

DEVELOPMENT OF EMERGENCY URINE BIOASSAY PROCEDURE

Rebecca Mueller¹, John Keaton, Jr.², Hiromu Kurosaki²

¹University of Kentucky

²Oak Ridge National Laboratory¹

In the event of a radiological emergency, *in vitro* bioassay procedures such as urine bioassay analyses are used to determine the internal exposure, if any, of individuals involved in the incident. A radiological event in a public place may affect many individuals, requiring the collection of a large number of bioassay samples for dose assessment. However, routine bioassay procedures, utilizing anion exchange chromatography, are generally time consuming, taking up to two weeks for completion. The large sample load would cause processing backups, leaving victims in a health quandary during the wait for results. Therefore, we endeavored to develop a rapid procedure that could be used during emergency situations which, while less robust than the routine procedures, is able to process a larger number of samples in much less time. This would allow more effective screening of potentially affected individuals.

A new extraction procedure for americium, plutonium, thorium, and uranium was developed, and by altering the routine procedure, the entire process, from sample receipt to alpha activity measurement, could be completed in eight hours. The four actinides were separated using extraction chromatography. Americium was eluted with 4 M hydrochloric acid; plutonium, with 0.1 M ascorbic acid in 0.5 M hydrochloric acid; thorium, with 0.07 M oxalic acid in 0.5 M hydrochloric acid; and uranium, with 0.1 M ammonium bioxalate. This new procedure allows for separation of these actinides in one to two hours.

¹ Managed by UT-Battelle, LLC, for the U.S. Department of Energy under contract DE-AC05-00OR22725.