

New developments of autoradiography technique to improve alpha and beta measurements for decommissioning facilities

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For any radioactive waste generated during post operational activities, there is a strong necessity to characterize as much as possible the residual radioactivity. The initial characterization informs the requirements for safety and the importance of accurate characterization is essential for decommissioning and moreover to nuclear waste management. The final characterization is very important for final release of nuclear facility depending on each country regulation.

To investigate non gamma emitters in situ directly on solid radioactive wastes, robust, sensitive and cost effective analytical technique are rather scarce. That is the reason why a new technology has been developed for decommissioning. R&D are ongoing on autoradiography technique. Initially developed for biological researches autoradiography technique has been found to be very promising to investigate alpha and beta emitters. This technique is a nuclear measurements that provides an image of radioactivity in the sample. Quantitative measurements and detection limit determination are also a real challenge.

Autoradiography using reusable screens has been developed at CEA (Atomic Energy Commission, France) for different applications (mainly for beta (even tritium) and alpha emitters) relating to qualitative mapping, sampling procedures and in-depth investigations (by different core studies). For qualitative mapping and more generally for results presentations, a GIS (Geographic Information System) connected with geostatistics calculations is a powerful system to optimize measurement time, costs and stakeholder decisions.

Apart from systems based on reusable screens (post-treatment required), commercial systems using CCD cameras (imaging in real time) already exist for biological applications. For these applications, the spatial resolution required for the images produced is very high (of the order of μm). For in-situ measurement of nuclear wastes, developments of these systems can be required to provide images of radioactivity in real time. These developments will lead to the necessary efficiency for sampling procedures always required for analysis in expert laboratories. The spatial resolution required for such measurements on radioactive wastes is

lower than for biological researches. Autoradiography is a new and innovative system that could be very useful for in-situ measurements.