Guidelines for the Operation of Continuous Water-Quality Monitors: Quality Assurance and Quality Control

Richard J. Wagner, Washington Water Science Ctr., 1201 Pacific Ave., Suite 600, Tacoma, WA 98402 (253) 428-3600 ext. 2685 rjwagner@usgs.gov

Numerous factors can influence the accuracy and precision of continuous water-quality monitoring data. For example, data corrections are often applied to recorded water-quality data to compensate for erroneous recordings. Most data corrections are needed because of instrument fouling or sensor drift. In order to logically and consistently manage continuous water-quality data, it is necessary to use prescribed guidelines and criteria for implementing technically approved methods and policies.

"Guidelines and standard procedures for continuous water-quality monitors: sites selection, field operation, calibration, record computation, and reporting" (Wagner and others, 2000) is a quality-assurance plan for the operation of continuous water-quality monitors that describes five major quality-assurance concepts: (1) a standard protocol for servicing monitors, (2) calibration criteria, (3) data-correction criteria, (4) maximum allowable limits, and (5) a rating of accuracy.

Wagner, R.J., Mattraw, H.C., Ritz, G.F., and Smith, B.A., 2000, Guidelines and standard procedures for continuous water-quality monitors: sites selection, field operation, calibration, record computation, and reporting: U.S. Geological Survey Water-Resources Investigations Report 00-4252, 53 p.

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Outline: Quality assurance and quality control

- Definitions –
  - –Quality assurance
  - –Quality control
  - –Quality Assurance Plan
- Components of a continuous water-quality QA Plan

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Definition

- **Quality Assurance (QA):** The systematic management of data-collection systems by using prescribed guidelines and criteria for implementing technically approved methods and policies

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Definitions and Implementation

- **Quality Assurance (QA):** All those planned or systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for quality.

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Definitions and Implementation -- *(continued)*

- **Quality Control (QC):** The operational techniques and activities used to obtain the required quality of data.

Definitions and Implementation

- **Quality Assurance (QA):** All those planned or systematic actions necessary to provide **adequate confidence** that a product or service will satisfy **given requirements for quality**.

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Definitions and Implementation *--(continued)*

- **Quality Control (QC):** The operational techniques and activities used to obtain the **required quality of data**.

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Quality Assurance Plan

- Quality Assurance
- Quality Control
- Quality Assessment

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Quality Assurance Plan

- **Quality Assurance**
  - Procedures used to control un-measurable components of a project

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Quality Assurance Plan

- **Quality Control**
  - Data used to measure the magnitude of bias and variability
  - Field, laboratory, and office components

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Quality Assurance Plan

- **Quality Assessment**
  - Reviewing:

  (1) the application of the QA elements, and

  (2) the analysis of the QC data

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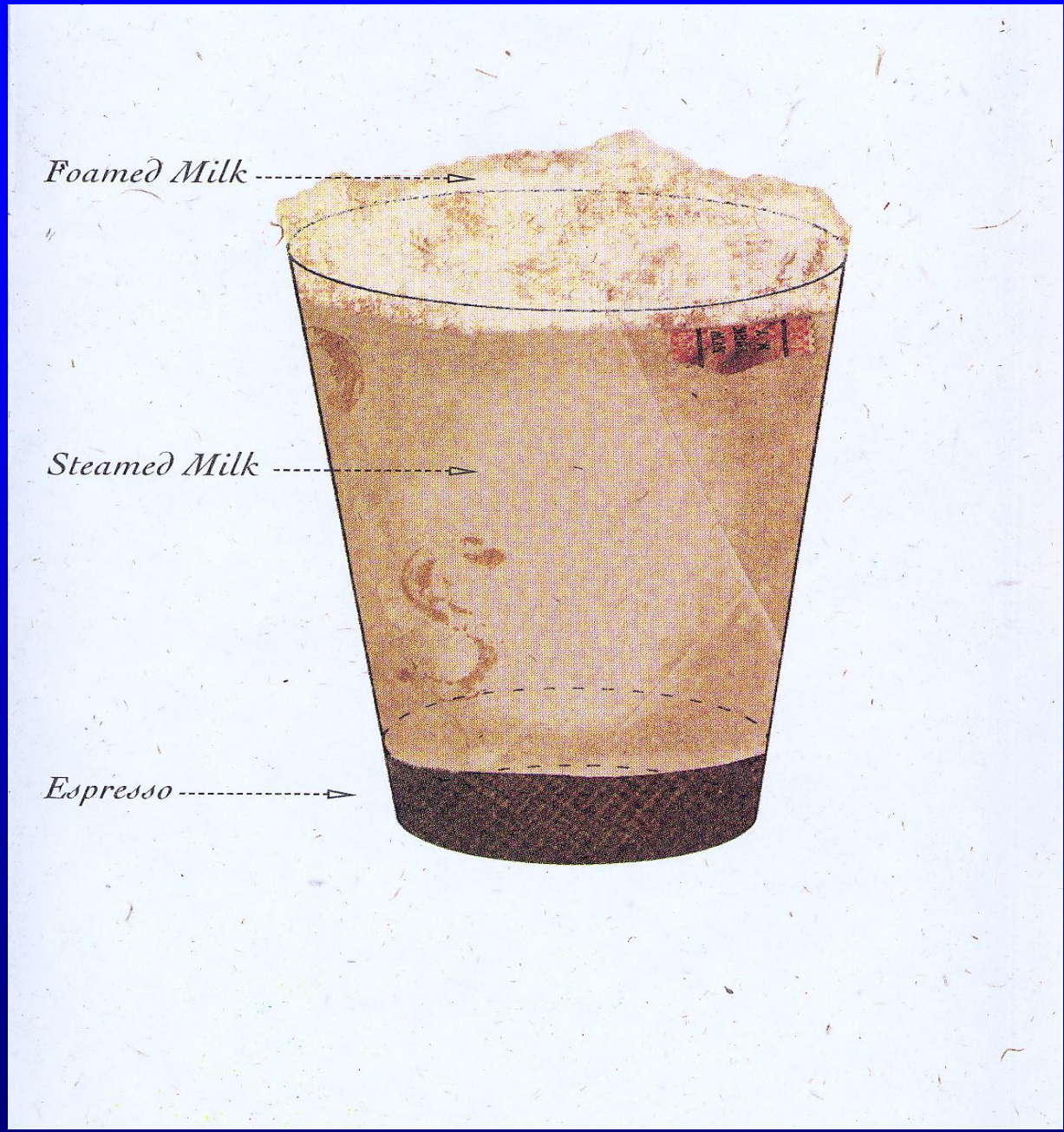

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Continuous Water-Quality Monitors

- Standard protocol
- Calibration criteria
- Allowable limits for corrections
- Maximum allowable limits
- Rating of accuracy

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Standard Protocol

(1) Initial reading of sensors to determine drift and fouling

(2) Second reading after cleaning: fouling

(3) Calibration check: drift

(4) Final environmental reading

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Calibration Criteria

- "Acceptable differences"
- Concept recognizes the accuracy and limits of recording electronic instruments in field conditions
- Monitor need not be adjusted if readings are within the calibration criteria

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Allowable Limits for Data Corrections

- Fouling, drift, and cross-sectional corrections
- Only made to measurements when type and degree of correction is known

Maximum Allowable Limits

- Quality-control limit for correcting data
- If recorded values exceed the maximum allowable limits, the data are not published

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Rating Continuous Water-Quality Data

- Assessment of accuracy
- Amount of data recorded and assessment of instrument performance
  - ✓ Excellent
  - ✓ Good
  - ✓ Fair
  - ✓ Poor

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QA Plan for Operation of Continuous WQ Monitors

- Quality Assurance
- Quality Control
- Quality Assessment

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QA Plan for Operation of Continuous WQ Monitors

- Guidelines and Standard Procedures for Continuous Water-Quality Monitors: Site Selection, Field Operation, Calibration, Record Computation, and Reporting, Water-Resources Investigations Report 00-4252

  http://water.usgs.gov/pubs/wri/wri004252/

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