Potential health effects for persons living in the northern Marshall Islands are calculated using the same assumptions and same methods used for the Bikini population (copy attached). Risk coefficients from both BEIR I and BEIR III were used providing not only a range of estimates but also a comparison of the most conservative (linear, relative risk model) with what would be described by many radiation biologists as the most probable (linear-quadratic, absolute model).

POPULATION ESTIMATES

The following population estimates are derived by simple ratios from the Bikini calculation (copy attached) for a population of 550. These calculations predicted 1277 births, 164 deaths over a period of 30 years and a final population of 1684 after 30 years for an initial population of 550.

Deaths in 30 years: $\dfrac{164}{550} = \dfrac{\text{deaths in population of interest}}{\text{initial population of interest}}$

Births in 30 years: $\dfrac{1277}{550} = \dfrac{\text{births in population of interest}}{\text{initial population of interest}}$

Population after 30 years: $\dfrac{1684}{550} = \dfrac{\text{population after 30 years}}{\text{initial population of interest}}$

Also from the Bikini population, the estimate of the full 30 year dose received by children born during the 30 year period is 0.36 of the dose persons living the entire 30 year period would receive.

RISK COEFFICIENTS

Both BEIR I and BEIR III risk coefficients are used. These are as follows:

BEIR I

Cancer--Minimum: Absolute risk of leukemia (26×10^{-6} rem^{-1}) + 30 year elevated risk for other cancers (61×10^{-6} rem^{-1}) = 87×10^{-6} rem^{-1}.

Maximum: Relative risk of leukemia (37×10^{-6} rem^{-1}) + lifetime elevated risk (421×10^{-6} rem^{-1}) = 458×10^{-6} rem^{-1}.

Genetic Effects: 0.2% per rem in first generation.

BEIR III

Cancer--Minimum: Absolute lifetime risk of cancer for continuous exposure, 67×10^{-6} rad^{-1} (low LET) based on linear quadratic model.

Maximum: Relative lifetime risk of cancer for continuous exposure, 430×10^{-6} rad^{-1}, based on linear model.

Genetic Effects--Minimum: 75×10^{-6} increase per rem in first generation.

Maximum: 5.0×10^{-6} increase per rem in first generation.

REPOSITORY *PNNL*

COLLECTION *Marshall Islands*

BOX No. *56 88*

FOLDER *Calculations 9/82*