



IN REPLY REFER TO:

# United States Department of the Interior

U.S. GEOLOGICAL SURVEY

Box 25046 M.S. 407

Denver Federal Center

Denver, Colorado 80225

## **NATIONAL WATER QUALITY LABORATORY TECHNICAL MEMORANDUM 1997.04**

April 7, 1997

To: Chief, Office of Water Quality  
Assistant Chief, Office of Water Quality  
Assistant Chief Hydrologist for Technical Support  
Regional Hydrologists  
Chief, NAWQA  
Chief, Office of Ground Water  
Assistant Chief, Office of Ground Water  
Chief, Office of Hydrologic Research  
Chiefs, Branches of Regional Research  
District Chiefs  
Regional Water Quality Specialists  
Assistant Regional Hydrologists for NAWQA  
District Water Quality Specialists  
Chiefs, NAWQA Study Units  
Chief, Quality Water Service Unit, Ocala  
Chief, Yucca Mountain Project  
QA Manager, Yucca Mountain Project  
Chief, Branch of Technical Development & Quality Systems  
Employees, National Water Quality Laboratory  
Members, Radchem Committee

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

Subject: Tritium/helium dating of ground-water samples available through contract with Lamont-Doherty Earth Observatory of Columbia University, Palisades, New York

Authors: L. Niel Plummer, Eastern Region Branch of Regional Research, (703) 648-5841, (NPLUMMER)  
Ann Mullin, Chief, Radiochemistry Unit, NWQL (303) 467-8235, (AHMULLIN)

Revision: None

Supplemental: NWQL Technical Memorandum 97.04S on the Web at: <http://wwwnwql.cr.usgs.gov/>

## BACKGROUND

The National Water Quality Laboratory (NWQL) of the U.S. Geological Survey (USGS) has contracted with the Lamont-Doherty Earth Observatory of Columbia University, Palisades, New York, for the analysis of low-level tritium ( $^3\text{H}$ ), total dissolved helium (He), total dissolved neon (Ne), and the helium-3/helium-4 isotope ratio ( $^3\text{He}/^4\text{He}$ ) of dissolved helium for purposes of ground-water dating based on the tritium/helium-3 ( $^3\text{H}/^3\text{He}$ ) method. The  $^3\text{H}/^3\text{He}$  dating method can be used to date waters recharged within approximately the past 30 years and complements existing capabilities within the U.S. Geological Survey for age-dating young ground-water, such as by use of chlorofluorocarbons (see joint Offices of Water Quality and Ground Water Technical Memorandum No. 95.02, dated December 29, 1994).

## SCOPE

The purpose of this memo is to make you aware of the availability of these analyses and to direct you to essential, detailed supplemental information concerning sample collection, submittal, log-in, laboratory processing, and reporting of analytical results. This supplemental information is available on the NWQL Technical Memorandum Supplementary Information web page under NWQL Technical Memorandum 97.04S at

URL: <http://wwwnwql.cr.usgs.gov/>

The supplemental material includes information on planning for sample collection, description of sample collection equipment to be purchased by the project, description of specialized collection containers, and technical background information on age-dating young ground-water.

Determination of the  $3\text{H}/3\text{He}$  age requires use of Schedule 1033 and associated lab codes as outlined in the supplemental material on the NWQL Web Page. Because it takes at least 6 months to complete one part of the analysis, results will be provided approximately 6 months to 1 year after submission of sample.

As noted in the supplement, Project Offices will not submit samples to the NWQL. Instead, projects must obtain log-in numbers by submitting Analytical Service Request (ASR) forms to the Analytical Contracting Unit, NWQL. The forms may be sent via mail or fax (303) 467-8240. Once log-in numbers are assigned by the NWQL, Project Offices will submit samples directly to Lamont-Doherty Noble Gas Laboratory, along with a duplicate of the ASR forms on which the log-in numbers have been written.

Supplementary Info: NWQL Tech Memo 97.04S on the Web (see address below)

Impact on Data Base: None

Supersedes: None

Key words: ground-water dating,  $^3\text{H}/^3\text{He}$ , Tritium/Helium-3

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