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NATIONAL WATER QUALITY LABORATORY TECHNICAL MEMORANDUM 2001.04

To: Distribution E

From: Gregory B. Mohrman, Chief
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Subject: Results for Filtered and Whole-Water Recoverable Aluminum and Zinc
by ICP-MS Affected by Contamination from May 2000 through September 2000.

Date: November 7, 2001

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Purpose

The National Water Quality Laboratory (NWQL) identified a source of contamination affecting most low-level results for filtered and whole-water recoverable aluminum and zinc determined by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) from May 2000 through September 2000. All potentially affected samples that were available at the time were reanalyzed and the results updated, if necessary. For those samples that were no longer available for reanalysis, the result qualifier was reset to the "less-than" data qualifier with the original concentration unchanged. These changes were sent to the district databases on May 2, 2001.

Background

In May 2000, ICP-MS operators were supplied with test-tube caps produced by a different manufacturer. This change was not obvious at the time of the switch because the new caps appeared to be identical to the caps being replaced. Therefore, the test-tube caps were not tested for potential contamination before they were used on environmental samples.

The NWQL Blind Blank Program operated in-house by the Quality Assurance Section did identify some individual analyses with data outside the control limits for aluminum and zinc; however, database problems hampered the preparation of control charts that would have helped to identify the extent of this problem, and control charts were not available for examination until late summer 2000. At that time, the process of troubleshooting was immediately started. The blank sample quality-assurance data revealed a contamination problem, and through subsequent tests, the NWQL was able to determine that the new caps were the source of low-level aluminum and zinc. The test-tube caps affected only the aliquot of sample being tested, and not the original sample. Use of the contaminated caps was discontinued on 9/27/00.

Generally, the range of aluminum contamination was from less than the minimum reporting level (1 ug/L) to about 10 ug/L. For zinc, the range was from less than the minimum reporting level (1 ug/L) to about 3 ug/L. The samples affected were logged in from Julian Date (JD) 104 (4/13/00) through JD 227 (8/14/00). The discrepancy between dates of contaminated cap use and JD of samples affected is caused by the lag time between login date and analysis date. All ICP-MS analyses with reported aluminum concentrations up to 45 ug/L or reported zinc concentrations up to 20 ug/L were considered for reanalysis. Above these concentrations, the effect of the low-level contamination on the analytical results is minimal.

Scope

The filtered aluminum (1106G) and zinc (1090G) results for 1,300 samples were identified as possibly being affected by contamination. Of these 1,300 samples, 700 were reanalyzed, and 600 had been discarded.

The whole-water recoverable aluminum (1105E) and zinc (1092D) results for 190 samples were identified as possibly being affected by contamination. Of these 190 samples, 40 were reanalyzed, and 150 had been discarded.

For all of the discarded samples, aluminum and zinc results have been updated with the "<" (less than) data qualifier.

The contaminated test-tube caps were not used for schedule 172 ("blank") filtered aluminum (1106H) and zinc (1090H) analyses, therefore schedule 172 results were not affected.

Results for parameters other than filtered and whole-water recoverable aluminum and zinc were not affected and therefore, not changed.

Effects on the data base:

For the 740 reanalyzed samples, updates to the database were necessary for 480 of the samples. Data for the remaining 260 samples showed no change from the original value, so results were not updated. For the 750 discarded samples, the original result was unchanged while the data qualifier was updated to the "<" data qualifier to indicate the level above which contamination did not occur for that sample.

Action Items:

The NWQL has implemented a new laboratory information management system (LIMS) that will enable the gathering and dissemination of QA/QC data to the Analytical Services Section in a more timely manner.

The Analytical Services Section has implemented new analytical procedures to minimize errors. These procedures include standardized analytical sequences and secondary data review. In addition, the NWQL has implemented a procedure so that all supplies (in this case the test-tube caps) will be tested for possible contamination (by manufacturer batch) before the supply is used on environmental samples so that this type of error does not happen again.

//signed//

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Supersedes: None

Reference: None

Key Words: Aluminum, Zinc, Contamination, Updates, Less-than