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Mineralogical characterization and uranium radioactivity of recent sediments from the Laguna del Cuervo, Chihuahua

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Abstract

The Sierra of Peña Blanca is found in the Aldama county region in the Chihuahua state, where most of the uranium natural deposits in Mexico are located. In the 1980s, mineral exploration was carried out with the molybdenum and uranium production by "Uranio de México (URAMEX)" company. However, in 1983, when the project was closed, the extracted and unprocessed ore was confined to rocky piles, exposing it to weathering. As a result, the runoff water that passes through the Peña Blanca reservoir accumulates at the bottom of the Laguna del Cuervo. Therefore, the mineral or dissolved uranium is transported and can potentially be deposited or precipitated in the sediments. In this work, the mineralogical characterization, the determination of the activity concentration of gamma-emitting radionuclides in a hyperpure germanium HPGe detector of the 238U radioactive series and the dating of a sedimentary core from the Laguna del Cuervo are exposed. It is recommended to apply a method to preserve the oxidation state of uranium in the samples, to be able to determine its speciation using X-ray absorption fine structure (XAFS) and X-ray photoelectron spectroscopy (XPS) techniques.

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