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#08-41 Study of neutron background in order to improve radioactive waste drum characterization

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A usual way of radioactive waste drums characterization combines gamma spectrometry measurements with passive neutron measurements. This method is well adapted in case of alpha spectra, for which both measurements provide different pieces of information and then enable to measure actinides for a large range of waste densities. But some difficulties are encountered when alpha radionuclides activities are so low that they cannot be measured in reasonable measurement time durations. In high density waste which prevents gamma signal from reaching detector cells, characterization with a high confidence level becomes a major issue.
The CEA DIF facility of waste drum characterization has been operated for more than 30 years. In this framework, a large variety of waste drums has been characterized in terms of spectra, densities, materials and radioactivity levels. As the facility was first dedicated to measure Intermediate-Level Long-lived Waste (ILW-LL), the neutron spallation background was not significant compared to expected neutron emitters from waste packages. These last years, Dismantling and Decommissioning operations have been well advanced at the CEA DIF and are now associated with mostly Low Level Waste production. Therefore, neutron spallation background is becoming significant.
Using the large variety of past characterized drums brings the opportunity to study this background. The present study has been led over a sample of almost 1500 drums of a wide density range. These drums have been selected during the last 20 years by taking into account only one criterion which is any expected neutron emitters from the waste itself. This work first presents the technical settings of the measurement facility before describing raw data of their measurements. Next, following a statistical study over raw data enables to better acknowledge the neutron spallation background behavior in terms of time, density and materials. Finally, ensues a way of using this new knowledge in order to improve how to take into account neutron spallation background in passive neutron measurements of packages of low actinides activities and high densities.

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