Proliferation Resistance of the Lithium Reduction Process

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Abstract

This paper addresses the characteristics of proliferation resistance of the lithium reduction process and international domestic safeguarding methods. In addition to dealing with qualitative features of the proliferation resistance, this study is emphasizing on the quantitative analysis of radiation barrier, which could be a significant accessibility barrier if the field is high enough to force a theft to shield the object during a theft. From the radiation barrier analysis, it is indicated that whole-body radiation dose is about 20 rem/hr at one meter of smelt and ingot metal of 40 kgHM, which could be considered to be a significant reduction in risk of theft. For safeguarding of this process, we propose a NDA concept for nuclear material accounting which is to measure the amount of curium in the reduction metal and associated process samples using a neutron coincidence counter and then to convert the curium mass into special nuclear material with predetermined curium ratios. For this, a well-type neutron coincidence counter with substantial shielding to protect the system from high gamma radiation is conceptually designed.