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410071

CALCULATION OF POTENTIAL RADIATION CAUSED HEALTH EFFECTS  
FOR PERSONS LIVING IN THE NORTHERN MARSHALL ISLANDS

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 coefficient 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).

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## 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.

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

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

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

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.

## RISK COEFFICIENTS

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

### BEIR I

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

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

Genetic Effects: 0.2% per rem in first generation.

### BEIR III

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

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

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BEIR III CONTINUED

Genetic Effects--Maximum:  $5.0 \times 10^{-6}$  increase per rem in first generation.

Minimum:  $75 \times 10^{-6}$  increase per rem in first generation.

REPOSITORY PNNL  
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BOX No. 5688  
FOLDER Calculations 9/82

DOCUMENT DOES NOT CONTAIN ECI

Reviewed by DJ Kucis Date 4/20/97

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