



# Accumulation of Man-made Radionuclides by Mushrooms Nearby the Site for SNF and RW Temporary Storage in Andreeva Bay of Kola Peninsula



metlyayev@mail.ru

E.S. SHCHELKANOVA<sup>2</sup>, E.G. METLYAEV<sup>1</sup>, S.V. NATKHA<sup>3</sup>, Yu.A. SHCHAGIN<sup>1</sup>

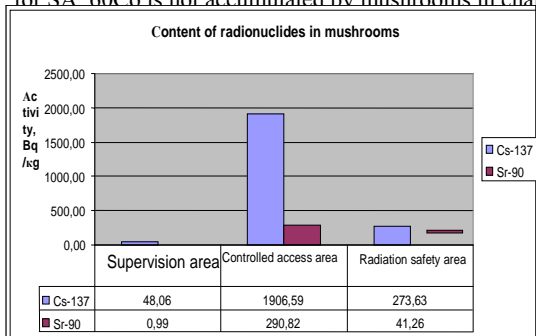
<sup>1</sup> Burnasyan Federal Medical Biophysical Centre, Moscow, Russia

<sup>2</sup> "Andreeva Bay" Facility, NWC "SevRAO", Zaozersk, Russia

<sup>3</sup> SRI of Industrial and Marine Medicine, St.-Petersburg, Russia

## Introduction

In the course of the examination, we got data on the contents of the main dose-forming man-made radionuclides (TENORM) <sup>137</sup>Cs and <sup>90</sup>Sr in the fruit bodies of different higher fungi of Basidiomycota. We found that mushrooms accumulate <sup>137</sup>Cs and <sup>90</sup>Sr, for which species dependence and species differences in the accumulation levels are evident. Data on <sup>137</sup>Cs and <sup>90</sup>Sr contents in all species of mushrooms gathered in different STS areas are shown in Fig.1. According to this figure, TENORM contents in mushrooms gathered in SA and RSA do not exceed the established Russian norms for <sup>137</sup>Cs and <sup>90</sup>Sr - 500 Bq/kg and 50 Bq/kg respectively. In mushrooms gathered in CAA <sup>137</sup>Cs and <sup>90</sup>Sr contents are twice higher than those for SA. <sup>60</sup>Co is not accumulated by mushrooms in charge, despite its 320 Bq/kg content in the CAA soils.

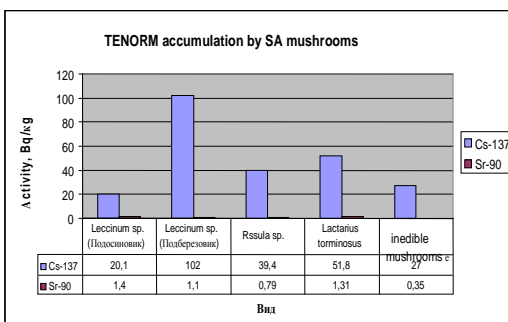


## Organization of sample examination

The sampling was being carried out in the period of mass gathering of mushrooms. Healthy young specimens were subject to gathering. In total, 15 samples of different specimens of edible and inedible mushrooms have been gathered. Among the inedible mushrooms, agarics specimens from basidiomycetes have been selected (unable to determine), as well as samples of the genus rain (*Lycoperdon* sp.). Among the edible ones, the mushrooms nutritionally significant for the residents of Zaozersk city have been gathered, such as orange-cap boletus (*Leccinum* sp.), brown cap boletus (*Leccinum* sp.), russulea (*Russula* sp.), sharp agaris (*Lactarius torminosus*). Samples of mushrooms were being examined using gamma spectrometry, radiochemistry and radiometry methods.

## TENORM accumulation by the CAA mushrooms

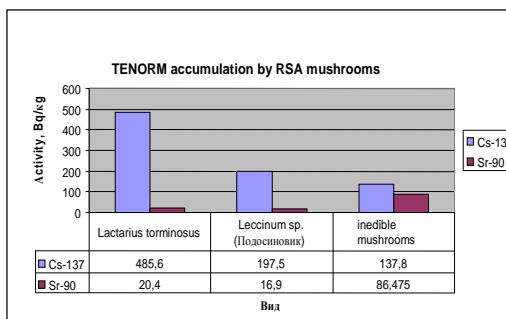
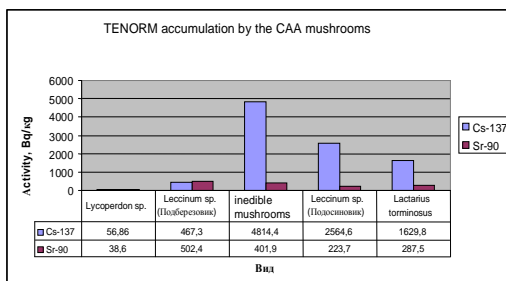
Radionuclide contents in all fungi species, except for the genus rain, exceed the established Russian regulations for <sup>137</sup>Cs and <sup>90</sup>Sr 500 Bq/kg and 50 Bq/kg respectively for any radionuclide. According to data provided by the Naval radiobiological laboratory over 1992, <sup>137</sup>Cs and <sup>90</sup>Sr contents in CAA are 32 Bq/kg and 1.5 Bq/kg respectively, i.e. much lower than the current indexes. This confirms the fact that SRW and LRW storage facilities impact on the environment and that engineering conditions of these storage facilities are inadequate.



## Material and Methods

### STS zoning

In order to assure radiation safety of workers and the public, the STS site and surrounding area is subdivided into the following zones: administrative and technical zones, health and hygienic zones.



## TENORM accumulation by RSA mushrooms

In the radiation safety area, *Lactarius torminosus*, *Leccinum* sp. and inedible agarics have been gathered. Figure 3 illustrates data on <sup>137</sup>Cs and <sup>90</sup>Sr contents. According to this figure, TENORM contents are not higher than the established Russian regulations, but <sup>137</sup>Cs content is the fruit bodies of *Lactarius torminosus* arrives to the limit – 485.6 Bq/kg.

## TENORM accumulation by SA mushrooms

In the supervision area such mushrooms were being examined as *Leccinum* sp., *Leccinum* sp., *Russula* sp., *Lactarius torminosus* and inedible agarics. The highest <sup>137</sup>Cs contents is typical for *Leccinum* sp. - 102 Bq/kg, and the lowest one – for *Leccinum* sp. – 20.1 Bq/kg. This reconfirms the wide intrageneric ability of TENORM accumulation. The highest <sup>90</sup>Sr has been registered for *Lactarius torminosus* – 1.31 Bq/kg, while the lowest – for *Russula* sp. – 0.79 Bq/kg.

## Conclusions

1. The dynamic monitoring of the radiation situation is required because of potential contamination of the STS area. Myco-indication can be one of the tools for radiation and environmental monitoring.
2. The examination performed by the authors found that SNF and RW STS activity dose not impact on the supervision area.
3. In the course of future studies within myco-indication, the samples of *Leccinum* sp. Are recommended to be used because their ubiquity, wide range of TENORM accumulation and the most significant food resource among mushrooms for the local public.