Ground Water Quality Standards Rules: PQLs Stakeholder Workgroup

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Anne Witt, Research Scientist
NJDEP Division of Water Monitoring and Standards
Bureau of Environmental Analysis, Restoration and Standards
Ground Water Quality Standards Program

Meeting Agenda

- Welcome, Introductions and Background
- Evaluating and Updating Practical Quantitation Levels (PQLs)
  - Process for Selecting and Deriving PQLs
  - Evaluating and Updating PQLs
  - Additional Information from Stakeholders
  - Discussion
- Wrap Up and Next Steps

Background

- Stakeholder process convened on April 11, 2016, to discuss possible amendments to the Ground Water Quality Standards Rules, N.J.A.C. 7:9C
  - Three technical workgroups formed:
    - Updates to Health-Based Criteria (Class II ground waters)
    - Updates to Practical Quantitation Levels (Class II ground waters)
    - Ground Water Classifications and Designated Uses

Purpose of Today's Meeting

- To share the basis and results of the Department's preliminary reevaluation of the existing PQLs for Class II constituents and recently solicited performance data.
- To obtain feedback from stakeholders on potential updates to the PQLs that would inform the rulemaking process.
- To gather additional information about analytical methods and performance data relative to specific constituents from stakeholders with knowledge/expertise in the subject.

What You Should Know About Today's Meeting

- This is an informal, technical meeting to discuss information related to the selection and derivation of PQLs and potential updates for constituents in Class II ground waters.
- The information presented today is preliminary and for discussion purposes only and should not be considered as draft, proposed, or final PQLs.

Related terms and definitions:

- "MDL" stands for method detection limit or the lowest concentration at which a constituent can be detected
- "RL" stands for reporting limit or the lowest concentration that the lab reports. This is often determined by the client, not by the available technology, and is often not the most sensitive.*
- "Low Point on the Calibration Curve" is the lowest concentration standard used in the generation of a calibration file for a parameter.

*Note: This is the definition of RL employed for ground water and drinking water PQLS but may not be consistent with other regulatory programs

What is a Practical Quantitation Level (PQL)?

- "Practical quantitation level (PQL)" means the lowest concentration of a constituent that can be reliably achieved among laboratories within specified limits of precision and accuracy during routine laboratory operating conditions.' (N.J.A.C. 7:9C-1.4)
- The constituent standard (GWQS) is the higher of the PQL or the ground water quality criterion for each Class II constituent (N.J.A.C. 7:9C-1.9(c))

Selection and Derivation of PQLs

From N.J.A.C. 7:9C-1.9(c)3ii:

PQLs … shall be derived or selected for each constituent using the most sensitive analytical method providing positive constituent identification from (c)3ii(1) and (2) below, in that order of preference:

(1) PQLs derived from Method Detection Limit (MDL) data from the New Jersey Department of Health and Senior Services Laboratory (DHSS) multiplied by 5;

Note: All VOCs and SOCs from 524.2 and modified 525.2 (Trimers)

Selection and Derivation of PQLs, cont'd

(2) PQLs derived from laboratory performance data that has been evaluated by the Department using the method of Sanders, Lippincott, and Eaton (See Sanders, P. et al., "Determining Quantitation Levels for Regulatory Purposes." J. Amer. Water Works Assoc., 1996, March pp. 104-114).

Selection and Derivation of PQLs, cont'd

- *Determining Quantitation Levels for Regulatory Purposes* (Sanders, P. et al.)
  - Median interlaboratory MDLs are multiplied by a variable factor that is determined from laboratory performance data.
  - The Bootstrap analysis is an appropriate statistical method for generating a normal distribution when the data set (n) is relatively small.

Selection and Derivation of PQLs, cont'd

From N.J.A.C. 7:9C-1.9(c)3:

i. PQLs shall be rounded to one significant figure using standard methods.

…

iii. The Department may approve an alternative PQL. An alternative PQL shall be approved when the evidence (in the context of an applicable regulatory program) establishes that:

(1) Based upon site-specific, ground water matrix considerations, a PQL listed in Appendix Table 1 for a constituent is not valid;

(2) An alternative PQL is more appropriate for that constituent with regard to compliance with this chapter;

…

Evaluating and Updating PQLs

- Solicitation of New Performance Data
- Review of Certified Laboratory Method Performance Data
- Literature Review of Published Performance Data
- Derived PQLs from most sensitive published analytical methods
  - Note: The most sensitive methods available may not be certified by Department's OQA due to lack of performance data, etc.

Evaluating and Updating PQLs

- It is important to investigate all available sources of performance data for environmental contaminants that **have been detected**, even if ambient concentrations cannot be accurately quantified.
  - New Jersey residents with private wells are consuming untreated well water
  - Where health-based criteria are below the reporting level (RL), the enforceable standard is "driven" by the PQL.
  - The PQL should be as close to the health based criterion as possible while still assuring that adequate laboratory capacity is available

Solicitation of New Performance Data

- July 5, 2016 request sent to approximately 300 labs asking for laboratory performance data for 50 constituents.
  - OQA Listserv
  - Posted on the DSREH website
- Submission deadline was September 15, 2016.
- Only five labs responded.

Performance Data Submissions

Laboratory Name	NJ Certified Lab ID#	Number of Parameters Reported (Out of 50)	Methods
Eurofins Spectrum Analytical	MA011	44	SW846
Cape Fear Analytical, LLC	NC013	2	1600 Series
Eurofins Lancaster Laboratories Environmental LLC	PA011	44	500, 600, 6000, SW846
SGS Accutest Inc.	12129	46	SW846
TestAmerica Edison	12028	46	SW846

Review of Certified Laboratory Method Performance Data

- Very small set of performance data received
- No performance data for some constituents
- Performance data received for same constituent but using different analytical methods
  - Can't make "apples to apples" comparison based on different methods
  - Performance data using the most sensitive published methods were not reported

Literature Review of Published Performance Data

- Literature review conducted by NJDEP Environmental Research Library for parameters with little method performance data
  - Looked for method performance data published in peer reviewed scientific journals
    - The National Environmental Methods Index (https://www.nemi.gov/)
    - Current methods used by NJDEP Site Remediation Program (in accordance with USEPA Superfund Guidance)
    - Existing or recommended PQLs from NJDEP regulatory programs (e.g., 1,2,3-Trichloropropane, new recommendation by Drinking Water Quality Institute for drinking water MCL)

Literature Review Results

Parameters Lacking Available Method Performance Data

1. 1,1,2 Trichloroethane
2. Cyanide
3. 4-Chloroaniline
4. Cobalt
5. 1,1,2,2 Tetrachloroethane
6. Ethylene Glycol monoethyl ether
7. Epichlorohydrin
8. Acrylamide
9. Demeton
10. 1,1'-Biphenyl
11. Pentachlorophenol

Comparison of Methods that can be used to Derive PQLs

PQL Derivation Approach	Number of Laboratories	Value (ng/L)
Median MDL (1.0 ng/L) x 5	13	5
Bootstrap Upper Confidence Limit of MDL (0.76 ng/L) x 5	7	4
Median of the reported lowest calibration standard	15	4
Mean of the reported lowest calibration standard	13	4
Bootstrap Upper Confidence Limit of Low Point Calibration Curve	11	4
Bootstrap Upper Confidence Limit of Reporting Limit	8	4
Median of the six (6) Quantification Methods		4

Bootstrap Method for Calculating Mean

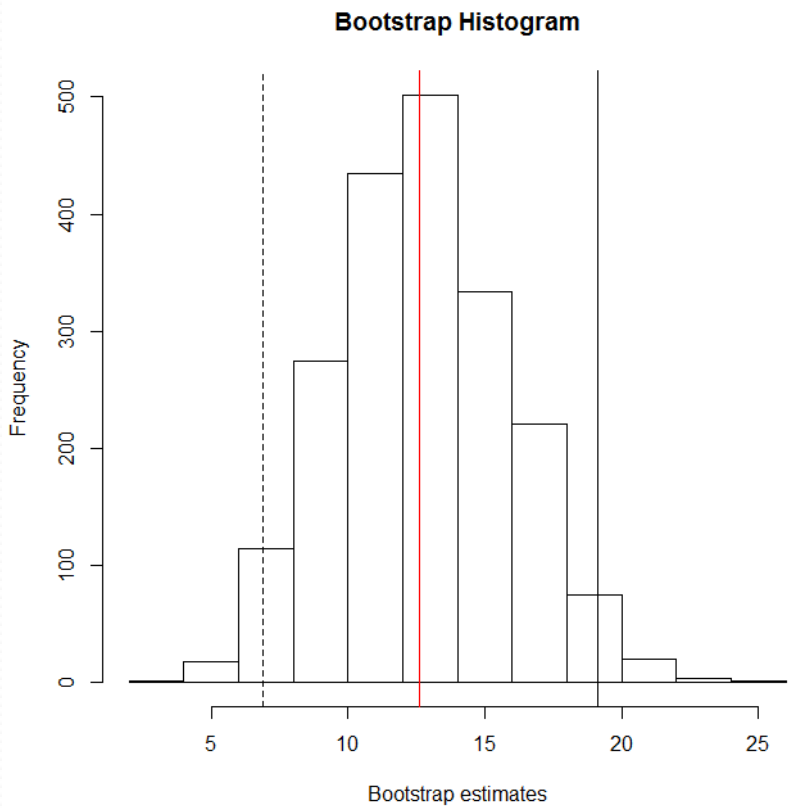
- MDL information
- Low Point of the Calibration curve interlaboratory data
- Reporting Limit interlaboratory data
  - The RL provided by the laboratory may be governed by the client's data quality objectives for environmental assessments, which may differ from those of NJDEP.
  - RL performance information is included and based on the data quality objectives of the lab's clients.

“Bootstrap Estimate of the Mean” Example 1:

RL Bootstrap

Iteration 1; ANALYSIS OF ALL 16 labs REPORTED RL values

LCL	XBAR	UCL	CONF	NREP
6.90625	12.6125	**19.14375**	95.05	2000

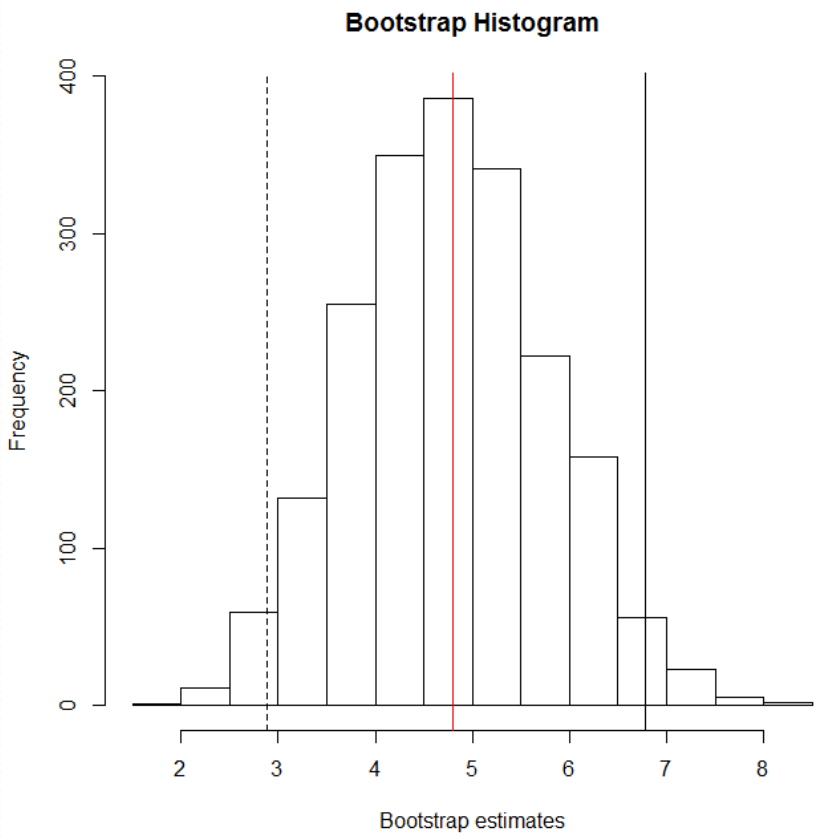


ACTION: ELIMINATE ALL RL VALUES ABOVE UCL OF **19.14 PPT**

“Bootstrap Estimate of the Mean” Example 2:

Iteration 2; **11 Lab RL values**

LCL	XBAR	UCL	CONF	NREP
2.890909	4.8	**6.781818**	95.25	2000



ACTION: ELIMINATE ALL RL VALUES ABOVE UCL OF 6.78 PPT

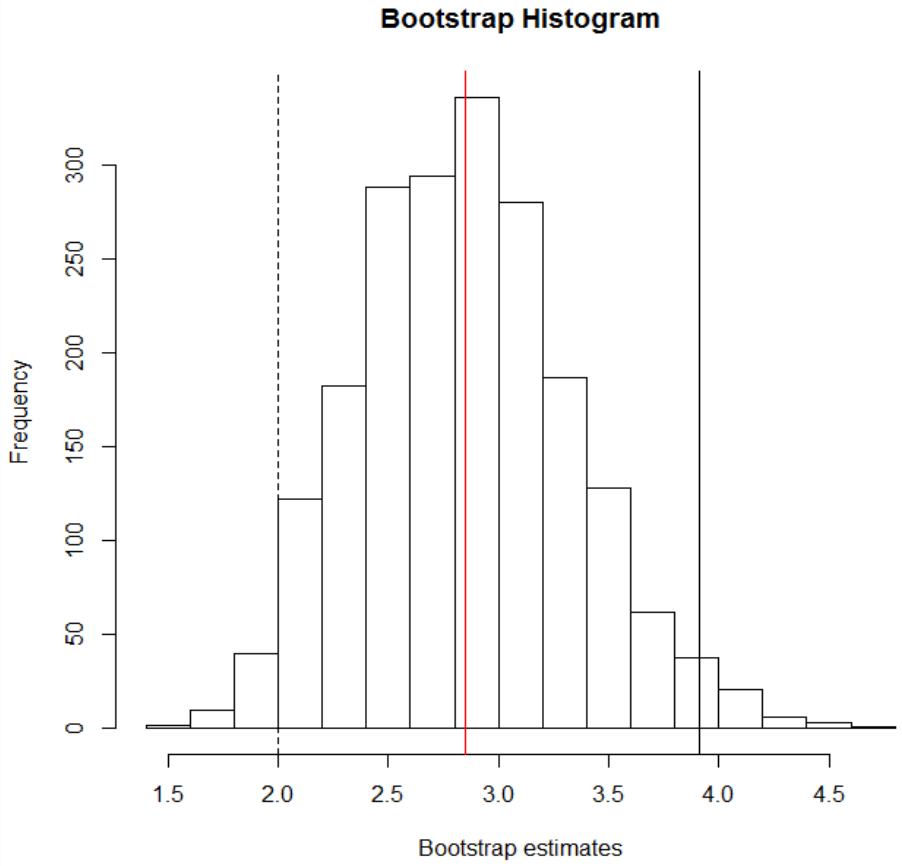
“Bootstrap Estimate of the Mean” Example 3:

CONCLUSION: A UCL value of 3.9 ppt is generated from the third iteration of the reporting limit data (RL) which would yield a PQL value of 4 ppt for Compound X. A fourth iteration of the RL data generated a discontinuous distribution.

Iteration 3; **8 Lab RL values**

[1] "Bootstrap Estimate of a Confidence Interval of the Mean"

LCL	XBAR	UCL	CONF	NREP
2	2.85	**3.9125**	95.6	2000



Preliminary Findings

Excerpts from Preliminary Findings

Constituent	CASRN	Existing PQL (mg/L)	MDL x 5 (mg/L)	Most Sensitive Published Analytical Method
1,2-Dichloroethane	107-06-2	2	0.03	524.4 SIM **
1,2-Diphenylhydrazine	122-66-7	20	0.14	526.0
2,4-Dinitrotoluene/ 2,6-Dinitrotoluene Mix	25321-14-6	10	0.6	529**
Cyanide (free Cyanide)	57-12-5	6	5	335.4
** method not certified by NJDEP				

Discussion

- Should we extend the data submission deadline?
- Does anyone have or know of additional performance data that can be submitted?
- How can we encourage submission of additional performance data?
- Should this workgroup meet again?

Wrap Up and Next Steps

Stakeholder Workgroup Meeting Schedule

- Ground Water Quality Criteria Workgroup, second meeting
  - December 20 2016, 1:00 – 3:00 PM
- Ground Water Classifications and Designated Uses Workgroup, first meeting
  - Rescheduled: January 25, 2017 10:00 AM to 12:00 PM
- PQL Workgroup, second meeting
  - To be scheduled for February 2017

Thank You for Your Participation