

METHOD BLANK AND DL (MDL)

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Thanks to Halley Dunn Hastings of ARS

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- The 2016 standard added a requirement to assess blanks as part of the process and this topic gives an in-depth assessors look at the relationship between method blanks and detection limit. Limit(s) of Detection (LOD): The minimum result, which can be reliably discriminated from a blank with a predetermined confidence level. Also used is Detection Limit.
- TNI uses DL instead of MDL to be consistent with DOD QSM 5.3
- EPA Definition and Procedure for the Determination of the MDL, Rv 2, EPA 821-R-16-006

BASIS OF DISCUSSION

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- The Appendix B of 40 CFR Part 136 (MUR 2017)
- TNI V1M4 1.5.2.1
- TNI V1M4 2016 Standard Update Guidance on Detection and Quantitation, GUID-3-109-Rev1.1, September 23, 2019
- EPA Drinking Water Letter to TNI Board, November 8, 2017

TOPICS

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- The Appendix B of 40 CFR Part 136
- TNI V1M4
- EPA drinking water (DW) methods
- Issues
- Opinions

- MDL = DL for this talk

MDL NOT REQUIRED

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- BOD
- DO
- Color
- pH
- Specific conductance
- Titrations
- Temperature
- Any method where low level spikes can't be prepared

MDL REQUIRED?

- Methods to consider the need for MDL
- 1664A, B section 9.1.2.1
 - If the detection limit of the method will be affected by the modification, the laboratory must demonstrate that the MDL (40 CFR Part 136, Appendix B) is less than or equal to the MDL in this method or one-third the regulatory compliance limit, whichever is higher.
- Solids? No per SM 2020 Table 2020:1
- ReDOX? No per SM 2020 Table 2020:1
- Turbidity, **Color**? Yes per SM 2020 Table 2020:1
- **Color** - TNI says No, V1M4 1.5.2.1, EPA Procedure
- HOWEVER, ask your AB.

EPA APPENDIX B OF 40 CFR PART 136

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- Estimate the initial MDL_s and MDL_b
- Seven MDL_s and MDL_b
 - On all instruments
 - Across multiple days (at least two days)
 - MUST pass method qualitative criteria and must have numerical result
 - Separately calculate the standard deviation of MDL_s and MDL_b
 - Use t statistic at 99% confidence for MDL_s and MDL_b

- Initial MDL contd
- For MDL_b
 - If all MDL_b have no detects then NA
 - If get + and – responses, then use one of these
 - Fewer than 100 results, set MDL_b to highest result
 - Greater than 100 results then set to the $n*0.99$ ranked method blank
 - If all MDL_b have numerical result, calculate the average $+t*$ standard deviation of blanks
- Select the greater number MDL_s or MDL_b as new MDL

- Ongoing evaluation MDL_b
 - Every 13 months compare: MDL_b and MDL_s
 - Use all method blanks from last 24 months or
 - Use last 6 months, or
 - Use 50 most recent
 - Use the highest blank OR if 100 results set it to 99th percentile of the method blanks
 - If all blanks have results, calculate the averaged $+t$ @.99 times standard deviation of blanks

- The ongoing (annual) verification is the same except:
 - TNI allows use of one spike/quarter
 - TNI tabulate data over last 2 years (minimum of 7 samples/spikes required).
 - Must record analysis/preparation methods, data preparation/test, batch identifiers, instrument, matrix, technology, analyte, spike concentration, units, results
 - For each analyte record: %R, number of results, mean, Std Dev of %R, spiking concentration

- Common MDL_b problems:
 - So many- drowning in data
 - When to exclude – batch failures LEGITIMATE no cherry picking
 - Common analytes present in blanks:
 - Metals – minerals, zinc;
 - Organics: methylene chloride, toluene, xylene, Phthalates
 - Truncated data at LOQ or MDL, e.g. organics
 - What if lab did not run the test in the quarter?
 - What if lab did not run the test in a year?

- Letter attachment states all blanks should not have recurring background.
- Question: what about minerals and zinc? Really tough to remove all.
- Does MUR 2017 ‘new approach’ effect DW?
- There are specific situations in DW (40 CFR 141) which specify 40 CFR Part 136
 - VOCs
 - Vinyl chloride
 - Lead
 - Copper
 - EPA 515.1, 548.1, 555

- For methods that either describe steps or have the ‘old’ MDL method, OPTIONS:
 - Follow the old method
 - Use the new method across the board
- What about Standard Methods edition 22nd vs 23rd
 - 22nd has ‘old’ MDL, 23rd had new MDL
- Bottom line, if the new method is used it appears no penalty will be issued; BUT regions vary
- BIG DW DIFFERENCE: DW does not allow pooling of all instruments data for one MDL, must determine by instrument
- LOWER MDLS may be needed for SOCs to allow reduced monitoring; thus these may not be pooled across instruments.

- If lab does drinking water, may dedicate instruments for this and not pool the MDL for DW.
- In order to do this a very adept Lab Information Management System, (LIMS) is needed but not required.
- Login spikes like samples quarterly into the system as a recurring project with QA as the client
- Set up LIMS to allow easy query
- If no LIMS, need lots of spread sheets,
 - VALIDATE the spreadsheets,
 - lock the formulas

1. Because most organic data is truncated, large labs are running hundreds of spikes quarterly, and the MDL_b are non detects due to truncation for all except common contaminants, is this where we should put our resources?
2. How to deal with clients that do not understand changing MDLs?
3. The new approach seems applicable for metals, some anions and some common contaminants in VOC /SVOC
4. Labs still have not implemented the updated MUR 2017 nor the TNI updated MDL/DL approach, Still writing these findings.
5. If you do not alter the preparation or testing methods, and labs only report to LOQ, 'should' we require additional quarterly verification?

REMINDER STATES ARE DIFFERENT

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- CA has DETECTION LIMIT FOR PURPOSES OF REPORTING (DLR) for DW which may be lower than typical MDL.

SUMMARY

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- As a lab community, we need to provide more input to the MDL process.
- Keep the items that are beneficial and remove the tasks that are not.

MY ASSOCIATE REMOTE ASSESSOR 😊



Questions??

THANK YOU

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