Loss of Scientific Integrity Finding at USGS National Water Quality Lab

A briefing for Chesapeake Bay
Data Integrity Workgroup
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https://www.usgs.gov/news/loss-scientific-integrity-finding-usgs-national-water-quality-lab

Loss of Scientific Integrity Finding at USGS National Water Quality Lab

Release Date: MARCH 16, 2021

Background Information

The USGS National Water Quality Laboratory (NWQL) is an environmental analysis and research facility specializing in chemical analyses of water, sediment and tissue, and the taxonomic identification and quantification of benthic invertebrates. The NWQL Analytical Services (AS) Section carries out analyses of 800+ inorganic and organic constituents in more than one million samples of groundwater, surface water, wastewater, sediment, atmospheric precipitation and biological tissues. Each year, the NWQL analyzes tens of thousands of water samples. The lab's work helps understand the health of aquatic systems and pinpoint potential sources of contamination such as agricultural runoff.

On July 8, 2020, NWQL's quality assurance/quality control processes revealed that data values of some samples had been altered without required explanatory notation. USGS immediately launched an investigation and has determined that from March 2019 through June 2020, a single AS Section analyst significantly departed from accepted practices and standards, violating the USGS's fundamental science practices and resulting in a loss of scientific integrity. Evidence shows the analyst acted alone and intentionally to falsify data for the nutrients nitrogen and phosphorus in approximately 2,300 water samples.

The USGS has taken appropriate measures to notify users of the affected analyses and is reprocessing and flagging the permanent analysis records to properly reflect the loss of quality control for the samples involved. The USGS is also examining ways to improve its analytical workflows and quality assurance/quality control procedures to identify weaknesses and remedy any issues found.

USGS Media Statement

Attributable to Dr. David Applegate, U.S. Geological Survey Associate Director for Natural Hazards Exercising the Delegated Authority of the Director.

The USGS's reputation for scientific excellence is founded on scientific integrity and transparency. Every day, thousands of disciplined and principled scientists work conscientiously to maintain those fundamental tenets. As soon as we learned of this issue, we implemented our standard protocols to investigate and take appropriate action. The unethical actions of a single individual are deeply troubling, and we offer our sincerest apologies for any inconvenience this may have caused our customers.

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Context for Chesapeake Bay Results

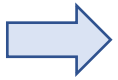
- 12 of 123 stream monitoring sites
- Affected constituents include:
  - dissolved nitrite,
  - dissolved ammonia,
  - and dissolved orthophosphate.
- Core constituents for Chesapeake unaffected (TN, TP, SSC)
- Sporadic occurrence from March 2019 through July 2020.
  - Approximately 11 percent of these analyses were affected
- The issues were uncovered by an active and deliberate quality management system at the NWQL.

MD RIM Core Constituents: Calculation methods

- Total Nitrogen

Total Dissolved Nitrogen (alkaline persulfate digestion)

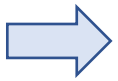
Total Particulate Nitrogen (High- temp combustion)



Total Nitrogen (calculation)

Total Ammonia and Organic Nitrogen (Kjeldahl distillation)

Dissolved Nitrate Plus Nitrite (Colorimetric - Enzymatic Reduction)



Total Nitrogen (calculation)

Total Nitrogen (alkaline persulfate digestion)

Total Nitrogen (reported) historical

MD RIM Core Constituents: Calculation methods

- Total Phosphorus, direct measurement

  or

- Dissolved phosphorus + particulate phosphorus

- Suspended Sediment (direct measure)

MD RIM Supporting constituents

- Loads and trends:
  - Nitrate plus Nitrate: (Colorimetric-Enzymatic Reduction)
  - Dissolved Orthophosphate

- Additional support:
  - Dissolved phosphorus
  - Dissolved organic carbon
  - Particulate organic carbon
  - Inorganic carbon
  - Ammonia
  - Nitrate
  - Chlorophyll
  - Pheophytin
  - Silica

Details of the issue:

Analyst allowed quality control samples to “pass” without recalibration when the measured value were outside established standard operating procedures (SOPs) for the following procedures:

- Laboratory reagent Blanks (LRB)
  - Nitrite + or - 0.001 mg/L
  - Ammonium + or - 0.01 mg/L
  - Orthophosphate No occurrences
- Continuing Calibration Validation (CCV): *+ or - 10% of expected value*
- Third Party Check (TPC): *+ or - 6% of expected value*

USGS follow up actions

1. Notify Partners
2. Analyze and assess impacts
3. Brief Data Quality and Integrity workgroup
4. Revise and document databases
    a) NWIS
    b) NWIS-WEB
    c) CEDR (Chesapeake Environmental Data Repository)
5. Publish Open-file report on potential impacts to Chesapeake Bay science

All press inquiries to be handled through the Directors office.