FACTSHEETS

702488

11/1/76

CENTER FOR HUMAN RADIOBIOLOGY

Fact Sheet on

Environmental Contamination from a Uranium Ore Processing Mill

This is a new project to be undertaken on behalf of the Division of Environmental Impact Studies as a contribution to the evaluation of the impact on the environment of uranium processing plants.

A survey will be made of possible contamination of the biosphere that could affect humans in the neighborhood of a uranium ore processing mill. This contamination is due to uranium and its long-lived decay products, ^{230}Th, ^{226}Ra and ^{210}Pb, as shown in the uranium series decay table (overleaf). Major factors (food chain, water and air) in human uptake of these materials will be studied and compared to those in control areas distant from the mill. Contamination may result from dust from the ore and processed uranium, and from dust and water from the tailing piles, which contain the residual activities from the processed ore. Radium-226 decays to the gas ^{222}Rn, which may then emanate from the tailings. The short-lived daughters of radon may contribute a relatively large dose to the lungs of people in the vicinity of the source, and the levels of ^{210}Pb deposited in the body may then be a measure of this dose.

Initially (during the first year of the study) the major emphasis will be on determination of the ^{226}Ra and ^{210}Pb levels using well-established analytical techniques in our laboratory. These nuclides will be determined in animals in the food chain, such as cattle, deer, sheep and rabbits, and to a lesser extent in fodder plants. These nuclides are contaminants in themselves, but in addition, the ^{226}Ra may be associated with the ^{230}Th and possibly with uranium, while the ^{210}Pb may be associated with atmospheric ^{222}Rn levels. Uranium and ^{230}Th will also be determined in some of the samples. Measurements will be made on samples from animals, bone, stomach contents (rumen), muscle and various organs (e.g. liver, spleen and kidney).

From these studies we can then estimate the levels of contamination in the human food chain produced by a mill. Insertion of these levels into metabolic models for the various nuclides will then make possible some assessment of the levels in man. This will indicate whether further studies are needed on samples (excreta, bone) from humans.

Prepared by R. B. Holtzman

REPOSITORY Argonne / CHR
COLLECTION Records relating to Industrial / Medical Exposure to Radium
BOX No. Binder # 33 - CHR Fact Dec 121 ASH
FOLDER Sheets Review Committees History of CHR from ANL Reports

0019646

Principal nuclides in the uranium series

Sub-series[1]	Element[2]	Mass number	Major mode of decay	Radioactive half-life
Uranium	Uranium	238	α	4.51×10^{9} yr
	Thorium	234	β	24.1 days
	Protactinium	234	β	1.17 min
	Uranium	234	α	2.47×10^{5} yr
Thorium-230	Thorium	230	α	8.0×10^{4} yr
Radium-226	Radium	226	α	1.60×10^{3} yr
Radon-222	Radon	222	α	3.82 days
	Polonium	218	α	3.05 min
	Lead	214	β	26.8 min
	Bismuth	214	β	19.7 min
	Polonium	214	α	1.64×10^{-4} sec
Lead-210	Lead	210	β	21 yr
	Bismuth	210	β	5.01 days
	Polonium	210	α	138 days
	Lead	206	none	stable

[1] Sub-series of radionuclides, based on half-lives or other properties.

[2] Each radionuclide is the parent of the following one.