

Keywords: uncertainty of measurements, entrance sizes, result of measurements, standard uncertainty, expanded un-certainty, analysis of correlations.

Nowadays the development of science and production, international cooperation is a prerequisite for further development, as well as the exchange of experience, methods and data. Before the international society arose the question about the need to compare, compare the methods of conducting tests and measurements. Moreover, today any testing area needs to evaluate the accuracy and accuracy of the measurements.

The concept of "uncertainty" in measurements, as quantified in terms of the measurement accuracy, is relatively new in the history of measurements, in contrast to the terms, error and error analysis, which have long been used in the practice of metrology.

With the adoption of the international standard ISO / IEC 17025: 1999, requiring the competence of testing and calibration laboratories, the requirements for uncertainty assessment in accredited laboratories have become international.

In order to facilitate cooperation between laboratories and agencies on accreditation, mutual recognition of measurement results and harmonization of national requirements and procedures with international ones in the Republic of Belarus, the national standard STB ISO / IEC 17025-2002 was introduced from 01.01.2002, which is an authentic text of the international standard mentioned above.

The purpose of this work is to study the sources of literature describing methods for estimating the uncertainty of measurements, calculating the uncertainty estimate for the example of monitoring the microbiological purity of purified water, determining the range of values within which the true value lies, i.e. the true value of the microbiological purity of the water purified in a certain range.

Next the procedure for estimating uncertainty by the example of the control of microbiological purity of purified water for the production of solid dosage forms No. 3 (production site No. 3) of JSC Borisov Medical Products Plant was performed.

The total standard uncertainty u_c was determined by the experimental standard deviation of the intra-laboratory reproducibility and the repeatability of the final test result. The extended uncertainty U is derived from the total standard uncertainty u_c with a coverage factor of k in the value of 2 to approximately correspond to a confidence level of 95 %. It was found that the expanded uncertainty U is equal 4.7.

GEOREACTOR AND ITS IMPACT ON THE ENVIRONMENT

I. Shturo, S. Korney, O. Boyarkin

Belarusian State University, ISEI BSU,

Minsk, Republic of Belarus

irina.shturo@mail.ru

Considering the hypothesis of the existence of a nuclear reactor in the bowels of the Earth, the method of search of georeactor, as well as considering the effects of georeactor on the environment

Keyword: georeactor, inversion of the magnetic field, neutrino, geoneutrino, a radioactive element, a nuclear chain reaction, isotopic composition, neutrino detector, liquid and solid core nucleuses.

What prompted the person to think about the existence of a powerful energy source inside the Earth? One of the answers to this question can be associated with the inversion of Earth's magnetic field, with the occurrence of volcanic activity or with a gradual increase in temperature with depth observed at drilling ultradeep wells.

The geophysicist J. Marvin Herndon has hypothesized about the existence of georeactor in the bowels of the Earth, which proves that the accumulation of uranium and thorium, can occur a nuclear chain reaction .

One of the methods for finding a georeactor is the analysis of fission products migrating from the reaction zone and reaching the earth's surface. In particular, this is the isotopic composition of helium. In the air per million atoms of 4He there is only one and a half atoms of 3He . But in the basalts of the mid-ocean ridges, the isotope 3He is more than 8 times larger. In ordinary radioactive decay only 4He is produced. When the reactor is operating, heavy nuclei, absorbing the neutron, become unstable and can be divided into two large fragments with the emission of light charged particles and 2–3 neutrons. This reaction can be written as: $^{235}\text{U} + n \rightarrow ^{131}\text{Xe} + ^{99}\text{Tc} + 4\text{He} + 2n$. In reactions of a somewhat different type, tritium is formed: $^{235}\text{U} + n \rightarrow ^{132}\text{Cs} + ^{99}\text{Tc} + 3\text{H} + 2n$. Radioactive tritium, in turn, decays, emitting an electron (β decay) and antineutrinos, with the formation of 3He :



In 2005, scientists from the Institute of Hydrodynamics of the SB RAS (Novosibirsk) and the Institute of Physics and Power (Obninsk) numerically simulated various models of operation of georeactors. The time of the beginning of the simulated processes is 4 billion years ago. The calculations were different. The probabilities of both the existence of a georeactor to the present time and the cessation of its activity are equal.

Studies on the neutrino detector KamLAND (Japan) led to the detection of antineutrinos from the interior of the Earth – geoneutrinos. Lack of experiments on KamLAND: they cannot determine the distance to the source of particles, but only the direction. The solution of the problem was the project of integration of four neutrino detectors on four continents – in Japan, Canada, Italy and Antarctica. A network of neutrino detectors will allow to establish the exact location of antineutrino sources (georeactors) inside the Earth.

When considering the impact of a georeactor on the environment, it is important to consider three factors: cosmic rays, the Sun and Earth itself. The nucleus of the Earth is divided into a solid internal and external liquid. On the boundary between the liquid and solid nuclei, according to the hypothesis of Professor Rusov, a chain nuclear reaction takes place, which is accompanied by the release of enormous energy. Angular rotation speeds of nuclei and lithosphere are different. This difference affects the climate processes. As the nucleus velocity changes, the lithosphere begins to accelerate the rotation. As a result, friction with the atmosphere occurs, it is accompanied by the release of heat. The power of the georeactor will increase with increasing temperature in the zone of its operation.

At the current level of development of methods for detecting antineutrino allows to talk about georeactor still premature. However, with the improvement of experimental techniques and the creation of more accurate detectors to allow timely warn of imminent planetary danger.

BIBLIOGRAPHY

1. *Rusov, V. D., et al.* J. Geophys. Res. 112 (2007).
2. *Anisichkin, V. F., Bezborodov, A. A.* Nuclear furnace of the Earth, 2009.

CHRONIC IRRADIATION OF SCOTTISH PINE TREES (PINUS SYLVESTRIS) IN THE NAROVLYANSKY AND VETKOVSKY PHYTOCENOSSES: DOSIMETRY AND RADIOBIOLOGICAL EFFECTS

V. Kovalev, N. Goncharova

*Belarusian State University, ISEI BSU,
Minsk, Republic of Belarus
goncharova@iseu.by*

The purpose of the research is to identify the effects of chronic internal and external radiation exposure for components of terrestrial ecosystems, a comprehensive study of Scottish pine trees. The experimental plan included over 30 young trees (up to 20 years old) selected from areas with varying levels of radioactive contamination. These pine trees were planted after the 1986 Chernobyl disaster mainly to prevent radionuclide resuspension and soil erosion. For each tree, the major morphological parameters and radioactive contamination values were identified. Cytological analyses were carried on for the selected trees representing all dose rate ranges. Dose rate/effect relationships for morphological changes and cytogenetic defects were identified and correlations for radiation effects occurring on the morphological and cellular level were established.

Keywords: Chernobyl, plant uptake, dosimetry, radiation effects.

In this research, quantitative dose rate/effect correlations were analysed for morphological and cytogenetic changes in Scottish pine trees exposed to chronic irradiation. Dose rates of 0,8 $\mu\text{Gy h}^{-1}$ and 39 $\mu\text{Gy h}^{-1}$ caused disappearance of the apical dominance in 10 % and 50 % of the sampled trees, respectively. This morphological effect and related to suppression of development can affect evolution of specific ecosystems in the experimental region, which probably has to be taken into consideration for the establishment of the predicted, no effect dose rate values and similar values for terrestrial ecosystems. Morphological changes are displayed to originally occur when the trees are 4–8 years old, with a weak correlation between dynamics of their occurrence and the dose rate. Moreover, a connection was established between cytogenetic changes in cells of the seed germs and the upper meristem and morphological changes in trees. A possible mechanism explaining the influence of radiation induced morphoses was proposed based on the major empirical data obtained Chronic irradiation of Scottish Pine Trees (*Pinus Sylvestris*) in the experimental region during the researches, which support the assumption that the observed morphological changes result in certain genetic changes in cells of the apical meristem of the Scottish pine trees.