

CONF-9010219-3

THORIUM-230 DATING OF NATURAL WATERS AT THE NEVADA TEST SITE

Rec

CONF-9010219--3

S. N. BAKHTIAR
REYNOLDS ELECTRICAL AND ENGINEERING CO., INC.
HEALTH PHYSICS DEPARTMENT, P.O. BOX 98521
LAS VEGAS, NV 89193-8521

OCT 26 1990

DE91 001323

Radiocarbon determinations have been used in the past to estimate the ages of groundwater from the Paleozoic aquifer underlying the Nevada Test Site and adjacent areas.

According to Grove et al.¹, for example, a generally good correlation exists between the Carbon-14 dates and the current hydraulic interpretations. The so called "adjusted" Carbon-14 ages of a total of ten water samples taken from the wells and springs at the Nevada Test Site and in adjacent areas vary from ~1,600 to 23,40 years. It seems, however, the aquifer is heterogenous and is insufficiently defined to permit detailed predictions of groundwater velocities or flow patterns.

In an attempt to establish an alternative dating method for the natural waters, we measured the concentrations of ²³⁰Th, ²³²Th, ²³⁴U and ²³⁸U in several water samples taken from the wells and spring at the Nevada Test Site and calculated the ²³⁰Th ages.

The preliminary studies indicate that the thorium to uranium ratios in these samples were found to be extremely low. This may be attributable to the fact that the thorium isotopes are also constantly being precipitated out of these waters.

It is worthy to note that the process of disruption of the radioactive equilibria has been occurring constantly throughout the past and in fact the process may still be going on at the present time. Under these circumstances, the ²³⁰Th ages for the spring and well waters may be a good indication of the mean residence times of the radioactive nuclides in the hydrosphere, which depends heavily on the chemical properties of the dissolved substances in aqueous solutions.

1) D. B. Grove, M. Rubin, B. B. Hanshaw, W. A. Beetem, U.S. Geol. Survey Prot. Paper, Vol. 650-C, 1969, pp.C215-C218.

MASTER

- 2) F. S. Jiang, S. C. Lee, S. N. Bakhtiar, P. K. Kuroda, J. Radioanal. Nucl. Chem., Vol.100, 1986, p. 65.

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.