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ENVIRONMENTAL SURVEILLANCE IN THE VICINITY OF HANFORD FOR MAY, 1968

By

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Introduction

This report contains information related to radioactive materials in the Columbia River, the atmosphere, and selected foods (Figures 1-17) for May, 1968. Measurements of the Columbia River flow rate, temperature, and chemical characteristics are also shown (Figures 5, 18-21 and Table 1). Data for the previous twelve months is included.

A comprehensive evaluation of these data is reported once per year in an annual report (see BNWL-439, "Evaluation of Radiological Conditions in the Vicinity of Hanford for 1966"). The data are updated at midyear and are published in a semi-annual report (see BNWL-665, "Evaluation of Radiological Conditions in the Vicinity of Hanford, January-June, 1967").

The radiochemical data presented in this report were supplied by the U. S. Testing Co., Inc., which performed the routine radioassays of environmental samples. The "analytical limit", as used on some of the figures in this report, is defined as the concentration at which the laboratory can measure a radionuclide with an accuracy of ±100 per cent at the 90 per cent confidence level. The detection limit for a specific radionuclide varies with sample type, sample size, counting time, and the amounts of interfering radionuclides present. The "analytical limits" were chosen to represent upper bounds to these fluctuating detection limits. Many of the graphs do not show the "analytical limit" because, for certain analyses, these limits are below the range of values shown on the graphs.

Summary

Atmospheric beta activity during May, 1968, which continued to be slightly above expected levels at all sampling locations was attributed principally to fallout.

Lower than usual river flow rates for May influenced river transport rates and radionuclide concentrations in drinking water.

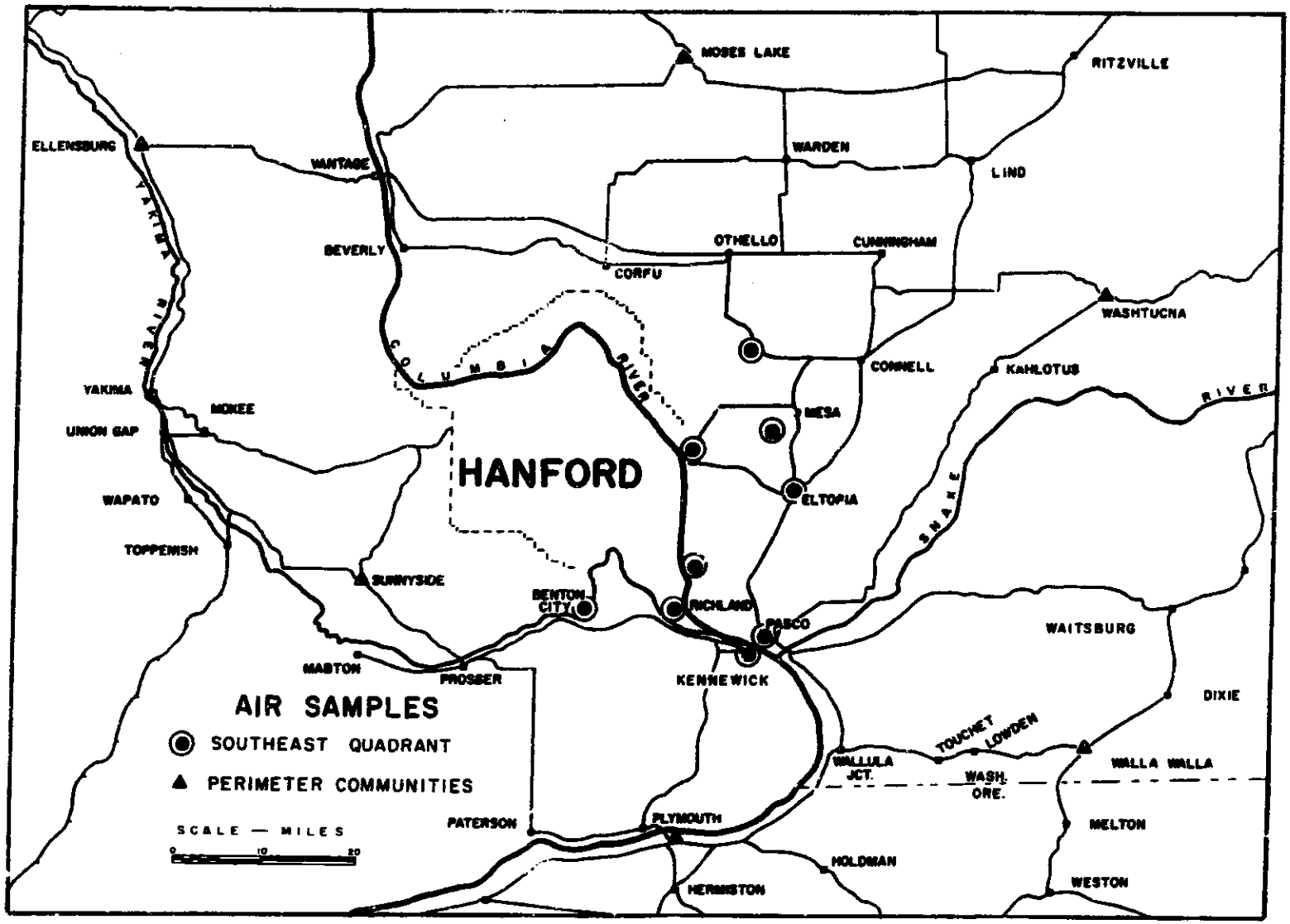

Figure 1

Air Sampling Locations

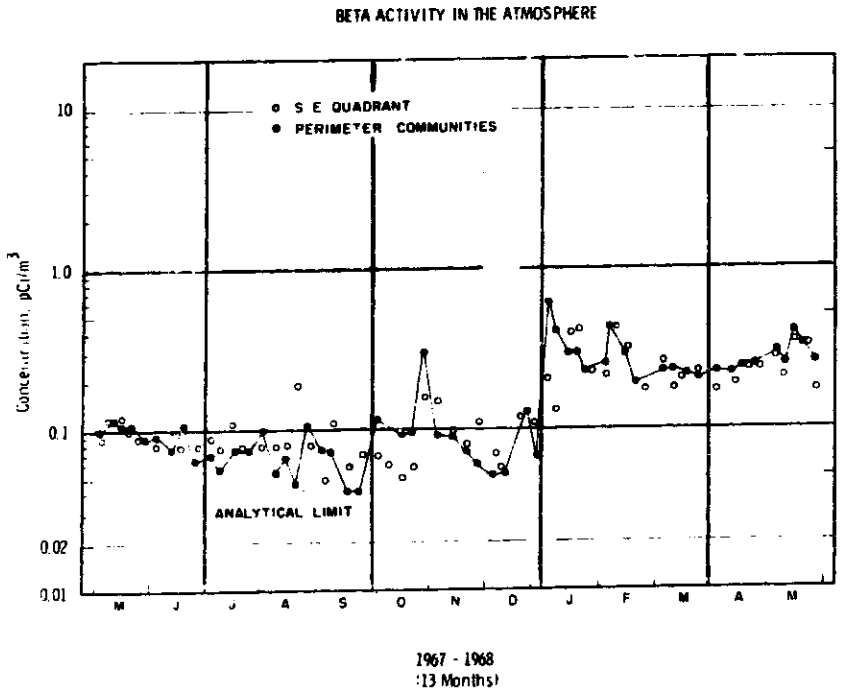

Figure 2

Beta activity in the atmosphere was determined from off-plant air filter samples from near-by locations in the direction of the prevailing wind (Southeast Quadrant), and from other more distant locations (Perimeter Communities). These are shown on Figure 2. Higher concentrations during May, 1968, compared to May, 1967, were attributed to fallout.

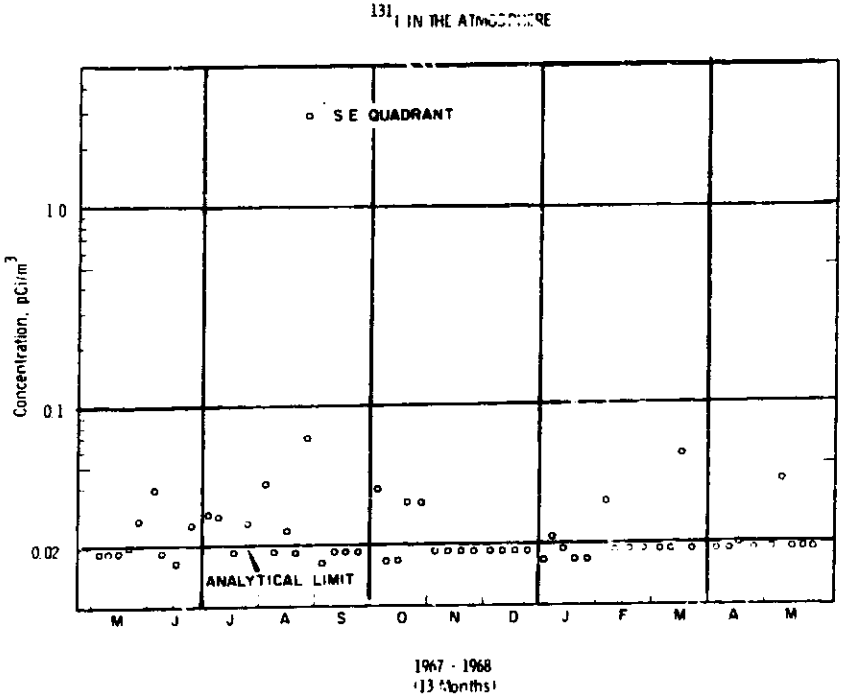

Figure 3

Radioiodine in the atmosphere was determined from caustic scrubbers operated at off-plant sampling locations (Southeast Quadrant). During most of May, ^{131}I concentrations were below the analytical limit (.02 pCi/m^3). Higher concentrations at several locations during the second week were attributed to normal plant releases.

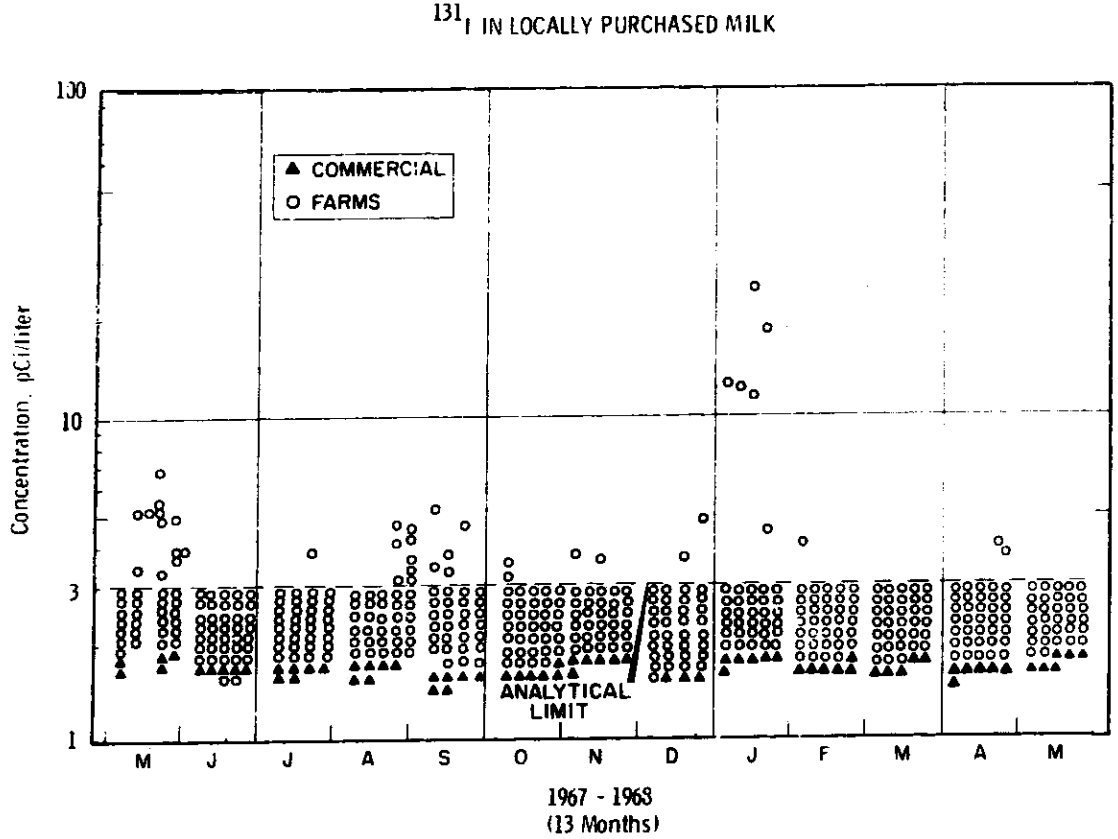

Figure 4

Milk is sampled from individual farms near the Hanford project, from a local creamery that collects milk from several producers near the Hanford perimeter, and from local stores. Radioiodine concentrations were below the analytical limit in all milk samples collected in May. (Data for other radionuclides in milk are presented in Figures 14-15).

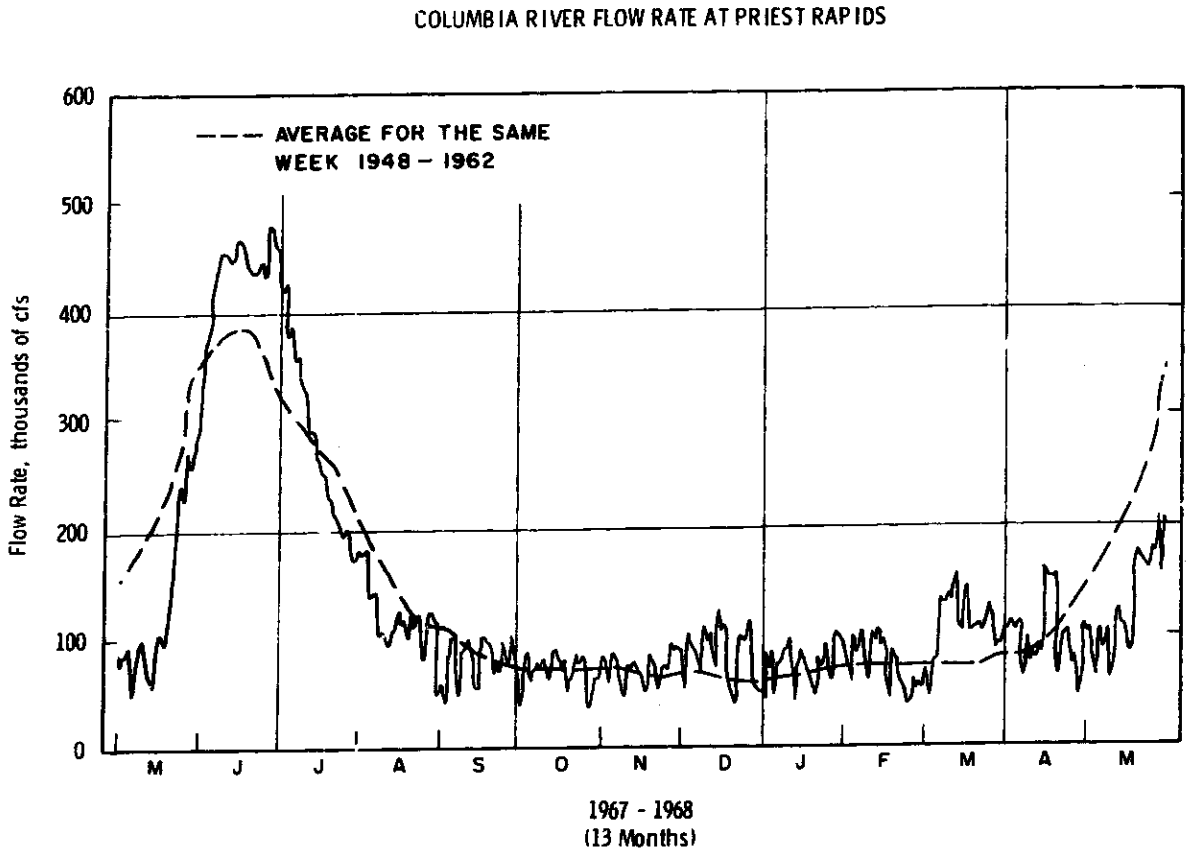

Figure 5

The average river flow rate during May, 1968 was 126,000 cubic feet per second, as published by U. S. Geological Survey Reports for the Priest Rapids Gauge Station. The peak mean daily flow rate for the month was 207,000 cubic feet per second on May 28. For comparison, the average river flow rate during May, 1967 was 139,000 cubic feet per second.

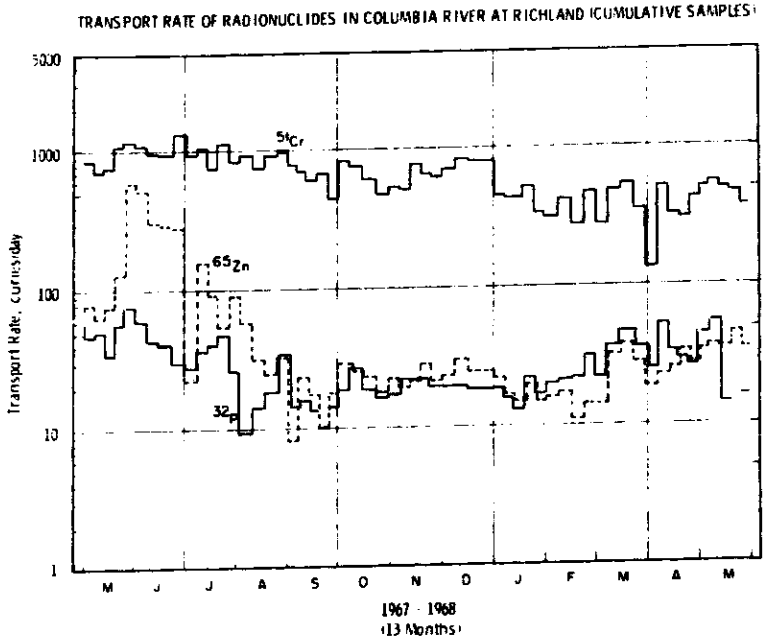

Figure 6

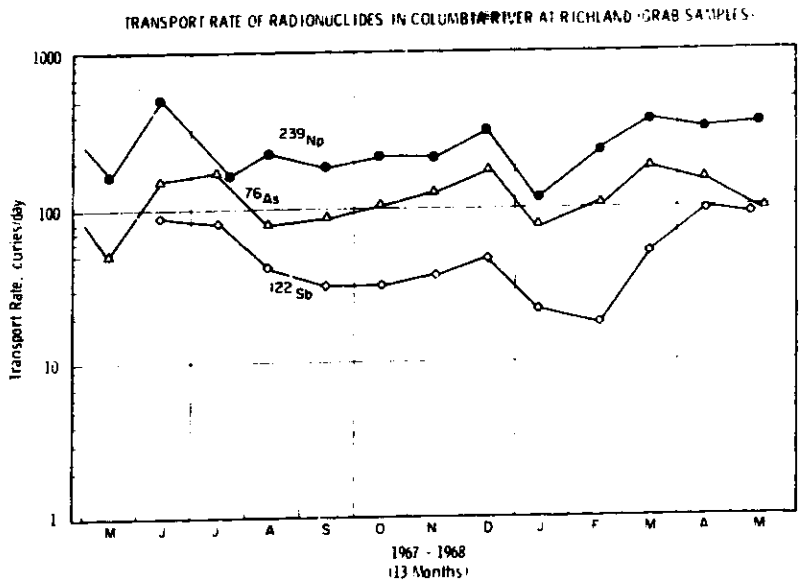

Figure 7

Transport rates for several radionuclides are calculated from concentrations measured at Richland and Columbia River flow rates measured at the Priest Rapids Gauge Station. The average transport rates for ^{51}Cr, and ^{65}Zn were below the comparable values for a year ago. The lower ^{65}Zn transport is attributed to the delayed appearance of the annual flood and consequent scouring of previously deposited ^{65}Zn on the river bed.

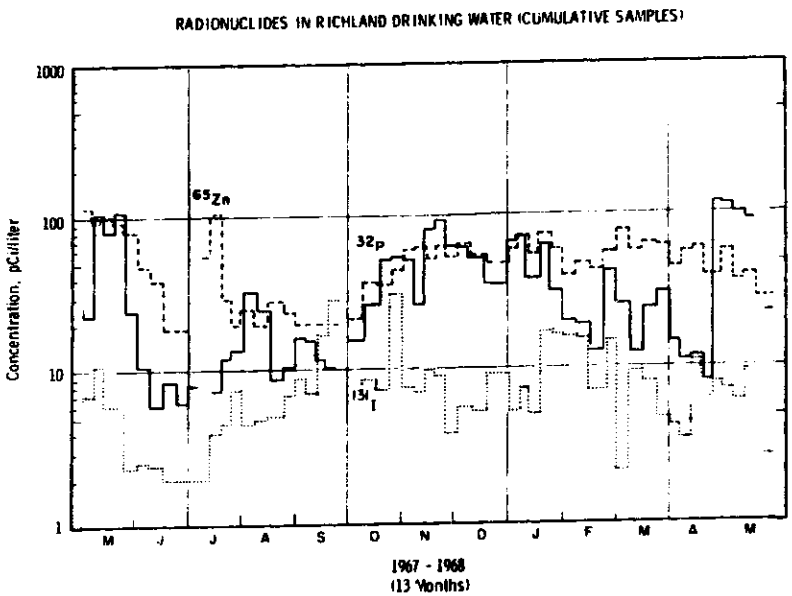

Figure 8

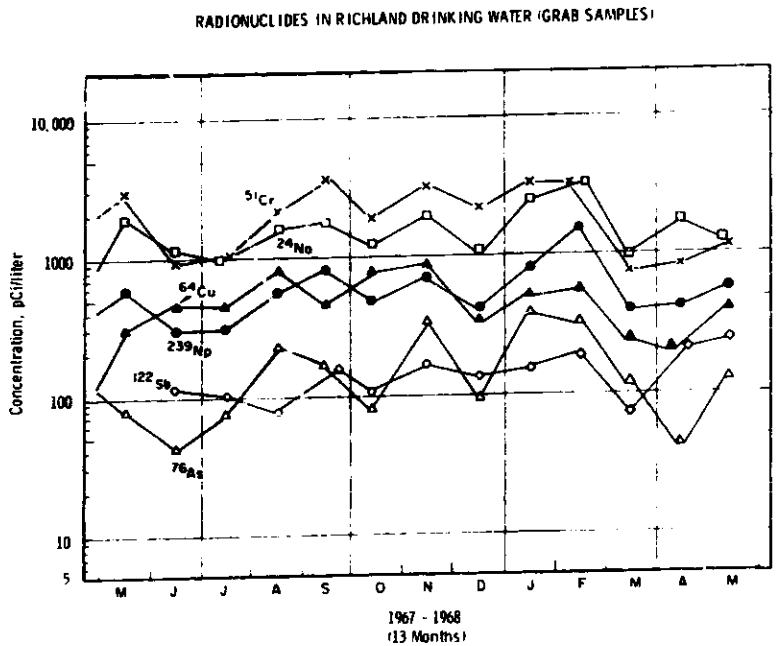

Figure 9

The concentrations of ^{51}Cr and ^{65}Zn in May samples of Richland drinking water were slightly below the comparable values for 1967. ^{32}P concentrations were at higher than expected levels in May, 1968.

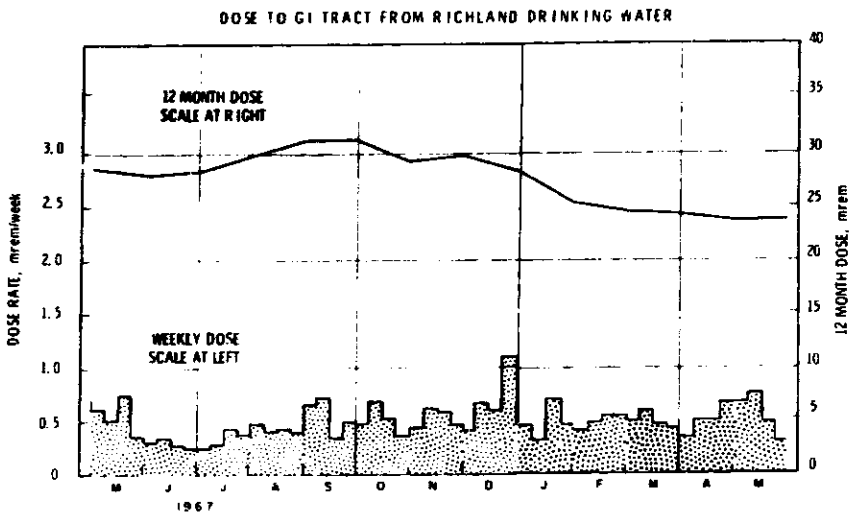

Figure 10

The cumulative 12-month dose to the GI tract from Richland drinking water was estimated to be 24 mrem through May, 1968, compared to 28 mrem through May, 1967. Estimates were based on an assumed intake rate of 1.2 ℓ/day.

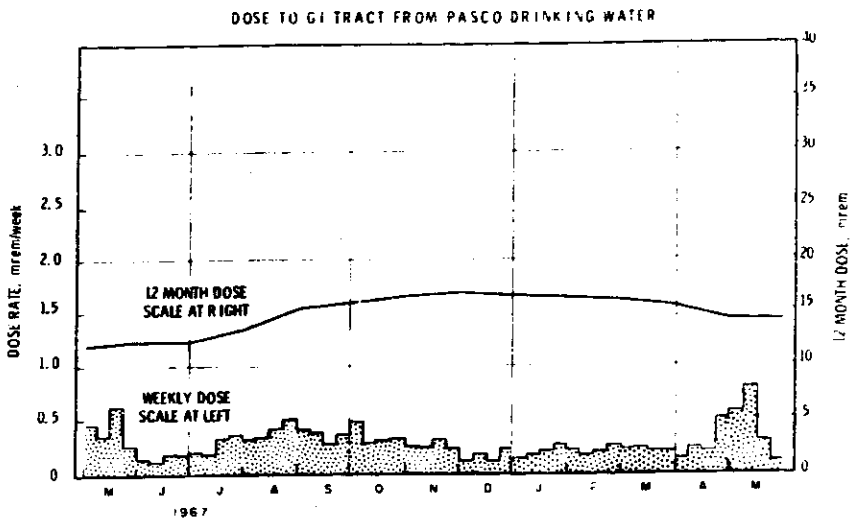

Figure 11

Through May, 1968, the cumulative 12-month GI tract dose from Pasco drinking water was 14 mrem compared to 13 mrem through May, 1967. The lower cumulative 12-month dose last year included the effects of reactor shutdown during the 1966 strike. Estimates were based on an assumed intake rate of 1.2 ℓ/day.

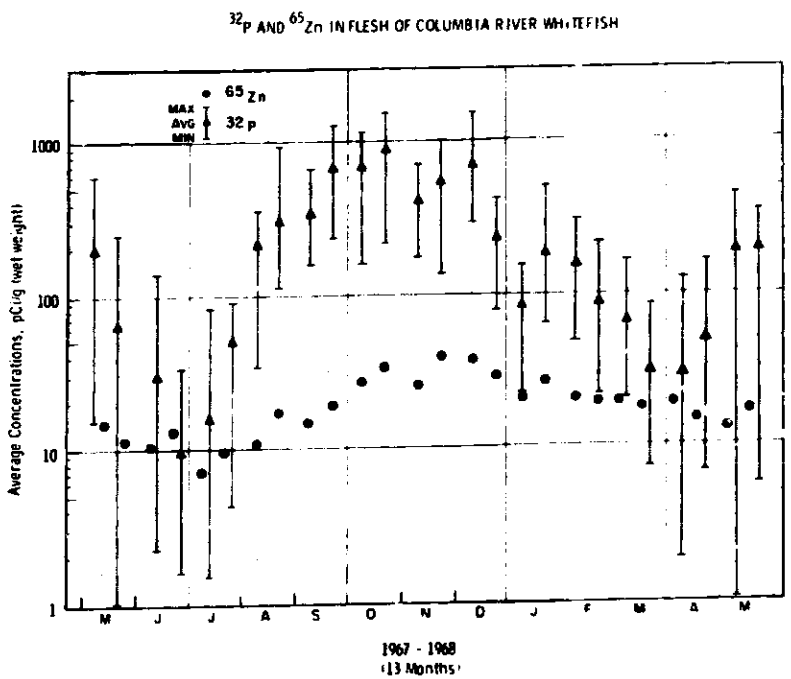

Figure 12

Columbia River whitefish are collected twice monthly from the stretch of the river above Richland. During May, 1968, average ^{32}P and ^{65}Zn concentrations were not significantly different from 1967 experience.

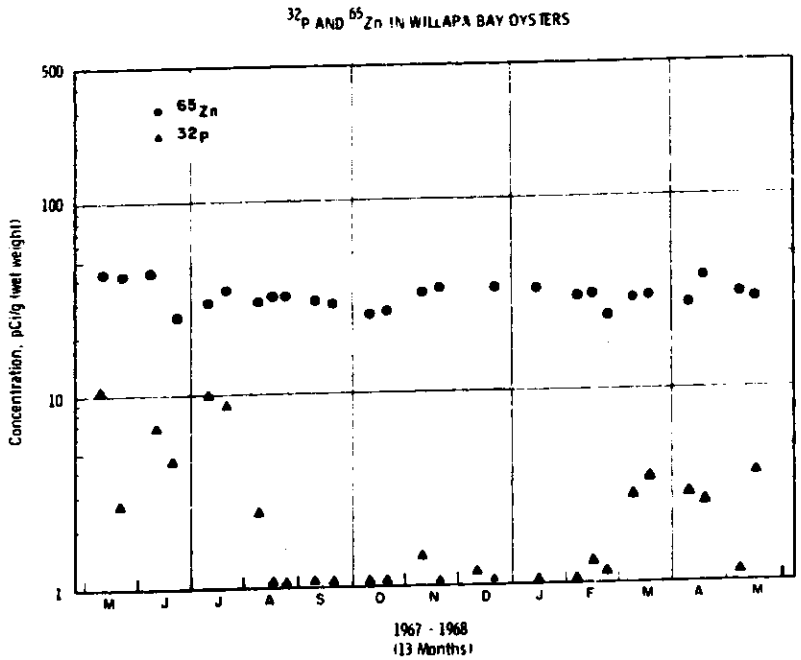

Figure 13

Both ^{32}P and ^{65}Zn concentrations in Willapa Bay were slightly lower than the concentrations observed a year ago.

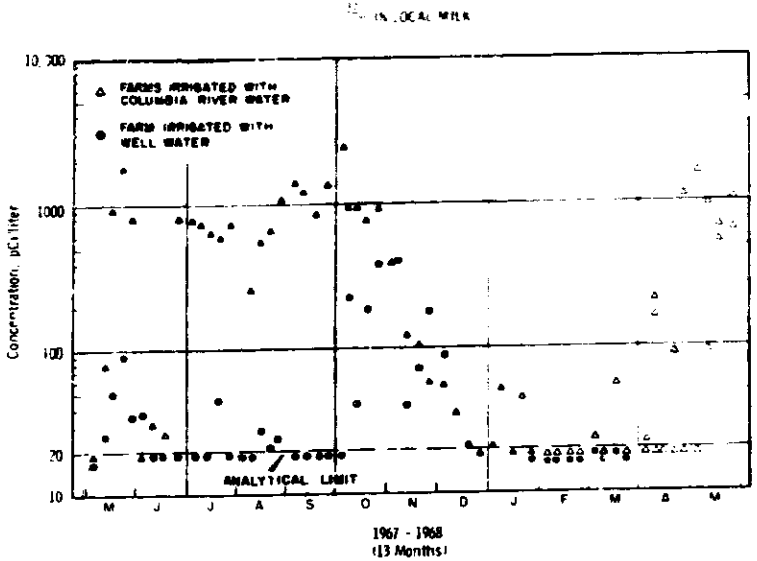

Figure 14

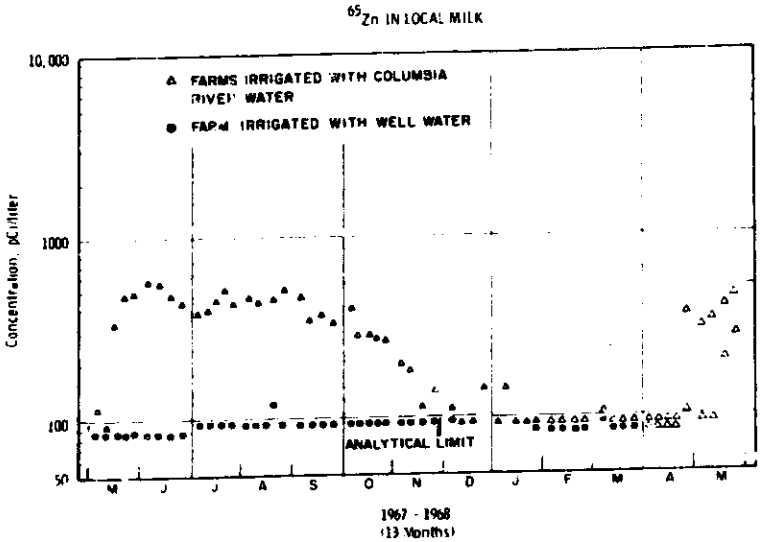

Figure 15

Seasonal use of Columbia River water for irrigation of pasture land results in the presence of ^{32}P and ^{65}Zn in some local farm milk. The analyses of milk samples from farms in the Riverview district are designated as "Farms Irrigated with Columbia River Water" in Figure 14 and 15. During May, ^{32}P and ^{65}Zn concentrations were generally at levels typical of the irrigation season.

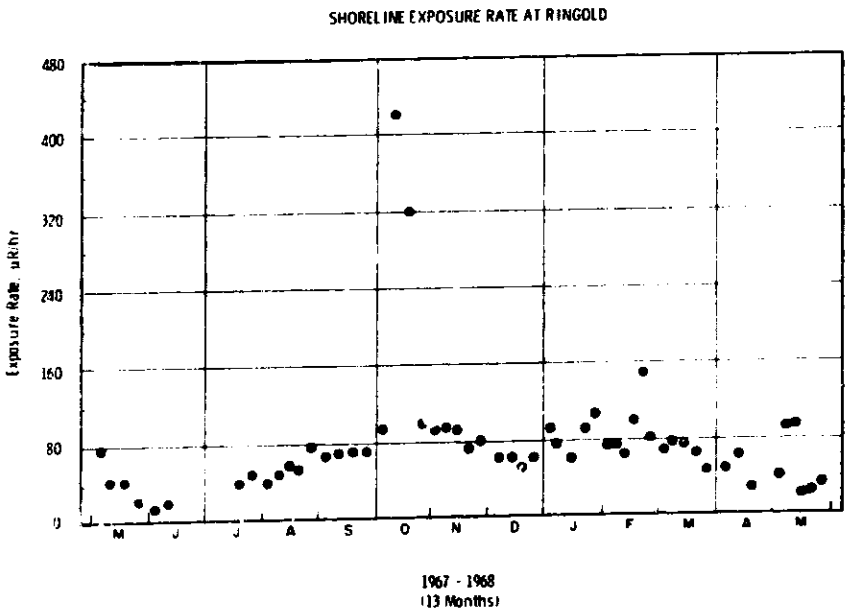

Figure 16

Gamma radiation exposure rates at the Columbia River shoreline are measured with a 40-liter ionization chamber, whose response is interpreted in terms of uR/hour (radium-gamma calibration). The measurements are made 3 feet above ground, thus approximating the dose rate to the gonads of a person standing on the riverbank. The Ringold location is near the furtherest upstream point of public access.

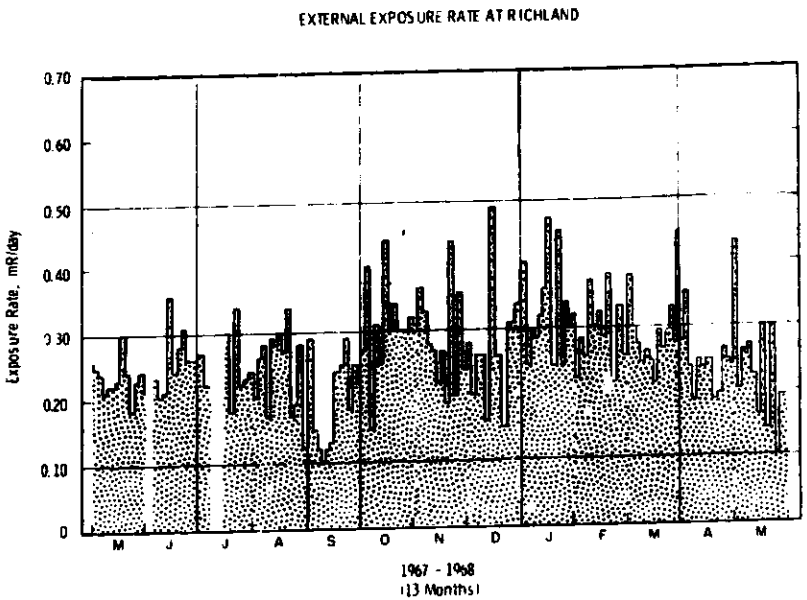

Figure 17

External gamma exposure rates in the city of Richland are measured with small ionization chambers. The average for May, 1968, was 0.23 mR/day. the measured exposure rates over the twelve months ending with May averaged 0.27 mR/day, the same as the comparable average for a year ago.

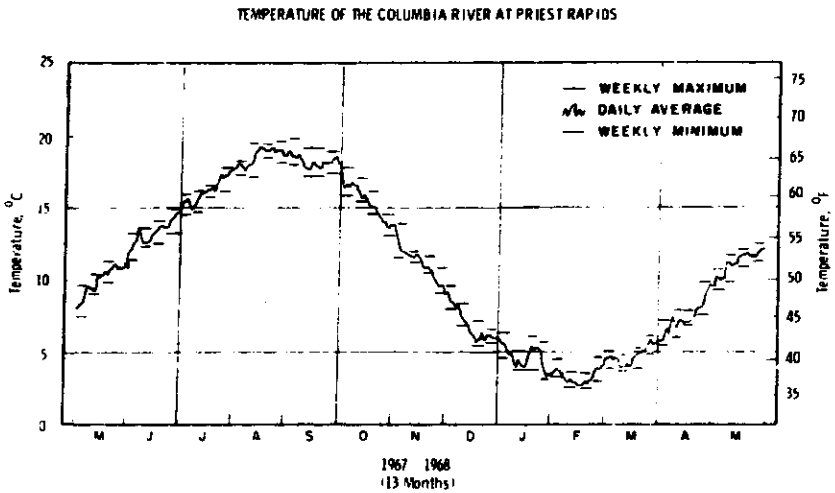

Figure 18

The temperatures plotted in Figure 18 are measured at the Priest Rapids Gauge Station.

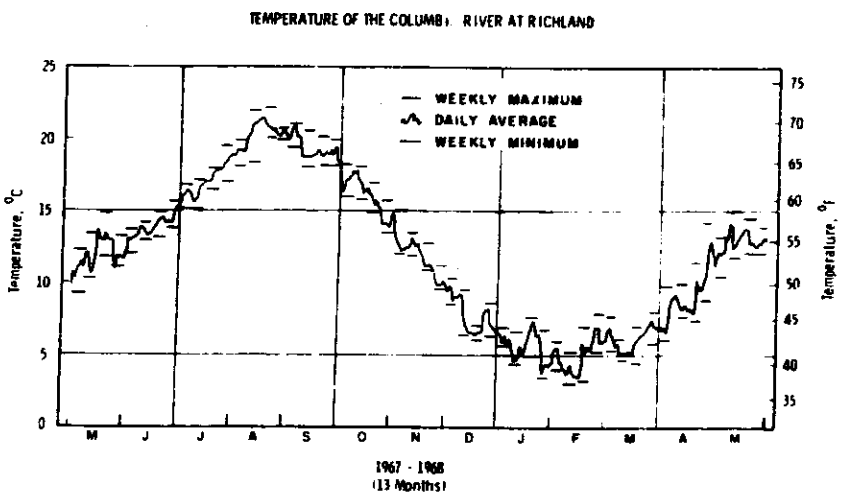

Figure 19

The temperatures plotted in Figure 19 are measured at the Richland Water Plant intake.

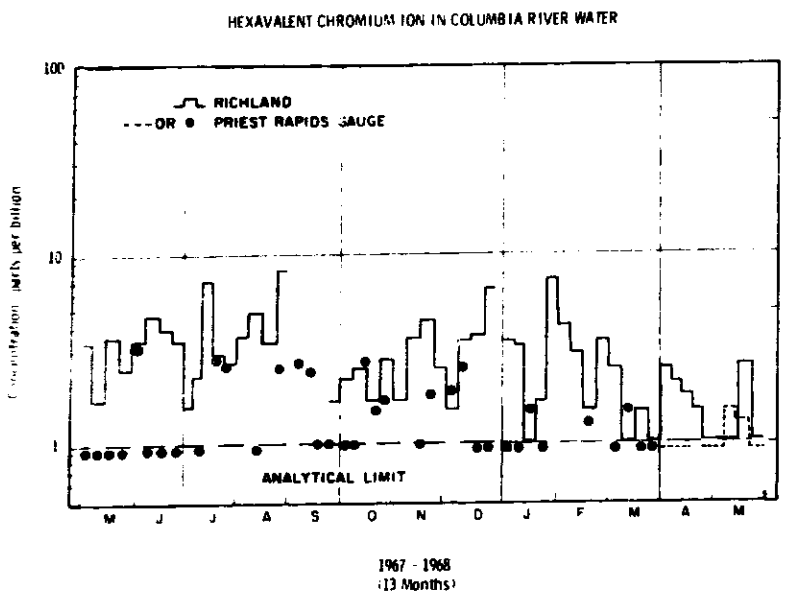

Figure 20

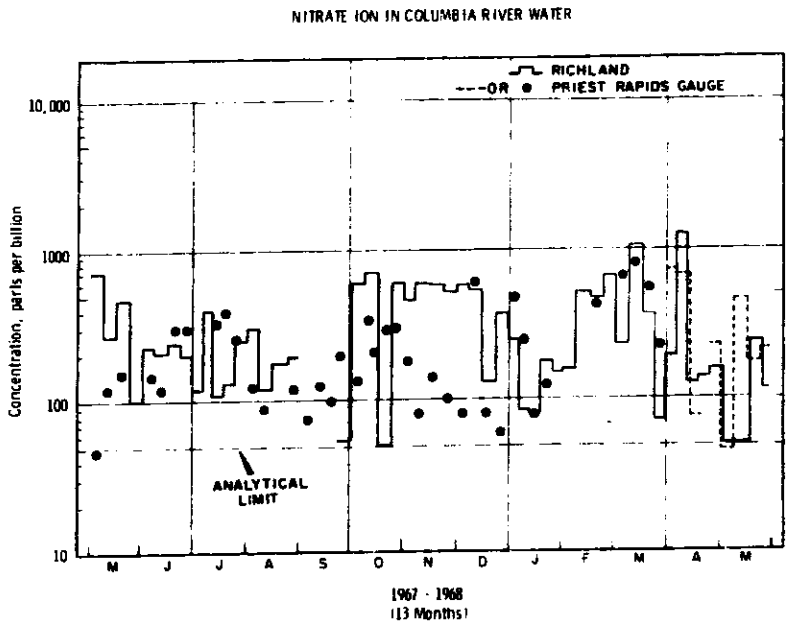

Figure 21

Concentrations of hexavalent chromium ion and nitrate ion were determined from grab samples at the Priest Rapids Gauge Station (upstream from Hanford) and from cumulative samples at the Richland Water Plant intake. Dichromate ion is added during the treatment process for reactor cooling water. Some nitrate ion from chemical wastes discharged to the ground may enter the river with underground water. For drinking water, the Public Health Service standards (1962) include concentration limits of 50 parts per billion as hexavalent chromium and 45,000 parts per billion as nitrate ion.

TABLE 1

CHEMICAL CHARACTERISTICS OF COLUMBIA RIVER WATER

Results for May, 1968, of analyses of river water collected at Vernita Bridge and the 100-F Area (above and below the productin reactors) as reported by Douglas-United Nuclear.

(results in ppm)

Vernita	Mg	Fe	Cu	Ca	SO_4	PO_4	Cl	Diss. O_2	Phth. Alk.	M.O. Alk.	Hardness	Solids
5-7-68	4	.03	.002	26	15	.08	.30	11.0	2	57	82	101
5-23-68	3	.02	-	26	12	.08	.25	12.2	1	58	79	94
100-F Area												
5-7-68	4	.03	.001	27	19	.12	.30	11.5	1	56	82	99
5-23-68	3	.01	.011	25	10	.04	.30	11.9	1	57	77	98

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