SEARCH FOR THALLIUM IN THE AREAS OF SOUTHERN POLAND BY MEANS OF BIOINDICATION METHODS

S u m m a r y

Thallium is a highly toxic element. For this reason it was applied in production of rodenticides and insecticides for many years. At present, after a ban on Tl rat poisons, it is used only in small amounts. At the beginning of the article, is presented the toxic impact of thallium at the molecular level, its cumulation in particular plant and animal tissues as well as its influence on the condition of individuals and populations. In vertebrate tissues the element cumulates mostly in kidneys and livers and causes very severe neurological, gastrointestinal and cardiovascular disturbances.

Despite its toxicity, thallium is an element very rarely studied in Poland and it is not under any routine monitoring. The research, carried out in the 1990-ties at the Department of Ecology, Warsaw University, in industrialised areas, allowed to point out several regions of the country which are seriously threatened by thallium, as well as to indicate direct sources of pollution. A two-step bioindication method was applied. Thallium concentrations were first measured in magpie feathers, and then in internal tissues of rodents. Polluted regions included mainly the surroundings of the zinc smelter "Boles³aw" in Bukowno near Olkusz and a non-ferrous metal smelter in Szopienice (district of Katowice). The thallium originated from post-floatation waste arising during Pb, Zn and Cd ore processing and stored in deposit reservoirs.

The study of many plants, fungi, invertebrates and rodents carried out afterwards at the Department of Ecology in both these areas pointed to Tl tissue concentrations distinctly exceeding those that are typical for unpolluted samples, i.e. 0.00X-0.X mg/kg dry weight. In Bukowno the highest values were found: in kidneys of rodents – up to 34.27 mg/kg, in *Arion* slugs – up to 33.48, in ovaries of frogs – up to 51.61 mg/kg. In Szopienice the highest values were found in earthworms – up to 35.1 mg/kg, and in bush crickets *Tettigonidae* – up to 83.6 mg/kg. Inhabitants of the villages living in the vicinity of the reservoir in Bukowno can be threatened with Tl pollution for example due to direct consumption of vegetables that contained 1.28–3.70 mg/kg d.w. of thallium.

The mentioned above regions, as well as areas near other ore smelters should be constantly monitored for thallium. This article proposes a range of preventive actions which would limit the influence of Tl pollution on humans and the environment.