documentation on file for each analyst.

3.5 Settleable Solids

- 3.5.a A MDL is not applicable to Settleable Solids.
- 3.5.b The laboratory must document each analyst's ability to determine settleable solids $\pm 20\%$ at 0.5 ml/L.
- 3.5.c Prepare or purchase a solution with a settleable solids value at 0.5 ml/L. Measurement of the solution should produce a result of 0.4 – 0.6 ml/L. The laboratory must keep a record of the documentation on file for each analyst.

3.6 pH

- 3.6.a A MDL is not applicable to pH.
- 3.6.b 47 CSR 32, Subdivision 4.2.5 states: "pH meters must have an accuracy of and scale graduations within 0.1 standard unit."
- 3.6.c The laboratory must document each analyst's ability to measure pH within ± 0.1 pH units. The laboratory must keep a record of the documentation on file for each analyst.

3.7 Dissolved Oxygen (DO)

- 3.7.a A MDL is not applicable to DO.
- 3.7.b The analysts must calibrate and operate DO meters in accordance with the manufacturer's instructions and be able to document performance in accordance with manufacturer's literature, in regards to measurement and accuracy of readings.

3.8 Flashpoint/ignitability

- 3.8.a A MDL is not applicable to Flashpoint or Ignitability.
- 3.8.b The analysts must operate the instrument in accordance with the manufacturer's instructions and be able to demonstrate and document acceptable results on known standards, such as p-xylene.

3.9 Paint filter test

- 3.9.a A MDL is not applicable to the paint filter test.

4.0 The point of contact for questions pertaining to this policy is:

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