

From A Twenty-Six Year Review of Medical Findings in a Marshallese  
Population Exposed to Fallout in 1954. R. A. Conard et al.

(In Draft)

401430

Appendix VI

DOSE ASSESSMENT

A. Early Radiation\*

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Table 1. Estimated gamma exposure (measurements in air).

Atoll	No. people	Approx. time fallout began	Time of evacuation	Instrument readings (mR/hr)	Est. $\gamma$ exposure (R)
Rongelap	64	H+4 to 6 hr	H+50 hr (16 people) H+51 hr (48 people)	375, H+7 days	175
Ailingnae	18	H+4 to 6 hr	H+58 hr	100, H+9 days	69
Rongerik	28	H+6.8 hr	H+28.5 hr (8 men) H+34 hr (20 men)	280, H+9 days	78
Utirik	157	H+22 hr	Started at H+55 hr	40, H+8 days	14

Table 2. Estimated body burden ( $\mu$ Ci) of Rongelap people.

	Activity* at day 1	Activity** at day 82	Max. perm. total body burden
$^{89}\text{Sr}$	1.6 - 2.2	0.19	40
$^{140}\text{Ba}$	0.34 - 2.7	0.021	9
Rare earth group	0 - 1.2	0.03	
$^{131}\text{I}$ (in thyroid gland)	6.4 - 11.2		0.7
$^{103}\text{Ru}$	0 - 0.013	-	50
$^{45}\text{Ca}$	0 - 0.019	0.0	200
Fissile material	0 - 0.016 ( $\mu\text{g}$ )	0.0	0.4

\*From U.S. Naval Radiological Defense Laboratory.

\*\*From Los Alamos Scientific Laboratory.

Table 3. Estimated whole-body (gamma) and thyroid doses (rad)

Population	No.	Whole-body dose	Thyroid dose (incl. gamma), at exposure age:		
			<10	10-18	>18
Rongelap	65	175	810-1800	335-810	335
Ailingnae	18	69	275-450	190	135
Utirik	158	14	60-95	30-60	30

\*A reevaluation of the early whole-body and internal organ doses is in progress at Brookhaven National Laboratory. Incomplete results give some indication that the previously estimated thyroid doses may be too low. Since the results are preliminary, they are not included in this report.

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Marshall Islands  
Whole Body Counting

1958-1977 BNL Medical Department    1978-1981 BNL S&EP

	<u>Bikini</u>	<u>Enewetak</u>	<u>Rongelap</u>	<u>Utirik</u>	<u>Control</u>	<u>Remarks</u>
1957			4 <sup>A</sup>	2 <sup>A</sup>		At ANL
8			100			Steel Room-Chair
9			227	30		" " "
1960						
1			110			Steel Room-Chair
2						
3						
4			158			Shadow Shield-Bed
5			169			Shadow Shield-Bed
6						
7						
8						
9						
1970						
1						
2						
3						
4	31		46	22		Shadow Shield-Bed
5						Shadow Shield-Bed
6						
7	48	35 (H&N)	66	66		Shadow Shield-Bed
8	99				12 (M)	Shadow Shield-Bed
9	101 (M) 129 (K)		75	75		Shadow Shield-Bed Shadow Shield-Bed
1980	200 (M&K)	402			73 (M&K)	Shadow Shield-Chair
1		378				Shadow Shield-Chair

Explanation

K - Kili  
M - Majuro  
H&N - Holmes & Narver employees  
LV - Large Volume Samples  
R - Rongelap



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Marshall Islands  
Urine Sampling

1958-1977 BNL Medical Department    1978-1981 BNL S&EP

	<u>Bikini</u>	<u>Enewetak</u>	<u>Rongelap</u>	<u>Utirik</u>	<u>Comparison</u>	<u>Other Atolls</u>	<u>Analysis By</u>
1954 (March)			Pooled (15)				NRDL & LASL
1954 (April)			51				NRDL
1954 (June)			Pooled				NRDL & LASL
6			Pooled	10	5-Pooled (NY-HASL)	9-Likiep, 5-Majuro	NRSL & HASL
7			Pooled				?
8			15				?
9			174	18			UW
1960							
1			19				BNL-Med
3			38				BNL-Med
4			27				HASL
5			28+2 Pooled				HASL
7			24				HASL
8			22				HASL
9			23			14-Kili	HASL
1970	Pooled + 2		20				HASL
1	Pooled + 7		15				HASL
2	Pooled + 4		18				HASL
3	14		11				HASL
4	21		14	11			HASL
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5	2 Pooled						HASL
6	8 + Pooled				Pooled	Ebeye, Wotje	HASL
7	5 Pooled	35 (H&N)	5 (LV)	5 (LV)			BNWL, LASL
8	49 + 5 (LV)		5 (LV)	5 (LV)		12-Majuro	BNL S&EP
9			73	73		49-Majuro	BNL S&EP
						129-Kili	BNL S&EP
1980		400				100-Majuro, Kili	BNL S&EP
1		335					BNL S&EP

Explanation of Symbols

- UW - University of Washington
- HASL - Health & Safety Laboratory (Now EML)
- LASL - Los Alamos Scientific Lab
- NRDL - National Radiological Defense Lab
- H&N - Holmes & Narver
- LV - Large Volume Samples

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