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The prospects for the application of the new generation neutron logging system developed by Rusburmash Inc (Russia) for handling geotechnical issues at sandstone-hosted uranium deposits

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In 2011-2013 Rusburmash Inc was developing AINK-49 new generation hardware system for fission neutron logging. The work was completed using the financing provided by and upon the Technical Assignment from Atomredmetzoloto JSC as part of the Research and Development Plan. The system was developed with the involvement of the Russian leading scientific and manufacturing companies in this field.
The relevance of the system is based on the fact that Rusburmash Inc is one of the leading Russian companies involved in the exploration and preparation of sandstone-hosted uranium deposits for ISR mining.
The peculiarity of these deposits consists in the complex radiological environment which is additionally subjected to complex and uncontrolled production-induced changes in the process of leaching. In such conditions the application of prompt fission neutron (PFN) logging has a promising outlook that has no alternative for operation in the conditions of altered ore as a result of production. This method is designed for the direct determination of uranium mass fraction within the drill hole environment. It is based on creating a neutron flux using an impulse neutron generator and recording of secondary neutrons produced in the natural environment under the influence from the generated neutrons.
In addition to PFN logging the developed system features impulse neutron-neutron logging technique using thermal neutrons. This allows determination of ore in-situ moisture content and considerably increases the reliability of uranium mass fraction determination owing to the precise account of the moisture content. Availability of a pulsed neutron-neutron logging channel makes it possible to assess the coefficient of ore clay content, to reliably and reasonably define sub-economic ore types by permeability.
The system has a range of advantages compared to similar tools. Application of new neutron generators increased the output of the neutron flux, increased the life of the generator up to 250 hours and reduced the downhole tool diameter to 49 mm. This significantly broadens the scope of the equipment application due to the possibility of using it in small diameter holes (60 mm) and cased holes. Logging speed can be increased to 60 m/hour (instead of 30-45 m/hour) as well as significantly reduce operational costs.
The hardware complex provides reliable results in a complex radiological environment including the areas subject to alteration due to ISR operations. Therefore, in addition to handling exploration issues, the complex can become widely used in the operational and mined-out ISR sites to monitor the leaching process, to provide on-going control of the applied ISR process flowsheet performance, to assess uranium in-situ recovery performance and recovery level from the production-induced areas of uranium re-deposition.

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