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United States Department of the Interior

U.S. GEOLOGICAL SURVEY

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Denver, Colorado 80225

NATIONAL WATER QUALITY LABORATORY TECHNICAL MEMORANDUM 1994.10

April 12, 1994

To: Assistant Chief Hydrologist for 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 Mountain HIP
QA Manager, Yucca Mountain Project
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 decay calculations at the University of Miami Tritium Laboratory
Change in oxygen isotopic data at the Reston Stable Isotope Laboratory

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Revision: None

PURPOSE

Two laboratories from which the National Water Quality Laboratory (NWQL) receives data, the University of Miami Tritium Laboratory and the Reston Stable Isotope Laboratory, have changed their methods for reporting certain results. The tritium lab change concerns decay calculations, and the stable isotope lab change is a shift in oxygen isotopic data.

Change in decay calculations at the University of Miami Tritium Laboratory

The Tritium Laboratory at the University of Miami corrects for the decay of tritium samples from the Julian date in the NWQL I.D. number to the time of analysis. The Julian log-in date was chosen as the reference based (1) on the assumption that samples are usually submitted to the NWQL soon after collection; and (2) on the fact that a difference of a few days (from time of collection to submission) in the correction factor would be insignificant since tritium has a half-life of 12.43 years. If any district personnel hold the tritium samples for extended periods of time before submitting them to the NWQL, it is that district's responsibility to correct for decay from the time of collection to submission.

Through December 31, 1993, the Miami lab used a tritium half-life of 12.26 years for this correction calculation. Starting January 1, 1994, the lab started using a tritium half-life of 12.43 years. For the U.S. Geological Survey, this affects all results starting with sample 932531241. Please note that this does not affect all samples from Julian date 253. There were some samples from this date that were reported before January 1, 1994, and therefore were calculated with the 12.26-year half-life.

Since this is strictly a calculation change and not affected by the matrix of the sample, there is a conversion factor, which follows:

"To convert from the new scale back to the old at any given point in time, multiply the new values by F, where

$$F = 0.9645 - (\text{year} - 1990) \times 0.0008;$$

i.e., for 1994, the factor is 0.9613. The formula is correct within 0.02 percent between 1962 and 1999. To convert data from the old scale to the new, divide by F." This conversion factor and explanation are quoted from a memorandum received from the University of Miami Tritium Laboratory.

Change in oxygen isotopic data at the Reston Stable Isotope Laboratory

The NWQL also received a memo from Tyler Coplen concerning a shift in oxygen isotopic data. This memo states:

"As a result of an intensive recalibration of the Reston Stable Isotope Laboratory, all National Research Project water (not carbonate) samples submitted after January 1, 1994, and all National Water Quality Samples with a laboratory number of 940010001 or greater will be reported on a new oxygen isotopic scale. The result of this new scale is to make 1994 samples more positive by 0.10 o/oo than identical samples submitted between May 1, 1987, and December 31, 1993. Although this change of 0.10 o/oo will not affect many users of our data since our 2-sigma standard deviation is about 0.15 o/oo, I thought it important to advise you of this change. I am sorry for any inconvenience this might cause.

"To eliminate bias in long-term data sets, users should increase (make more positive) by 0.10 o/oo oxygen 18/oxygen 16 values of all water samples submitted to this laboratory between May 1, 1987, and December 31, 1993. There is no change in the oxygen isotopic scale for samples submitted prior to May 1, 1987. Should you have a

question as to which of your data should be changed by 0.10 o/oo, please contact me.
(Tyler Coplen)

"There is no change in the hydrogen or carbon isotopic scales of this laboratory according to the results of this recalibration."

If you have questions concerning oxygen isotopic data, please contact Tyler Coplen (TBCOPLN; (703) 648-5862). If you have questions concerning the calculation change at the University of Miami, or if you would like a copy of the memo sent by the University, please contact Ann Mullin.

cc: NWQL Radiological Advisory Committee

Supersedes: None

Key Words: Decay, correction factor, isotopic, o/oo (per mil)