

ACCUMULATION OF RADIONUCLIDES IN SEWAGE SLUDGE

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ABSTRACT

Monitoring of radioactivity in municipal waste water and sewage sludge has been common practise ever since the beginning of using radioisotopes on a broad scale in the early sixties. Accumulation of radionuclides in sludge may lead to radiation exposure of population by two major routes: incineration and use in agriculture.

While incineration is important for volatile nuclides, e.g. I 131, agricultural use is of interest for longlived radionuclides, particularly. In a research project accumulation of radionuclides in sewage sludge and elimination in waste water was investigated by simulation sewage treatment in an experimental facility on laboratory scale. Accumulation in sludge and elimination in waste water were measured for 30 radionuclides, predominantly gamma emitters. Additionally measurements were performed on samples of a municipal sewage plant where uranium effluents from fuel fabrication were released to. According to the results of the

study, elements and radionuclides may be grouped into three categories according to their accumulation behavior:

- 1) low accumulation factors (1000 l/kg dry weight) and elimination rates (10 %): Na, Rb, Cs, Sr, As, Sb, I
- 2) medium accumulation factors (3000 - 6000 l/kg dry weight) and elimination rates (50 %): Tl, Se, U, Nb, Mn, Tc, Co
- 3) large accumulation factors (6000 - 10000 l/kg dry weight) and elimination rates (90 %): Be, Sn, Pb, Ag, Au, Zn, Cd, Hg, Sc, Y, Ce, Gd, Cr, Fe.

After the reactor accident of Chernobyl the findings of the laboratory study were ascertained for fission products by a comprehensive monitoring program in two sewage plants and appended by an investigation of sludge incineration. It was shown that with the exception of I 131 all radionuclides were retained in ashes and filters to a large extent.