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State of North Carolina
Department of Environment, Health, and Natural Resources
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James B. Hunt, Jr., Governor

Jonathan B. Howes, Secretary

DIVISION OF ENVIRONMENTAL MANAGEMENT

JANUARY 26, 1993

MEMORANDUM

TO: All Laboratories, Consultants, Permittees and Interested Parties

FROM: Arthur Mouberry, Chief Groundwater Section *AM*

SUBJECT: Groundwater Policy For Metals Determinations Required by 15A NCAC 2L

Effective March 1, 1993, all groundwater samples for metals analyses required by the North Carolina Division of Environmental Management, Groundwater Section, will be collected and analyzed according to Standard Method 3030C "Preliminary Treatment for Acid-Extractable Metals", (Standard Methods For The Examination of Water And Wastewater, 17th edition, 1989 or 18th edition, 1992). Specific conditions, which are outlined in the attached memorandum, will apply.

Please be aware that Standard Method 3030C will be the only accepted method for metals analyses.

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DIVISION OF ENVIRONMENTAL MANAGEMENT

GROUNDWATER SECTION

JANUARY 26, 1993

M E M O R A N D U M

TO: Regional Supervisors

FROM: Arthur Mouberry, Chief
Groundwater Section 

SUBJECT: Policy on Treatment of Groundwater Samples for Metals
Determinations Required by 15A NCAC 2L
EFFECTIVE MARCH 1, 1993

It has recently come to my attention that there continues to be a tremendous need to establish statewide consistency in the handling of all groundwater sample analyses. To affect change along these lines, the subject policy is being established.

The purpose of collecting and analyzing groundwater samples is to obtain a representation of what is dissolved and mobile IN groundwater. This can usually be achieved with few problems when clear samples are collected from wells which have been properly developed so that sediment in the water is minimal.

Recently, there has been considerable controversy about whether or not highly sedimented samples (primarily a result of poor well construction and/or development) should be filtered prior to laboratory analysis. In the past, some samples have been filtered in the field or laboratory prior to analysis. There has been no consistency in when, or under what conditions, filtration took place. In other instances, no filtration was conducted, all acid-reactive particulate matter was digested (i.e. dissolved in boiling nitric acid), and the result reported as a "total" concentration. These inconsistencies have caused conflict and confusion among permittees, consultants, laboratories, regional office personnel, and other regulatory officials. Presently, no established guidance exists for clarification of highly sedimented samples analyzed for total metals. Inquiries and requests for guidance from the U.S. Environmental Protection Agency, U.S. Geological Survey, environmental industry, and the scientific community, have failed to provide a consistent resolution of the concerns. There seems to be no accurate way to differentiate between sediment that represents formational material in a sample, and mobile particulates or precipitates.

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Laboratory analysis of groundwater is our primary tool for evaluating compliance with groundwater quality standards. We, therefore, must ensure that those analyses reflect as little bias as possible as a result of the presence of sediment in samples being analyzed for metals which are mobile (i.e. dissolved and colloidal phases). Analyses for "Total Metals" and "Total Recoverable Metals" both involve digestion procedures which may bias results high by including measurement of metals in the sediment as well as dissolved and colloidal phases. On the other hand, analysis for "Dissolved Metals" may bias results low as a result of sample filtration through a 0.45 micron filter prior to acidification. This procedure may remove some normally mobile metals that have either been adsorbed onto formational material or have moved from the liquid to solid phase as chemical precipitates.

Standard Method 3030C, "Preliminary Treatment for Acid-Extractable Metals", [Standard Methods For The Examination Of Water And Wastewater, 17th edition, 1989, or 18th edition, 1992] was designed to determine both the dissolved and extractable metals lightly adsorbed on particulate matter. This method provides less bias than the aforementioned established methods (Total Metals, Total Recoverable Metals, or Dissolved Metals) in minimizing the impact of sediment on groundwater analyses for total concentrations of mobile metals.

Therefore, the following policy, effective March 1, 1993, is established with respect to treatment of all groundwater quality samples for metals analyses required by 15A NCAC 2L:

NOTE: This policy affects those metals analyses which are required to determine compliance with North Carolina's groundwater quality standards. Additional metals analyses, which may be required under local ordinances or federal regulations (such as RCRA and CERCLA), are not affected by this policy.

Sample filtration in the field will not be permitted for metals analyses.

Standard Method 3030C, "Preliminary Treatment for Acid-Extractable Metals", will be the only accepted method for metals analyses. This method requires field acidification, and laboratory filtration following an acid extraction procedure. Acid contact time (holding time) and filter size are unspecified by the method and must be specified as procedural conditions. Since the objective of this method is to extract metals which are lightly adsorbed on particulate material while limiting absorption by the sample container, it is necessary to limit the acid contact time. CLW

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order to minimize the dissolution of some formational material. The following specific conditions will apply to all groundwater samples:

Samples must be acidified at the time of collection with 5mL of concentrated nitric acid per liter of sample, maintained at 4° C, and analyzed within 72 hours of collection. A 0.45 micron filter must be used for filtration in the laboratory following acid extraction.

For sample acidification, acid may either be added to the samples in the field at the time of collection, or may be added to the cleaned containers prior to their transport to the field.

A 72 hour holding time is specified in order to allow reasonable transport time to the laboratories and to allow some flexibility in scheduling of sample collection while minimizing acid contact time. Since field acidification will prevent precipitation and adsorption of metals onto the container, and filtration is required only after acid extraction, a small pore size (0.45 micron) filter is specified.

→ Please ensure that this policy on treatment of groundwater samples for metals analyses, effective March 1, 1993, is communicated to regional staff and all applicable members of the public. I have asked the staff here in the Central Office to transmit copies of this memorandum to all laboratories on the current certified laboratories list. If you should have any questions, please let me know.

AM/BW/CC/sbp/GWSAMPL1.

cc: Regional Groundwater Supervisors
Preston Howard
Harlan Britt
Bernie Sims
Ted L. Bush
Burrie Boshoff
James Faulcon
Bob Cheek
Bill Jeter
Betty Wilcox
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