



Radioactivity In The Ohio River

Introduction

Traces of naturally-occurring radioactivity can be found in almost all living and non-living substances. Cosmic rays bombard our atmosphere from outer space; radioactive elements and compounds in rocks decay; radium and tritium dials on wristwatches glow in the dark; and x-rays and radioisotopes are used extensively for medical and dental purposes. Radiation can also be found in the air and water around us and in common materials such as wood and brick. All of these are forms of radioactivity.

This report concerns radiation levels in the Ohio River. The Ohio River is the source of drinking water supply to more than three million people. As such, its waters are extensively monitored for a wide range of contaminants, including heavy metals, nutrients (nitro-

gen and phosphorus compounds), organic chemicals (especially volatiles like chloroform and carbon tetrachloride) and radioactivity.

Sources of Radioactivity

Historically, the concern about radioactivity in the Ohio River was with man-made sources, the result of open-air testing of nuclear weapons in the late 1940's, 1950's, and early 1960's. These tests released large amounts of radioactivity to the atmosphere, which then found their way into water and soil, and eventually into the food chain. The US Public Health Service initiated a national water monitoring program for radioactivity in 1957. In 1963, a test ban treaty ended most open-air nuclear test explosions.

Since 1963, radioactivity levels have declined markedly. This has occurred despite the growth in the use of radioactive materials in electrical power generation through nuclear energy, medicine and research and other industrial applications. In the Ohio Valley, there are two nuclear power plants, both in the upper river between Pittsburgh, PA, and Wheeling, WV: the Shippingport Atomic Power Station (currently inoperative

The Ohio River Valley Water Sanitation Commission is an interstate agency formed in 1948 to control water pollution in the Ohio Valley. Member states are: Illinois, Indiana, Kentucky, New York, Ohio, Pennsylvania, Virginia and West Virginia. The federal government is also represented on the Commission.

and to be decommissioned in 1984) and the Beaver Valley Power Station. The generating capacity of these plants amounts to about 2.5 percent of the total generating capacity of all power plants on the Ohio River. Two nuclear power plants are under construction in the middle Ohio River area: William H. Zimmer Nuclear Station near Cincinnati, OH, and Marble Hill Nuclear Station near Madison, IN. A second unit at Beaver Valley is also under construction (see map, Figure 1).

At various times between the mid-1960's and the present, the states of Indiana, Illinois, Ohio, Kentucky, Pennsylvania and West Virginia have monitored radioactivity in the parts of the Ohio River that form their borders. The Ohio River Valley Water Sanitation Commission (ORSANCO), US Geological Survey (USGS) and US Environmental Protection Agency (US EPA) have monitored the entire river at selected sites during this period, as well.

Levels of Radioactivity in the Ohio River

For purposes of this report, six locations were selected to present a profile of radioactivity from beta particles (see Figure 3 for explanation of radioactive particles) in the Ohio River. The data base for gross beta radiation is more extensive than that of other radioactive particles because beta was considered a good indicator of radiation levels resulting from nuclear fallout. Data are availa-

ble for 75 locations on the river, but many of these were sampled for only a few years. In some cases, sampling points close to one another have been grouped to form the six stations profiled (see Figure 2).

Data from US Public Health Service monitoring in 1960, 1961 and the first part of 1962 indicate that most beta activity then was in the form of natural background radiation. Average levels in the Ohio River were similar to average levels throughout the United States — between 5 and 20 picocuries per liter (pCi/l; see Figure 4 on measurement of radioactivity).

However, radioactivity sampling undertaken in the early 1960's by the University of Louisville's Potamological Institute under contract to the Commission showed beta levels in 1962 as high as 90 pCi/l and 177 pCi/l at the Markland Dam and the mouth of the Great Miami River, respectively. US Public Health Service data show that in the second half of 1962 and in 1963, average levels in the Ohio River rose to between 29 and 83 pCi/l with the average level at most of the six sites profiled here above the current standard of 50 pCi/l (see radioactivity criteria, Figure 5). The highest values recorded by the US Public Health Service in the Ohio Valley were 421 pCi/l in 1962 at Evansville, IN, and 771 pCi/l in 1963 at Cairo, IL.

Since the test ban treaty of 1963, levels of beta radiation have decreased substantially. At times, average levels at certain locations have been below detection limits. The maximum one-time level of beta recorded since 1963 was 54 pCi/l in the Louisville, KY-New

Beaver Valley Nuclear Power Station

Photo courtesy of Ohio Edison



