



Overview of the Method Detection Limit (MDL) Revision 2

**Finalized in the 2017 Clean Water Act Methods
Update Rule**

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MDL Revision 2 Summary



- Originally Submitted by TNI
- MDL calculation of spiked data remains unchanged
- Addresses background contamination and multiple instrument MDLs
- Quarterly spike samples
- Annual calculation

Became effective Sept. 27, 2017
Diverse Comments!





- Original procedure sought to distinguish results from “zero”
 - But “zero” cannot be measured easily
 - It ignored that common occurrence of analytes in a blank
 - Often could not measure the analyte at the MDL in an actual sample
- Revised procedure changed the focus from “zero” to what is typically found in method blanks
 - Even in well-run laboratories, “blanks happen” and cannot be ignored
 - Moves the burden of assessing very low-level results from the user to the lab, who should not report too low

MDL Comparison (cont.)



- Both procedures use clean reference matrices (e.g., reagent water, Ottawa sand)
- Both procedures use spiked samples
- The revised initial MDL uses an equal number of method blanks
- Revised MDL spreads preparation and analyses across three separate days to capture routine analytical variability instead of “best case”
- Revised procedure sets the MDL at the higher of the results calculated from the blanks or from the spiked samples

Initial vs. Ongoing MDL



- MDL Revision 2 contains an initial MDL determination and an ongoing MDL verification
 - Conceptually they are the same
- Initial MDL process is required when:
 - Implementing a new method
 - Have reason to believe sensitivity has changed significantly (e.g., new instrument or detector)
- Ongoing MDL verification is required when:
 - A method with an initial MDL is run regularly
 - MDL spikes run with client samples
 - Consistent low level spikes are necessary
 - 2 spikes per quarter
 - Less often if analysis is run less often

MDL Sample Count Comparison



# Samples	Original 1984 MDL	2017 Revised MDL
Sample spikes	7/year*	8/year (2/quarter)**
Method blanks (MBs)	0	Use routine MBs

*Most commercial laboratories that currently participate in analyses supporting the National Pollutant Discharge Elimination System (NPDES) ran MDLs for each method/instrument combination once per year.

**Assumes at least 2 analysis batches per quarter, fewer samples are required if the analysis is run infrequently.

MDL - Common Misconceptions



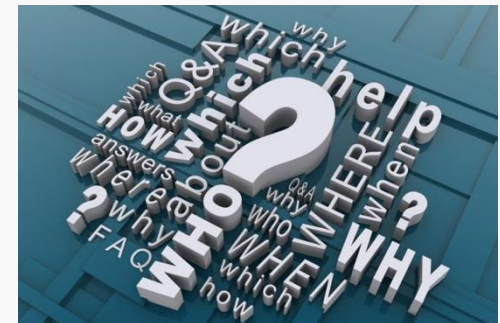
- The laboratory has to run MDL samples every quarter, even if no client samples are analyzed
- The laboratory has to recalculate the MDL every quarter
- The laboratory will have to run more blanks than before

All three of these statements are incorrect





- What if there are less than 7 MDL spikes and method blanks available when performing the annual MDL calculation?
 - Perform an initial MDL
 - Can use data from last 2 years
- Can one high blank detect drastically alter the MDL value? It depends.
 - 99% confidence
 - Associated with rejected data?
 - Documented gross failure?





- Why is ongoing data collection necessary?
 - Captures drift and typical performance
- Revised MDL could lead to higher MDLs and MLs, what if this affects the ability to meet regulatory limits?
 - Some MDLs and MLs will likely increase
 - This situation existed with the original MDL
 - The Sufficiently Sensitive Methods Rule addresses this in detail

MDL Revisions in Response to Public Comments



- Clarification of methods to which the MDL applies
- Clarification on when MDL data can be rejected
- Option to use fewer method blanks in the calculation
- Option for adding a new instrument for a multi-instrument MDL

Useful Websites



- MDL Procedure

<https://www.epa.gov/cwa-methods/procedures-detection-and-quantitation-documents>

- MDL Frequently Asked Questions

<https://www.epa.gov/cwa-methods/method-detection-limit-frequent-questions>



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