

IMPLEMENTATION OF A PLUTONIUM BIOASSAY PROGRAM USING ALPHA SPECTROMETRY AND MASS SPECTROMETRY

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Detection of plutonium in urine is used to assess occupational intakes of plutonium. Current radiochemical techniques produce data that may be used to infer intakes resulting in committed effective dose equivalents (CEDE) down to 500 mrem if the intake time is known and an intensive sampling program is implemented. Routine biannual bioassay sampling may identify a CEDE in the range of 2-10 rem. Current DOE regulations require detection of all occupationally related CEDE's exceeding 100 mrem in the year of intake.

Through a combination of efforts between the Environmental, Safety, and Health Division and the Nuclear chemists and Mass Spectrometrists at Los Alamos National Laboratory, we have implemented a routine plutonium bioassay program using both alpha and mass spectrometry to approach a 100 mrem detection capability. Utilizing alpha spectrometry and thermal ionization mass spectrometry techniques, we will have improved our plutonium accident dose evaluation turn around time from 8-9 months to 4 weeks, lowered missed doses for routine surveillance from 5-10 rem to approximately 260 mrem, and increased accuracy and sensitivity. We will have the ability to collect mass, mass ratio, and activity measurements to enable the characterization of the source of occupational and environmental exposures.