

¹³⁷Cs and Plutonium Exposures in the Marshall Islands: An Assessment Based on Whole-Body Counting and Plutonium Urinalysis Monitoring.

Terry Hamilton, David Hickman, Edward Kaplan[#], William Robison, Cynthia Conrado, Casper Sun[#], Thomas Brown, James Brunk, Alfredo Marchetti, Roger Martinelli, Steven Kehl, and Carolyn Cox

Lawrence Livermore National Laboratory, PO Box 808, Livermore, CA 94551-0808.

[#]Radiological Science Division, Department of Advanced Technology, Brookhaven National Laboratory, Upton NY 11973

(hamilton18@llnl.gov).

The United States (U.S.) Department of Energy (DOE) has recently implemented a number of strategic initiatives to address long-term radiological surveillance needs at former U.S. nuclear test sites in the Marshall Islands. These initiatives include provisions to train and educate local Marshallese technicians in whole body counting and basic health physics. Over the past 3 years, whole-body counting programs have been established on Enewetak and Rongelap Islands, and a third whole-body counter will be placed on Majuro Atoll in 2003. The average annual internal effective dose from cesium-137 (¹³⁷Cs) to resettlement workers on Rongelap Island is below 1 mrem y⁻¹ (0.01 mSv y⁻¹) and range between 0 and 3 mrem y⁻¹. Similar doses have been observed across the entire Enewetak Island resident population. Annual dose estimates compare with background doses of 140 mrem y⁻¹ in the Marshall Islands and 300 mrem y⁻¹ in the United States. Maximal exposed individuals (ca 3 mrem y⁻¹) are far below the cleanup standard of 15 mrem y⁻¹ adopted by the Marshall Islands Claims Tribunal. Consequently, under present living conditions, the observed doses indicate that island workers and residents are receiving adequate protection from residual fallout contamination. There is also no evidence of significant incremental intakes of plutonium associated with resettlement. Urinary excretion of plutonium by resettled populations is within the range expected from systemic burdens acquired from previous exposures to worldwide fallout contamination. The whole-body counting and plutonium urinalysis programs are providing a unprecedented level of long-term radiation protection monitoring and reassurance for resettling and established populations. Current data and information provide a baseline to assess potential local exposures associated with the resettlement of other islands or atolls in the region. Long-term trends in historical data reflect an accelerated pattern of dose reduction compared with radioactive decay of ¹³⁷Cs in the environment. The lower levels of ¹³⁷Cs uptake over time can be attributable to changes in life-style and eating habits of native populations or to losses associated with the environmental availability of ¹³⁷Cs or both.

This work was performed under the auspices of the U. S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under Contract No. W-7405-Eng-48.