Contribution ID: **8** Type: **Poster**

Cementation of the Solid Radioactive Waste with Polymer-Cement Solutions Using the Method of Impregnation

Thursday, 15 May 2014 17:30 (1h 15m)

Cementation of the solid radioactive waste (SRW), i.e. the inclusion of solid radioactive waste in the cement matrix without cavities - is one of the main technological processes during the conditioning of the low and intermediate radioactive waste. The main task in the process of mixing the solid radioactive waste with the cement solution is to maximize the radioactive waste filling of the final compound, preserving the required regulated properties.
However, to achieve the desired quality of the final compound is possible only including a maximum finely dispersed solid radioactive waste (e.g., ash) no more than 20-30% of the weight.
In the FSUE "Radon" was developed and since 2003 has cemented the solid radioactive waste by using an industrialized method of impregnation. The technology is that the polymer-cement solution, having high penetrating properties, is supplied under pressure through a tube to the bottom of the container in which is preliminarily placed solid radioactive waste. The polymer-cement solution is evenly moving upwards through the channels between the particles of solid radioactive waste, fills the voids in the bulk volume of the waste and hardens, forming a cement compound, the amount of which is equal to the original volume.
On the cementing go various kinds of diverse sizes of SRW: large lump fragments of the retiring equipment, bulk material with a size of 1-30 cm, particulate materials such as soil or ash from the incineration of the SRW with particle size of 0.5-150 mm. Justified the technological parameters and the composition of the high penetrating polymer impregnation solution for the solid radioactive waste of different granulometric compositions.
It has experimentally confirmed that when moving the cement solution through a bulk layer of solid radioactive waste, the initial ratio of the liquid and solid phases of the solution changes. As the cement solution is a suspension, the dispersed in water solid particles, in the impregnation process can settle on the cemented material. This process can lead to the depletion of the cement content in the solution in the subsequent layers of the impregnated material, whereby therein will be the slurry with less cement with higher S / C ratio (e.g., the initial solution with S / C = 0.6, at the exit will be depleted liquid solution with S / C = 0.8-1.0), which ultimately leads to a deterioration in the quality of the resulting product.
In addition, the settling cement particles, at the entrance, fill the voids of the impregnated material and prevent the further conducting cementing process, even more depleting the cement penetrating in the subsequent layers of the solution.
It has been chosen a polymer, which is a stabilizing and water-retaining component of the cement slurry. It allows reaching a bigger mass transfer of the cement particles in the upper layers of the bulk volume of SRW. The experiments confirm that the polymer increases the permeability of the cement solution in 2-2.5 times, the fluidity in 1.2 times, the stability of the consistency in 1.5-1.7 times, and extends the operating range of the W / C ratio to 0.5-1.1. The report presents the experimental data and scientific justification of the process of cementation the solid radioactive waste by an impregnation method using polymer-cement solutions.

Primary author: Dr GORBUNOVA, Olga (FSUE "RADON")

Presenter: Dr GORBUNOVA, Olga (FSUE ”RADON”)

Session Classification: Poster Session - Chemistry of Nuclear Fuel Cycle / 1st ASGARD International Workshop

Track Classification: Chemistry of Nuclear Fuel Cycle / 1st ASGARD International Workshop