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# United States Department of the Interior

U.S. GEOLOGICAL SURVEY

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## **NATIONAL WATER QUALITY LABORATORY TECHNICAL MEMORANDUM 1996.10**

May 22, 1996

To: Assistant Chief Hydrologist for Technical Support  
Regional Hydrologists  
Chief, Office of Water Quality  
Assistant Chief, Office of Water Quality  
Chief, National Water Information System  
Acting Chief, NAWQA  
Chief, Office of Ground Water  
Area Hydrologists  
District Chiefs  
Regional Water Quality Specialists  
Assistant Regional Hydrologists for NAWQA  
District Water Quality Specialists  
Chiefs, NAWQA Study Units  
Chief, Ocala Project Office  
Chief, Yucca Mountain HIP  
QA Manager, Yucca Mountain Project  
Chief, Branch of Technical Development & Quality Systems  
Employees, National Water Quality Laboratory

From: Peter F. Rogerson, Chief  
National Water Quality Laboratory  
Branch of Analytical Services

Subject: Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP-AES) to replace Direct Current Plasma-Atomic Emission Spectrometry (DCP-AES) for the determination of dissolved Aluminum and Boron in water

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Revision: None

The National Water Quality Laboratory (NWQL) has been determining dissolved concentrations of Aluminum (method I-1054-86) and Boron (method I-1114-86) by the Direct Current Plasma-Atomic Emission Spectrometry (DCP-AES) method since 1984. A widely used alternative

technique, Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP-AES), is now available and allows for the analysis of dissolved Aluminum and Boron simultaneously along with other trace metals. Because virtually no additional analytical time or operator time is required, the ICP-AES method is more cost effective than the old method for both the NWQL and for customers requesting multiple trace metal parameters.

Effective June 1, 1996, the NWQL will replace the DCP-AES method for the determination of dissolved Aluminum and Boron in water samples by the ICP-AES method. All samples logged in after June 1, 1996, for the analysis of dissolved Aluminum or Boron will be analyzed by the ICP-AES method documented in U.S. Geological Survey Open-File Report 96-149, "Methods of Analysis by the U.S. Geological Survey National Water Quality Laboratory--Determination of Dissolved Aluminum and Boron in Water by Inductively Coupled Plasma-Atomic Emission Spectrometry," approved on February 14, 1996. The method reporting limits are 5 micrograms per liter for dissolved Aluminum and 4 micrograms per liter for dissolved Boron by the ICP-AES method in comparison to 10 micrograms per liter for both Aluminum and Boron by the DCP-AES method. The lab codes for dissolved Aluminum determinations by DCP-AES, 1284 (Aluminum DIS DCP), and for dissolved Boron determinations by DCP-AES, 1183 (Boron DISSOLV), will no longer be valid. The new lab codes will be 2111 (Aluminum DISSOLVED) and 2110 (Boron DISSOLVED) for dissolved determinations by ICP-AES.

Boron determinations by ICP-AES benefit from improved accuracy when compared to the DCP-AES method. Aluminum determinations, on the other hand, exhibit similar accuracy by both methods. The overall precision of Aluminum and Boron determinations by ICP-AES provides improvement over the DCP-AES method. The number of replicates used to study the accuracy and long-term precision varies from 150 to 550 replicates, depending on the reference material used.

To request a dissolved Aluminum or Boron analysis by ICP-AES, a customer may either add the Lab Codes 2111 for dissolved Aluminum or 2110 for dissolved Boron to an existing ICP-AES schedule, or simply request the lab code for dissolved Aluminum or Boron, or both, on the Analytical Services Request form listing other required parameters. The NWQL will update all existing schedules that include dissolved Aluminum and Boron requests by DCP-AES with the new lab codes and prices using ICP-AES.

Please be aware that determinations of only dissolved Aluminum and Boron are affected by this memorandum. Aluminum and Boron will still be determined by the DCP-AES method for whole water recoverable analyses. In addition, please note that whereas dissolved Boron determinations by DCP-AES require filtered-unacidified sample type, dissolved Boron determinations by ICP-AES require filtered-acidified sample types as do all ICP-AES analyses.

Supersedes: None

Key Words: Aluminum, Boron, Direct Current Plasma-Atomic Emission Spectrometry, Inductively Coupled Plasma-Atomic Emission Spectrometry, Spectrometry

Distribution: See above plus the Netnews USGS.labnews & .waterquality; WRD Secretaries; Field and Project Offices; Hydrologic Technicians; and <http://wwwnwql.cr.usgs.gov/>

Effect on Data Base: None