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PROGRESS ON PRODUCTION OF A EUROPEAN ALTERNATIVE OF 241AM FOR USE IN RADIOISOTOPE POWER SYSTEMS

Abstract

Production of 238Pu requires considerable facilities including a nuclear reactor and reprocessing plants that are very expensive to build and operate. The European Space Agency (ESA) has assessed the options for post-launch power generation in future European space missions and has made the decision to pursue the use of 241Am as an alternative isotope to power future European RTGs and RHUs. ESA are now following their published roadmap of studies to develop flight ready RTGs and RHUs.

Development of the preferred European alternative of 241Am for use in future Radioisotope Power Systems (RPS), and the issues that will need to be addressed has continued with the testing of the flowsheet to be used for production of 241Am.

The conceptual flowsheet for the process of separation and buffer storage of 241Am has been developed: • Removal of Pu cans from the store at Sellafield • Transport of the cans to the Central Laboratory import facility • Dispensing the plutonium • Ag2+ catalytic dissolution in nitric acid • Am/Pu separation using solvent extraction • Am/Ag separation using solvent extraction • Oxalate precipitation and packing of a PuO2 product • Oxalate precipitation and packing of a Am2O3 product • Ag and solvents recycled • Storage of the Am2O3 product • Returning purified PuO2 back to Sellafield stores.

The current project is focused on underpinning the conceptual flowsheet, using aged plutonium in NNL's PuMA laboratory. This will underpin the design of a plant to produce a steady supply of 241Am. The scope of the overall project is "store to store" – the starting point is aged plutonium currently housed in existing Sellafield stores and the end point is the storage of separated plutonium and americium powders on the Sellafield site. The minimum 241Am content of the feed will be 3.5%.

The required product is americium sesqui-oxide powder in a package suitable for temporary storage pending fabrication into RPSs. The design basis throughput for the capability is 240kg HM/year (i.e. 240kg of aged Pu with Am in-growth). The capability is to be designed for a 15 year operating lifetime, producing on average 8.4kg Am/year.