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Plutonium losses reduction during the separation of precipitating elements from SNF solutions before extraction processing

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Introduction
When dissolving highly burnt spent nuclear fuel (SNF) with obtaining of solutions containing heavy met-als (HM) more than 300 g/L, there is a high probability of secondary precipitation, the composition of precipitants depends on the degree of nuclear fuel burnup and the conditions of its dissolution. When a zirconium molybdate precipitate is formed, a certain amount of plutonium is included in its composition. The amount of captured plutonium can exceed the allowable losses of nuclear materials (NM) and in-crease the radioactive waste class.
Plutonium losses reduction
When handling sediments containing molybdenum, you can use the operation to decompose zirconium molybdate in an oxidizing agent - hydrogen peroxide [1]. For the complete extraction of plutonium, the sediment should be treated in this way at least three times, the residual plutonium content in the sedi-ment being 0.01%. Leaching of plutonium (IV) from the zirconium molybdate precipitate with a solution of electrogenerated silver (II) does not lead to the extraction of plutonium from the precipitate.
A method was developed to reduce the amount of sediment-forming elements (molybdenum and zirco-nium) in SNF solutions by preliminary electrochemical oxidation of Pu (IV) to Pu (VI) in the presence of silver (II). Reduction of NM (plutonium) losses with the zirconium molybdate precipitate is achieved by preliminary electrochemical oxidation of Pu (IV) to Pu (VI) in the presence of silver (II), followed by the precipitation of zirconium molybdate precipitate with continued electrochemical oxidation. This method was tested on an installation designed to dissolve plutonium dioxide, located in one radiation-shielding chamber at the radiochemical plant of JSC SKhK using gram quantities of NM.
Conclusion
A method that allows reducing the amount of sediment-forming elements (molybdenum and zirconium) in SNF solutions by preliminary electrochemical oxidation of Pu (IV) to Pu (VI) in the presence of silver (II) was successfully developed.

Primary authors: Mr MURZIN, Andrey; SHADRIN, Andrey (Khlopin Radium Institute); RYABKOVA, Nadezhda (Russian Federation); DVOEGLAZOV, Konstantin (JSC "VNIINM"); Mr CHESHUJAKOV, Sergey; Mr KRUGLOV, Sergey; Mr TERENTYEV, Sergey

Presenter: RYABKOVA, Nadezhda (Russian Federation)

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