AEC-NASA TECH BRIEF

Concentrations of the Naturally Occurring Radionuclides ^{210}Pb, ^{210}Po, and ^{226}Ra in Aquatic Fauna

The concentrations and distributions of the radionuclides ^{210}Pb, ^{210}Po, and ^{226}Ra have been studied extensively in the biosphere and particularly in the human environment; detailed results are available (*1*).

In addition to being among the oldest known radioisotopes and having been studied as industrial hazards, these naturally occurring radionuclides are ubiquitous and contribute a substantial fraction of the natural radiation dose to humans and to various biota. Comparison of these nuclides is desirable because they are in the same radioactivity-decay chain.

As well as enabling estimates of these nuclides in the human diet, regarding health, such measurements may be useful in ecological and other biological problems such as tracing of the food chains of animals and study of the metabolism of these elements. Lead-210 is a tracer for lead which is of great interest in itself. Radioactive nuclides may also be of value for determination of ages—of sediments, for example. Thus here is a preliminary survey of some relations of these nuclides in a variety of aquatic fauna from many parts of the world, many in the human food chain.

The ^{226}Ra concentrations were fairly independent of species at about 5 picocuries (pc) per 100 g of bone ash and 0.2 pc per 100 g of wet soft tissue. In fish and seal bone the ash concentrations of ^{210}Pb and ^{210}Po resembled those in human bone: about 15 pc/g.

Fish muscle contained ^{210}Pb at about 0.2 pc/100 g (wet weight) and ^{210}Po at about ten times this specific activity. Mollusks contained concentrations of each nuclide about one order of magnitude greater than did fish muscle. The concentrations in bone and soft tissues of a fin whale were similar to those in fish, but in teeth and bones of a sperm whale the concentrations of ^{210}Pb were one order of magnitude greater than in hard tissues of the fin whale.

The contributions of these nuclides, to the human diet, from aquatic fauna appear to be relatively small. Mollusks, arthropods, and whales would contribute substantial amounts to the human diet, but their fraction in the average diet is very small. However, special population groups that consume large quantities of these foods may be useful for epidemiological studies of the somatic effects of radiation. These studies could in turn help to protect the health of the people involved.

In ecological studies these nuclides are useful in tracing of the food chains and the life cycles and seasonal variations in food habits of animals.

In the analyses the ^{210}Po was removed from the solution by plating onto a silver disk by the electrodisplacement method, and the amount was determined by counting of the disk in an internal alpha counter.

Reference:

1. R. B. Holzman, in *Proc. 2nd Nat. Symp. Radioecology Ann Arbor, Michigan, May 1967* (CONF-670503, 1969).

Notes:

1. This information may interest fisheries and such groups as the U.S. Public Health Service.

(continued overleaf)

2. Inquiries may be directed to:

Office of Industrial Cooperation
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439
Reference: B69-10258

Source: R. B. Holtzman
Radiological Physics Division
(ARG-10345)

Patent status:

Inquiries concerning rights for commercial use of this innovation may be made to:

Mr. George H. Lee, Chief
Chicago Patent Group
U.S. Atomic Energy Commission
Chicago Operations Office
9800 South Cass Avenue
Argonne, Illinois 60439