HISTORICAL CEMENTED SLUDGES FROM THE LIQUID WASTE EVAPORATOR- NCSRD

ROUTES SUBTASK 4.2

GREECE

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SURVEY HISTORY

- 1970-1990, at the Greek Research Reactor GRR-1, targets with $Mo_{nat,}$ Te_{nat}, $Au_{nat,,}$ ^{152}Sm και ^{185}Re were irradiated to produce ^{131}I, ^{198}Au, ^{153}Sm και ^{186}Re
- More than 30 years ago, the chemistry of ^{99}Tc complexes was studied. According to discussion with current staff, the estimation is that in total, 1g≡0.63 GBq of ^{99}Tc was used. It is questionable how much is inside the drums with the cemented sludge and in how many drums. (general clearance ^{99}Tc is 1 Bq/g)
- More than 40 years ago, geological samples were analyzed by the method of neutron activation
- In 1983, there was an incident in the GRR-1 involving limited leakage from the fuel elements (general clearance Cs-137 is 0.1 Bq/g)

All these liquid effluents were collected in retention tanks and then, were evaporated at a liquid waste evaporator. The residue was solidified in cement.

OBSERVATIONS

- 55 drums with dose rate 0.10-0.13 μSv/h (equivalent to background)
- 2 drums with dose rate ~0.15 μSv/h, 2 drums with dose rate ~0.20 μSv/h and 1 drum with dose rate 0.35-0.55 μSv/h. Cs-137 was detected in these drums and activity inhomogeneity was observed. (recent dose rates)
- The drums are of 4 sizes (different diameter and height) and of different weight
- The content of each drum is expected to be different. The most of them are expected to be exempt waste , with the remainder being VLLW (as per ROUTES questionnaire for Greece and the Subtask 4.1 report)
- There is no inventory regarding the origin, date of production, initial activities or doses, parameters of cementation, specifications of cement ……..
- The drums are ordinary and rusty. They are kept inside the old surface storage facility with the historical waste at NCSRD. This facility has no climate control or monitoring arrangement.

CHARACTERIZATION OF DRUMS IN WHICH ^{137}CS IS NOT PRESENT (FIRST OPTION):

1. Breakage of the cement of each drum;
2. Comparison of β-γ and β measurement by a contamination monitor (direct frisking);
3. In case of presence of pure β (i.e. ^{99}Tc), samples should be taken for radiochemical analyses;
4. Characterization and classification or clearance of the debris;
5. The debris which is classified as radioactive waste should be conditioned in the future in cement that will satisfy WAC for disposal.

Equipment for breakage of cement with containment and ventilation system is needed

CHARACTERIZATION OF DRUMS IN WHICH ^{137}CS IS NOT PRESENT (SECOND OPTION):

1. Core sampling from each drum;
2. Comparison of β-γ and β measurement by a contamination monitor;
3. In case of presence of pure β (i.e. ^{99}Tc), powder by a milling tool can be collected from several depth and measured by a low background total β counter or sent for radiochemical analyses;
4. In case of low background total β measurement, measurement of cement powder which doesn't present pure β contamination should be carried out for determination and subtraction of the background;
5. Characterization and classification or clearance of the drums with cemented sludge;
6. The cemented sludge which is classified as radioactive waste should be broken in the future and conditioned in cement which will satisfy WAC for disposal.

Equipment for core sampling with containment and cooling system with circulation of water is needed

CHARACTERIZATION OF DRUMS IN WHICH ^{137}CS IS PRESENT (FIRST OPTION):

1. Breakage of the cement of each drum;
2. Comparison of β-γ and β measurement by a contamination monitor;
3. In case of presence of pure β (i.e. ^{90}Sr or ^{99}Tc), samples should be collected for radiochemical analyses of ^{90}Sr and ^{99}Tc as well as for other fission products (in case of high concentration of ^{137}Cs). ^{137}Cs is determined by analyzing the samples by gamma spectrometry;
4. Classification or clearance of the debris;
5. The debris which is classified as radioactive waste will be conditioned in the future in cement which will satisfy WAC for disposal.

Equipment for breakage of cement with containment and ventilation system is needed

CHARACTERIZATION OF DRUMS IN WHICH ^{137}CS IS PRESENT (SECOND OPTION):

1. Non destructive determination of ^{137}Cs as well as determination of bias by measuring each drum;
2. Core sampling from each drum;
3. Comparison of β-γ and β measurement by a contamination monitor;
4. In case of presence of pure β (i.e. ^{90}Sr or ^{99}Tc), samples should be sent for radiochemical analyses of ^{90}Sr and ^{99}Tc as well as for other fission products (in case of high concentration of ^{137}Cs);
5. Classification/ clearance of the drum;
6. The cemented sludge which is classified as radioactive waste will be broken in the future and conditioned in cement which will satisfy WAC for disposal.

Equipment for core sampling with containment and cooling system with circulation of water is needed

THANK YOU VERY MUCH!

ALL THE IDEAS ARE WELCOME!!!