CONF-9010219--3

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

CONF-9010219--3
DE91 001323

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

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 ^{230}Th, ^{232}Th, ^{234}U and ^{238}U in several water samples taken from the wells and spring at the Nevada Test Site and calculated the ^{230}Th 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 ^{230}Th ages for the spring and well waters may be a good indication of the mean residence times of the radioactive nuclides int he 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.

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