



**Международная научно-практическая конференция  
«Физико-технические проблемы в науке, промышленности и медицине»  
Секция 6. Актуальные вопросы ядерного нераспространения, безопасность и  
экология ядерной отрасли**

**REMOTE CONTROL OF AN INTERNAL SAFETY BARRIERS STATE OF SHUT DOWN IUGR**

A.O. Pavliuk<sup>1</sup>, S.G. Kotlyarevsky<sup>1</sup>, E.V. Bespala<sup>2</sup>, A.M. Izmetiev<sup>1</sup>

<sup>1</sup> JSC «Pilot and Demonstration Center for Uranium-Graphite Nuclear Reactor Decommissioning»,

Russia, Tomsk region, Seversk, Avtodoroga, 13, 636000

<sup>2</sup> Tomsk Polytechnic University

Russia, Tomsk region, Tomsk, av. Lenina 30, 634050

E-mail: [bespala\\_evgeny@mail.ru](mailto:bespala_evgeny@mail.ru)

At the present time 13 Industrial Uranium-Graphite Reactors (IUGR) in Russia are at stage of preparation for decommissioning and stage of decommissioning.

There is «Concept of decommissioning of IUGR by variant of radiation-free burial on a place» approved 12.28.2009. According of this concept safety during decommissioning of IUGR is carried out by reliable isolation of solid radioactive waste (SRW) in the territory of placement of IUGR. Therefore, radiation safety of staff, population and environment for entire period of potential danger are provided.

Implementation of pilot project is finished on a base of JSC «PDC UGR» for realization of this concept. Closing stage of this project is creation of internal barriers of safety by void-free filling of cavities by friable barrier materials in reactor spaces and technological placements [1,2].

Damaging of integrity of safety barriers because of external influences of natural or technogenic origin can lead to contact of radwaste with water and migration of radionuclides out of stopped IUGR. Therefore, it's necessary to control a state of created internal safety barriers using remote (nondestructive) methods. In this case tightness of object will be kept.

Method of control of internal safety barriers in burial ground of IUGR is developed and tested by staff of JSC «PDC UGR» developed and [3]. According to this method, inspection channels are installed in various places of reactor during decommissioning of IUGR. This channels are used for radiation logging, which widely applied in geophysics. For control of internal metalware position use gamma-logging, for identify places of shrink barrier materials and drowning use pulsed neutron gamma and neutron-neutron logging.

The inventive method allows to organize a system of control of cavities formation and drowning in the event of their occurrence. Moreover, this method makes it possible to determine possible changes position the main structure of the reactor during a long period of conservation (burial).

#### REFERENCE

1. Izmetiev A., Pavliuk A., Kotlyarevsky S. Application of void-free filling technology for additional safety barriers creation during uranium-graphite reactors decommissioning // *Advanced Materials Research*. – 2015. – V.1084. – PP. 613-619.
2. Pat. 2015112186 RF.MPK14 G21C11/00 Method of void-free filling of the reactor space during the decommissioning of Uranium-Graphite nuclear reactor / A.M. Izmetiev, E.S. Paderin, A.O. Pavliuk, E.V. Bespala, S.G. Kotlyarevsky. St. 05.04.2015. – 16 P.
3. Pat. 2015103823 RF.MPK14 G01V5/12 A method for controlling the stability of the internal security barriers in placement of preservation uranium-graphite reactor // A.M. Izmetiev, E.S. Paderin, A.O. Pavliuk, E.V. Bespala, S.G. Kotlyarevsky. St 05.02.2015. – 19 P.