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Abstract. Reconnaissance studies of radioelements in the ground waters of Iowa indicate that, where radium is present, it is Ra^{226}, the biologically significant isotope. Its distribution varies, but it appears that (1) waters from consolidated sandstones in areas distant from recharge points may contain up to 8 $\mu\mu$c/L Ra^{226}; (2) waters from limestone aquifers vary but, in general, are likely to contain appreciable amounts, up to 3 $\mu\mu$c/L Ra^{226}; and (3) waters from glacial aquifers contain little, if any, Ra^{226}.

Reconnaissance studies of naturally occurring radioelements in the ground waters of Iowa were started in 1952[2] and have yielded sufficient data that a progress report can be made and a future program outlined.

Radiochemical studies (gross counts) were made of nearly 200 samples. At least 35 of these samples were also analyzed for radium content, and five Ra^{226}-Ra^{224} differentiations were made. Although these data are inadequate for accurate predictions of radium concentration in the aquifers sampled, certain generalizations can be made.

It appears that consolidated sandstones in areas far from their recharge points yield water that contains significant amounts of radium. Samples from the basal aquifer in Iowa, the Mt. Simon sandstone, and from the overlying Jordan, Root Valley-Oneota, and St. Peter sandstones, so far indicate highest concentrations, between 7 and 8 $\mu\mu$c/L radium, in the central and southeastern parts of the state. No wells penetrate these deep sandstones in southwestern Iowa, but to the northwest and north the radium content of tested samples becomes progressively smaller. To the east, water from at least one of these aquifers, the St. Peter, shows a marked increase in radium content (Lucas and Ilcewicz, 1958). The only other water so far sampled that contains as much as 7 or 8 $\mu\mu$c/L radium comes from the Dakota sandstone in the western and northwestern parts of the state. However, the radium

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[2]The Water Resources Division of the U. S. Geological Survey is preparing to publish the results of reconnaissance studies begun in 1952 on the radioelement content of municipal water supplies from major aquifers in the United States. These data are in open file reports, and those that pertain to Iowa have been used as background for part of this report. The balance of the studies reported on here were performed cooperatively by the State Hygienic Laboratory of the Iowa Department of Health and the Iowa Geological Survey.

content of Dakota waters appears to vary widely over short distances and many more analyses will be needed before a reliable generalization can be made for this aquifer.

The waters in limestones of Silurian, Devonian, and Mississippian age apparently contain much smaller amounts of radium than those of the more deeply buried sandstones. The highest radium content measured in these was slightly less than 3 $\mu\mu$c/L, in a sample from a well finished in the Hampton formation of Mississippian age.

Water from the lenticular aquifers of the Pennsylvanian system varies greatly, as might be expected, with the sample of highest radium content so far measured, 3 $\mu\mu$c/L, taken from a channel sandstone of the Des Moines series. All waters tested from glacial or alluvial aquifers contain less than 1 $\mu\mu$c/L radium.

Finally, the limited data available indicate that, where radium is present in appreciable quantities, it is largely Ra^{226}, the biologically significant, bone-seeking isotope.

It is apparent that many additional analyses, with particular attention to radium differentiations, will be needed before a definite report can be made. Present plans call for a speedup of the current studies as well as cooperation of other interested agencies in order that more progress can be made.

Literature Cited

Lucas, Henry F., Jr. and Frank H. Ilcewicz. 1958. Natural radium 226 content of Illinois water supplies. Jour. Amer. Water Works Assoc., vol. 50, no. 11, pp. 1523-1532.

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