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# United States Department of the Interior

U.S. GEOLOGICAL SURVEY

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## **NATIONAL WATER QUALITY LABORATORY TECHNICAL MEMORANDUM 1994.03**

December 22, 1993

To: Assistant Chief Hydrologist, PC&TS  
Regional Hydrologists  
Chief, Office of Water Quality  
Assistant Chief, Office of Water Quality  
Deputy ACH for PC&TS for NAWQA  
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 Mtn. Group  
Chief, Branch of Quality Assurance  
Employees, National Water Quality Laboratory

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

Subject: Change in Method for Determining Chloride, Sulfate, and Fluoride

Author: Peter F. Rogerson

Revision: None

### **SCOPE**

The National Water Quality Laboratory (NWQL) has had difficulty with determinations of chloride, sulfate, and fluoride at various times for different reasons over the past several years. In April 1990, three separate methods for these anions were replaced with a single ion chromatographic (IC) method (I-2057- 90) which used a Dionex OMNIPAX-500 column. Subsequently, problems arose with chloride using this method, and chloride was changed back to an approved photometric method on December 16, 1992 (see NWQL Tech Memo 93-03). Sulfate and fluoride continue to be determined with the OMNIPAX-500 column IC method.

On January 3, 1994, NWQL will change methods for chloride and sulfate from the above procedures to a previously approved IC method using standard Dionex AS4A columns (TWRI I-2057-85). At the same time, fluoride will be changed to a previously approved ion selective electrode (ISE) procedure (TWRI I-2327-85). Method detection limits estimated according to EPA standard procedures (40 CFR 136 App. B) are as follows: Chloride 0.021 mg/L; Sulfate 0.06 mg/L; Fluoride 0.025 mg/L. For accuracy, we have analyzed many Branch of Quality Assurance (BQA) Standard Reference Water Samples (SWRSs) and found excellent agreement with expected values. In addition, we have analyzed about 300 samples by the current method, by the OMNIPAX-500 method, and by the AS4A and ISE methods so that results obtained with each can be directly compared. Precision information has also been generated by rerunning some 75 of the 300 samples on different days. In general, precision and accuracy of chloride determinations by the AS4A column IC method are better than those obtained with the previous IC method, and about the same as those observed with the current photometric method. Fluoride determinations by ISE are more precise and accurate than the previous IC method. Sulfate precision and accuracy remain high. These data will be shared with the Water Resources Division through a subsequent NWQL Tech Memo which will be distributed following suitable review.

Starting on January 3, 1994, all determinations for chloride and sulfate will be determined by the AS4A IC method and fluoride by the ISE method (excluding low ionic strength methods, which remain unchanged). All samples and reruns which await analysis for anions on that date will be converted to the new lab codes, which are 1571 for chloride, 1572 for sulfate, and 31 for fluoride. NWQL expects no perceptible change in data quality for chloride compared to the current photometric method, no perceptible change in sulfate from the current IC method, and some improvement in difficult samples for fluoride compared to the current IC method.

NWQL is making this change on January 3, 1994, so that it will be most convenient for our customers to keep track of any unexpected changes in data quality. Please let us know if you see any data that you consider to be unacceptable. NWQL believes that these changes will result in the best quality data for our customers. Please contact Charles Patton (303 467-8084, EDOC: CJPATTON) for detailed technical questions and Harold Ardourel (303 467-8105, EDOC: ARDOUREL) for operational questions. We continue to strive for zero defect products.

Supersedes: NWQL Tech Memo 93-03, Change in method for the determination of chloride in water due to data quality problems, December 28, 1992

Key Words: Sulfate, chloride, fluoride, precision, accuracy

Distribution: See above plus QWTALK & LABNEWS