

Uranium and ²²²radon in Ground Water from Glacial and Bedrock Aquifers in the Northern United States

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Abstract

Regional occurrence and distribution patterns of uranium and ²²²radon were analyzed using data from 1,200 monitoring, public, and domestic drinking-water wells in glacial and bedrock aquifers throughout the northern United States. These data, collected as part of the U.S. Geological Survey National Water Quality Assessment Program, show that uranium and ²²²radon concentrations vary by source of aquifer materials and exceed drinking-water standards in localized areas.

Uranium concentrations greater than 1 microgram per liter (µg/L) were measured in 36 percent of 1,200 ground-water samples. Only 28 samples (2.5 percent) were above the U.S. Environmental Protection Agency's (USEPA) Maximum Contaminant Level of 30 µg/L; 82 percent of these samples were from monitoring wells in glacial aquifers in the western United States, and 18 percent were from domestic wells in the crystalline bedrock aquifers of New England and New Jersey. Uranium concentrations were highest in wells in glacial aquifers that are within sediments derived from predominantly Cretaceous deposits found in north central United States, the glacial aquifers in the Columbia Lava Plateau, and the crystalline bedrock aquifers of New England, New Jersey, and New York. High uranium concentrations also correlated with chemical constituents related to agricultural land use raising the issue that some of the uranium may be related to the use of recycled irrigation waters in the north central United States

²²²Radon concentrations exceeded the proposed USEPA drinking-water 2nd-option standard of 300 picocuries per liter (pCi/L) in 60 percent of nearly 1,200 ground-water samples. Ground water in bedrock and glacial aquifers in the Northeast, however, had ²²²radon concentrations exceeding the USEPA drinking-water 1st-option standard of 4,000 pCi/L. The highest concentration, 215,000 pCi/L, was from a domestic well in an intrusive igneous granite pluton in New Hampshire. ²²²Radon correlated positively with uranium, lead, and gross alpha in wells in the crystalline bedrock aquifers.