

Impact of uranium mines water treatment on the uranium and radium behaviour.

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Uranium has been mined in the Limousin area (France) until the end of the 90's. Nowadays mines are closed and environmental monitoring is conducted by the former operator (AREVA-NC) under the control of the French administration. In the year 2006, the French safety authority board has created a pluralist expert group (GEP) that enjoin experts, stake holders and government representatives, to improve the environment protection concerning the process of uranium mines closure and rehabilitation. A part of the work is devoted to the study of mines as radionuclides sources and to the transport of radionuclides in the environment. According to regulation, site waters must be collected, and when necessary treated, before being released into the environment. Those waters constitute the main vector of radionuclides transportation. Several previous studies revealed an accumulation of radionuclides in lake sediments downstream mines inputs. This phenomenon is illustrated on the Ritord watershed; in an artificial lake created only few kilometres downstream one of the main treated mine waters release. To identify the mechanisms of the radionuclides accumulation in sediments, the GEP has investigated, through the environmental survey database, the water treatment efficiency and the behaviour of ^{238}U and ^{226}Ra from mines to the river. It concluded that a part of particles containing ^{226}Ra produced in the water treatment station is not trapped but released to the river. The reduction of the water flow velocity where the stream enters the lake leads to the particles deposition. As a consequence, the water treatment station has been modified to reduce the particle outflow. The uranium and radium content on particulate, colloidal and dissolve fractions were then investigated over a year all along the treatment process as well as downstream the water release point. Results of this specific study would be presented.