April 5, 2013

Office of Water Quality Water-Quality Information Note 2013.05

Subject: Scientific Investigation Report on Bias and Precision in Total Nitrogen Methods

The purpose of this Water-Quality Information Note is to announce the availability of a U.S. Geological Survey (USGS) Scientific Investigation Report on the observed bias and precision in Total Nitrogen (TN) concentrations in whole water samples analyzed using alkaline persulfate and Kjeldahl digestion methods. The USGS report serves as the technical foundation for OWQ Technical Memorandum 2013.01 titled Guidance on Methods for Determining the Concentration of Total Nitrogen in Whole-Water Samples. Technical guidance changes based on peer reviewed field and laboratory investigations, such as described in the subject report, strengthen the reliability of USGS water-quality monitoring and assessment results.

Technical Memorandum 2013.01 recommends the computation of TN in whole-water as the sum of dissolved nitrogen (DN), determined by alkaline-persulfate digestion of a filtered-water sample, and particulate nitrogen (PN), determined by the U.S. Environmental Protection Agency's high-temperature-combustion oxidation of suspended sediment method (U S. Environmental Protection Agency, 1997).

There is a need over time to continually improve and document methods of analysis used in the evaluation of the Nation's water quality. The Kjeldahl method was recommended as a water analysis method for whole water samples and for the computation of TN beginning with the Second Edition of "Standard Methods" (American Public Health Association, 1915). By comparison, alkaline persulfate digestion methods for TN analysis are relatively new. The OWQ approved analysis of TN in water at the National Water Quality Laboratory (NWQL) in 2003 by USGS method I-2650-03 (Patton and Kryskalla, 2003).

The multiyear study of bias and precision in determinations of TN was conducted jointly by the OWQ, the National Water Quality Assessment Program, and the NWQL. These findings are contained in the following report that is now available. Current and former USGS employees who brought the TN bias and precision issue to our attention, contributed to the report, or both are identified in the *Acknowledgements* section of SIR 2012-5281.

Suggested citation:

Rus, D.L., Patton, C.J., Mueller, D.K., and Crawford, C.G., 2013, Assessing total nitrogen in surface-water samples—Precision and bias of analytical and computational methods: U.S. Geological Survey Scientific Investigations Report 2012–5281, 38 p.

The URL for this publication is http://pubs.usgs.gov/sir/2012/5281/

This publication is online only.

References:

American Public Health Association, 1915, Standard Methods for the Examination of Water and Sewage, Second Edition: American Public Health Association, Boston, Mass., pp. 15-21.

Memorandum to Water Resources Division, July 2, 2003, Approval of a Water Quality Analytical Method for the Determination of Nitrogen and Phosphorus in Whole and Filtered Water by the National Water Quality Laboratory http://water.usgs.gov/usgs/owq/Analytical_Methods/

Office of Water Quality Technical Memorandum 2013.01 Guidance on Methods for Determining the Concentration of Total Nitrogen in Whole-Water Samples http://water.usgs.gov/admin/memo/QW/

Patton, C.J., and Kryskalla, J.R., 2003, Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory—Evaluation of alkaline persulfate digestion as an alternative to Kjeldahl digestion for determination of total and dissolved nitrogen and phosphorus in water: U.S. Geological Survey Water-Resources Investigations Report 03–4174, 33 p., accessed July 2011, at http://nwql.usgs.gov/Public/pubs/WRIR03-4174/WRIR03-4174.pdf .

U.S. Environmental Protection Agency, 1997, Determination of Carbon and Nitrogen in Sediments and Particulates of Estuarine/Coastal Waters Using Elemental Analysis, Method 440.0, Revision 1.4, September 1997, U.S. Environmental Protection Agency, National Exposure Research Laboratory, Office of Research and Development, Cincinnati, Ohio, 10 p. at http://www.epa.gov/microbes/documents/m440_0.pdf

Signed,

The Office of Water Quality 4/5/13

Distribution: All WMA Employees