

Levels of uranium-238 and radium-226 in the Kennebecasis River sediment (New Brunswick, Canada) as shale gas activities indicators and their environmental legacy.

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Since 2001, shale gas wells have been drilled and fracked in the Kennebecasis river watershed, New Brunswick, Canada. Even the production has remained limited for the last 20 years, engaged citizen from the local communities have raised their environmental concerns: for instance, they wonder about the environmental impact of a small radioactive fracking fluid reported in 2006 and its current legacy. In the summer 2021, 4 sedimentary cores (15 to 25 cm length) were sampled along the riverbank. A first one was realized upstream all existing shale gas wells, a second one at the spill site, a third one at the disposal site and the last one 40 km downstream. Uranium-238 and radium-226 were measured in both sediment solid phase and porewater to determine the level, the dispersion, and the mobility of the contaminants. Solely sediments located close to the disposal site were enriched with uranium-238 (~twice the local geological background). A secular disequilibrium between uranium-238 and radium-226 was also monitored suggesting an anthropogenic source of this radionuclide for this site. Using uranium as an indicator, dispersion of the pollution from the disposal site remained extremely limited but its environmental legacy is still measurable 15 years later. Influence of early diagenesis processes on uranium and radium geological cycle will also be discussed.