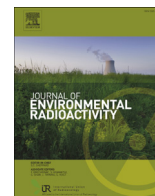




Contents lists available at ScienceDirect

Journal of Environmental Radioactivity

journal homepage: www.elsevier.com/locate/jenvrad ^{137}Cs and ^{90}Sr IN lizards of Semipalatinsk test site

A.V. Panitskiy*, S.N. Lukashenko, N.Zh. Kadyrova

Institute of Radiation Safety and Ecology of the NNC RK, Kurchatov, Kazakhstan

ARTICLE INFO

Article history:

Received 31 October 2015

Received in revised form

18 April 2016

Accepted 25 April 2016

Available online xxx

Keywords:

Radioecology

Radionuclides

 ^{137}Cs ^{90}Sr

lizards

Concentration ratios

The paper provides research results of ^{137}Cs and ^{90}Sr radionuclides concentrations in bodies of *Lacertidae* family lizards, inhabiting different parts of Semipalatinsk Test Site, and the parameters of these radionuclides' transfer into lizards' bodies. It shows that high activity concentration of radionuclides in lizards' bodies can be noticed if they live directly at locally contaminated areas. Since the distance from contaminated spots exceeds home range of the studied animals, no increased values of radionuclides' activity were found in the animal bodies. At some individual radioactively contaminated spots, very high activity concentrations of ^{90}Sr radionuclide up to $7.8 \times 10^5 \text{ Bq kg}^{-1}$ were found in lizards. So under certain conditions, lizards can significantly contribute to radionuclides redistribution in the natural environment.

Mean concentration ratios (CR) of radionuclides were as follows: ^{137}Cs — 6.2×10^{-3} , ^{90}Sr — 1.1×10^{-2} .

© 2016 Elsevier Ltd. All rights reserved.

1. Introduction

Tests of nuclear weapons and radioactive substances for military purposes at the territory of Semipalatinsk Test Site (STS) formed the spots with high activity concentrations of radionuclides in natural environment (soil, vegetation, water). Mainly, such spots are associated with epicenters of nuclear explosions at the “Experimental Field” site (where surface nuclear explosions were performed), channels of radioactively contaminated streams running out of testing adits at Degelen site (Panitskiy and Lukashenko, 2015), venues of warfare radioactive agents (WRA) testing at “4” and “4A” sites as well as venues of underground excavation explosions—“Atomic Lake”, “Telkem 1”, “Telkem 2” (Fig. 1). Radioactive contamination of the test site territory was also formed by “plumes” from radioactive clouds generated by the tests (Larionova and Lukashenko, 2013).

Since high activity concentrations of artificial radionuclides were found in soils, vegetation and water of these territories, assessment of artificial radionuclides activity concentration in bodies of animals constantly inhabiting these territories and living in holes digged in radioactively contaminated soil are of some interest. At the territory of radioactive fallouts from Chernobyl accident, and in the passage zone of Eastern Ural radioactive plume,

high values of radionuclides' activity concentrations were found in bodies of animals which had close contact with radioactive grounds: soil fauna, fossorial mammals (mice, rats and etc.), amphibians (toads, frogs and etc.), reptiles (lizards, snakes) (National report, 1998, Lukashovich, 2010). All the listed above animal species can be found at the STS territory—however the most widely spread are lizards. Therefore, reptiles of *Lacertidae* family were chosen as an object of research in this work.

A variety of their biological peculiarities (including relatively long individual life, sedentary life, close association with the substrate, limited range of activity, high abundance, stability of the basic populational characteristics, simplicity of entrapment and observations) make them useful for bioindication and bio-monitoring (Semenov, 2001). They also have a role in the food chain of predator animals and birds.

Various models for assessment of radiation exposure of wild animals have now been developed (Beresford et al., 2008). However, there is still a lack of experimental data in the assessment of parameters of radionuclides transfer into reptiles bodies.

The objective of this paper is to characterize the radioecological state of *Lacertidae* family representatives which inhabit STS and to obtain some parameters of radionuclides transfer into lizards' bodies for further use in assessment of possible risks for biota.

Data provided in the work was collected in 2006–2013 within the frame of the ISTC K-759 international project and the state programs of the Republic of Kazakhstan.

* Corresponding author.

E-mail address: Panitskiy@mail.ru (A.V. Panitskiy).

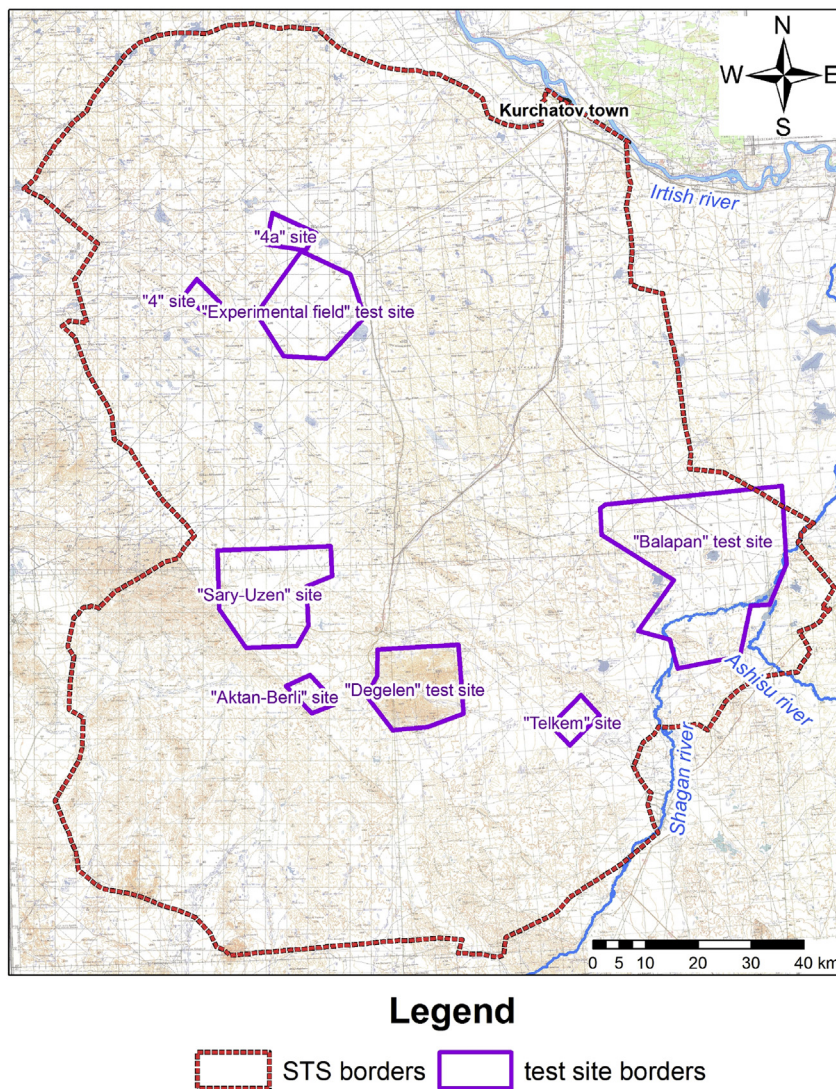


Fig. 1. STS testing sites.

2. Methods

2.1. Objects of research

A sand lizard *Lacerta agilis Linnaeus*, a representative of *Lacertidae* family and widespread at the STS territory, was chosen as an object of research. The biological peculiarities of this species are well studied. The sand lizard is moderate large lizard with a body length of up to 114 mm and one and half or twice longer tail. It mainly inhabits dry biotopes sufficiently warmed up by the sun (Dujsebajeva et al., 1999, Khromov, 1999). Home range of these animals is about 40 m.

The systematic position of the species is given in the table below (Table 1).

For shelter they use holes of rodents, cavities in the rocks, old

stumps, brushwood gorges as well as holes they make themselves with a depth of up to 70 cm. Lizards can climb on to low bushes and trees, and sometimes they use hollows in trees trunk as shelters. At the STS territory, besides natural landscapes, sand lizards also inhabit zones where anthropogenic activities take place. After winter they appear on the surface in March–April. Lizards mainly consume insects and maggots. They typically consume bugs, butterflies, lepidopteran larva, orthopteran insects, dipterous insects, hemipterans, hymenopterans, dragonflies, as well as spiders, pill bugs, earthworms, mollusks, etc. They also eat small lizards and their own offspring. They can swallow soil particles containing radionuclides when eating.

2.2. Sampling

The reptiles were caught with a hoop net. The weight of the lizards varied within the range of 5–13 g. The average weight was approximately 7 g.

Animals were caught at the following areas:

- “background” parts of the STS beyond the testing grounds. Activity concentrations of radionuclides in the top soil of

Table 1
Systematic position of sand lizard.

Class	Order	Family	Genus	Species
Reptilia Reptiles	Squamata (Scutal)	Lacertidae (Old-World lizards)	<i>Lacerta</i> (Lizards)	<i>Lacerta agilis</i> (Sand lizard)

Download English Version:

<https://daneshyari.com/en/article/5477630>

Download Persian Version:

<https://daneshyari.com/article/5477630>

[Daneshyari.com](https://daneshyari.com)