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NATIONAL WATER QUALITY LABORATORY TECHNICAL MEMORANDUM 1998.11

September 30, 1998

Subject: Graphite Furnace Atomic Absorption Spectrophotometry (GFAAS) to replace Hydride Generation Atomic Absorption Spectrophotometry (HGAAS) for the Determination of Arsenic and Selenium in Filtered and Whole Water Recoverable Water, and Recoverable Bottom Material Sediment

Effective Date

of Change: October 1, 1998

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Revision: None

PURPOSE

The National Water Quality Laboratory (NWQL) has been determining arsenic (dissolved I-2062-85, whole-water-recoverable (WWR) I-4062-85, bottom materials I-6062-85) and selenium (dissolved I-2667-85, WWR I-4667-85, bottom materials I-6667-85) using the hydride generation atomic absorption (HGAAS) spectrophotometric methods since the mid 1970's. A widely used alternate technique, graphite furnace atomic absorption spectrophotometry (GFAAS), is now available for the simultaneous determination of arsenic and selenium. The GFAAS methods are more efficient and reliable than the HGAAS methods, and chemical waste is minimized.

SCOPE

Effective October 1, 1998, the NWQL will replace the hydride generation methods for the determination of filtered and WWR arsenic and selenium in water and in bottom material samples by the GFAAS method. All samples logged in after October 1, 1998, for the analysis of filtered, WWR, and bottom materials for arsenic or selenium will be analyzed by the GFAAS method documented by Jones and Garbarino (in press). Currently, (1998), the method reporting limits are 1 microgram per liter for arsenic and selenium, identical to the HGAAS methods for water samples. Bottom material method detection limits will vary depending on sample size used for analysis, but will be comparable to HGAAS limits.

The lab codes for arsenic and selenium determinations by HGAAS will no longer be valid. The hydride lab codes will be replaced by the new lab codes listed in the following table.

	Hydride Labcode	Arsenic GF-AAS LabCode	Method Code
Filtered	112	2160	I-2063-98
WWR	118	2162	I-4063-98
Bottom material	597	2316	I-6063-98

	Hydride Labcode	Selenium GFAAS Labcode	Method Code
Filtered	87	2161	I-2668-98
WWR	286	2163	I-4668-98
Bottom Material	597	2317	I-6668-98

To request an arsenic or selenium analysis by GFAAS, a customer may simply request the appropriate lab code on the Analytical Services Request (ASR) form. The NWQL will update all existing schedules that include HGAAS methods for Arsenic or Selenium with the new lab codes and prices using GFAAS. If a customer requests an invalid hydride labcode, it will automatically be changed to the GFAAS labcode. Pricing information is available in the NWQL catalog.

Filtered arsenic or selenium will still require the filtered-acidified (FA) sample type, and WWR arsenic or selenium will still require the unfiltered-acidified (RA) sample type. Bottom material sample type remains the same. The unfiltered-acidified (RAH) bottle type will no longer be needed.

Data in Jones and Garbarino (in press) show that bias and variability for arsenic and selenium are equivalent to or better than the existing hydride generation methods. No change in data quality is expected from the method changes. The NWQL expects decreased turnaround time for the analysis, substantial improvements in laboratory efficiency, and decreased costs for waste disposal.

CITED REFERENCE

Jones, S.R., and Garbarino, J.R., in press, Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of arsenic and selenium in water and sediment by graphite furnace atomic absorption spectrophotometry, U.S. Geological Survey Open-File Report 98-xxx (in press).

Effect on Data Base: None

/signed/
Robert S. Williams, Jr., Chief
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Supersedes: None

Key Words: Arsenic, Selenium, Graphite Furnace Atomic Absorption Spectroscopy, Hydride Atomic Absorption Spectroscopy

Distribution: E and <http://www.nwql.cr.usgs.gov/USGS>