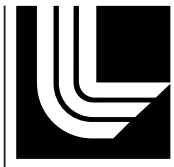

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ACCELERATOR MASS SPECTROMETRY OF ACTINIDES AT LAWRENCE LIVERMORE NATIONAL LABORATORY

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ACCELERATOR MASS SPECTROMETRY OF ACTINIDES AT LAWRENCE LIVERMORE NATIONAL LABORATORY

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Accelerator mass spectrometry (AMS) is an atom counting technique ideally suited to measure very small amounts of long-lived radionuclides that otherwise could not be determined by conventional radiometric methods. AMS is characterized by high rejection of molecular interferences and low susceptibility to matrix components. We will report on the use of AMS for measurements of plutonium concentrations and isotopic ratios in environmental samples including soils, sediments, waters, and human urine. We will also report on studies to improve the sensitivity of AMS for actinide detection. The current lower limit for quantification is about 1E+06 atoms/sample with a linear response expanding to >1E+11 atoms/sample. In addition to Pu, measurements of U-236 and Np-237 have also been carried out with similar results. One of our studies has shown that that acute exposure to plutonium results in trace quantities in urine that are detectable by AMS for months to years following exposure. Urinary excretions of plutonium in the general population should be about 1E+06 atoms per day, i.e., the current AMS quantification limit. Accordingly, incidental exposure to plutonium is expected to result in concentrations in urine that can be detected by AMS. The high-throughput design of the LLNL AMS facility, coupled with reduced demands of AMS sample preparation, results in a cost-effective method with rapid turn-around of analyses.

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