FRACTIONATION OF CESIUM ISOTOPES AND $^{90}$Sr IN SNOWMELT RUN-OFF AND LAKE WATERS FROM A CONTAMINATED NORWEGIAN MOUNTAIN CATCHMENT

B. SALBU,* H. E. BJØRNSTAD,* J. E. BRITtain**

*Isotope and Electron Microscopy Laboratories, Agricultural University of Norway, P. O. Box 26, N-1432 AAS-NLH (Norway).
**Freshwater Ecology and Inland Fisheries Laboratory (LFI), University of Oslo, Sarsgt. 1, 0562 Oslo 5 (Norway)

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Cesium isotopes and $^{90}$Sr have been determined in the inflow and outflow rivers of a Norwegian subalpine lake. The lake is situated in an area contaminated by Chernobyl fallout. Sampling was carried out during the spring peak discharge period associated with snowmelt. Transformed coarse particulate plant material was collected by traps. Particles and colloids were removed from water samples by hollow fibre ultrafiltration. The results illustrate that run-off during the spring snowmelt is an important pathway for these radionuclides. The cesium isotopes are predominantly transported as colloids, while $^{90}$Sr is present in the form of low molecular weight mobile species. Based on lake budget calculations, more than 50% of the cesium input is retained in the lake, while more than 90% of the $^{90}$Sr is transported through the lake and into lower parts of the drainage system.

INTRODUCTION

Fallout from Chernobyl reached Central Norway on 28 April 1986. The deposition of radionuclides was found to be very inhomogeneously distributed and hot particles have been identified (1, 2). In certain high mountain areas, such as Øvre Heimdal, regions of high deposition have been identified. Based on the observed ratio of $^{137}$Cs/$^{134}$Cs in soil and vegetation in the area, the fallout from nuclear weapons testing is of no significance (3, 4). Three years after deposition, the cesium isotopes ($^{134}$Cs and $^{137}$Cs) are still present in the upper soil layers (0-2 cm), while $^{90}$Sr seems more mobile. Based on sequential extraction (4), the cesium isotopes seem to be strongly associated with organic and mineral material, while strontium-90, however, is easily exchangeable (Figure 1). Only a few percent of the cesium isotopes are available for root uptake, while the
Relative distribution of radioactive cesium isotopes and $^{90}$Sr in the different extractions of soil samples (0-2 cm), Heimdalen, 1989.