Britain to use spent nuclear fuel for batteries to power deep space craft

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Sellafield Nuclear Reprocessing Facility

(Phys.org)—To reduce the cost of cleaning up nuclear waste at Britain's Sellafield nuclear reprocessing facility in Cumbria, workers from the British National Nuclear Laboratory have been harvesting americium-241, in hopes of using it as part of nuclear batteries for long range spacecraft built by the European Space Agency (ESA). It's all part of a £1 million pilot program designed to find ways to use existing fissionable materials for use in future space missions.

The idea would follow designs already used by the United States to power its Cassini and Voyager space probes and now in use by the Mars rover, Curiosity. Nuclear material gives off heat for many years, which can be used directly to keep a craft warm, or be converted into electricity for use by electronic components. The team has reportedly

already harvested some amount of americium-241 from the plutonium waste left over from the production of nuclear weapons. The Sellafield facility reprocesses or separates plutonium, uranium and other fissionable materials from spent nuclear fuel, some of which is used for other purposes such as creating new fuel for nuclear reactors. It's also the site of what will be a new nuclear power station due to begin operation in 2025.

The ESA is keen to find a suitable replacement for plutonium-238, as it's only currently available from the United States and Russia, and believes americium-241, harvested from already existing plutonium waste would make a good choice. Each nuclear battery would only need about 5 kg of the material, which would mean Britain could supply all that would be needed (the Sellafield facility is believed to house some 100 tonnes of waste plutonium) by the ESA for the foreseeable future. Batteries made using it could be used to support missions to other planets and other exploratory projects.

It's also been noted that such batteries could be used for other purposes as well, such as in long term undersea probes, or in buoys outfitted with sensors to monitor sea conditions and other countries such as China and India have already expressed interest in using them for various projects. Thus, the market for long duration nuclear batteries might be expanding, which would make harvesting americium-241 not only cost efficient but perhaps at some point, profitable.