



September 25, 1979

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R

T. F. McCraw
Division of Operational and
Environmental Safety
U.S. Department of Energy
Washington, DC 20545

Dear Tom:

We have recently returned from our most recent field trip to the Marshall Islands. Our objectives were to provide personal monitoring services to the residents of Rongelap and Utirik, collect site specific environment samples at these two atolls and repair the windmills so that the air sampling program could be reinstated. All of these objectives were completed during the August 16 - September 7 field trip.

At Rongelap, a new generator was installed and began to slowly charge the batteries that power the air sampler. Because the batteries were discharged and the trade winds had not commenced, we anticipate that it will take several months to store enough energy in the batteries so that a constant air sample can be taken. The first air sample may be available next January. Also we established three permanent sampling locations for coconut, breadfruit, and pandanus. This will allow us to monitor yearly variations between soil and vegetation activity concentrations. Finally, sixty-seven persons participated in the whole body counting program and sixty-three persons contributed urine samples. Table 1 summarized whole body counting results in each age and sex category and compares the mean 1979 ^{137}Cs body burdens with the mean ^{137}Cs body burdens measured by Stan Cohn in 1974 and 1977. Appendix A lists cumulative results for all gamma emitting nuclides detected from 1974 to 1979.

The data in Table 1 suggests that the ^{137}Cs body burdens are continuing to decrease. When comparing the individual data in Appendix A with prior results, one observes that not everyone's ^{137}Cs body burden declined. Of the twenty-five persons with prior whole body counting histories, twenty-one body burdens declined, three increased and one remained unchanged. The increase may be due to a change in diet or to a short residence interval prior to the first count.

In the August 3 letter to Bill Stanley, we stated that the minimum sample size required to obtain the true value for the population mean ^{137}Cs body burden at the 90% confidence limit was thirteen. As Table 1 indicates, we did not

Of if we can be of any assistance, please do not hesitate to contact me, Ed Lessard at FTS 666-2503 or Nat Greenhouse at FTS 666-4250.

Sincerely,



Robert P. Miltenberger

RPM/jwe

cc: J. Balsamo
N. Greenhouse
A. Hull
E. Lessard
B. Wachholz
W. Weyzen

TABLE 1

1974 - 1979 Summary of ¹³⁷Cs Mean Population Body Burdens - Rongelap Atoll

Result in μCi	Adult Male			Adult Female			Adol. Male	Adol. Female	Male Child	Female Child
	1974*	1977**	1979	1974*	1977**	1979	1979	1979	1979	1979
Mean	0.48	0.30	0.18	0.30	0.19	0.15	0.10	0.14	0.084	0.079
1 standard deviation	0.19	0.11	0.088	0.16	0.057	0.044	0.017	0.044	0.033	0.037
Low value	0.24	0.089	0.089	0.15	0.076	0.081	0.076	0.073	0.030	0.022
High Value	0.97	0.68	0.45	0.89	0.28	0.25	0.12	0.16	0.14	0.13

* CO 75

** CO 77

TABLE 2

1974 - 1979 Summary of ¹³⁷Cs Mean Population Body Burdens - Utirik Atoll

Result in μCi	Adult Male			Adult Female			Adol. Male	Adol. Female	Male Child	Femal. Child
	1974*	1977**	1979	1974*	1977**	1979	1979	1979	1979	1979
Mean	0.26	0.12	0.062	0.13	0.078	0.043	0.046	0.041	0.040	0.03
1 standard deviation	0.10	0.048	0.022	0.035	0.032	0.015	0.013	0.012	0.018	0.01
Low Value	0.18	0.050	0.029	0.074	0.027	0.018	0.026	0.023	0.019	0.01
High Value	0.53	0.22	0.11	0.21	0.15	0.069	0.066	0.065	0.079	0.05

* CO 75

** CO 77

1007	66	-	-	115	0.29	-	-
79	60	-	-	105	0.37	118	0.15
905	54	-	-	144	0.26	-	-
939	89	-	-	158	0.25	148	0.21
20	73	-	-	143	0.33	140	0.21
90	63	-	-	167	0.50	184	0.13
1038	53	-	-	138	0.28	-	-
113	60	-	-	142	0.26	165	0.073*
96	72	-	-	122	0.089	145	0.089*
1028	47	-	-	127	0.23	-	-
132	37	-	-	95	0.31	-	-

Appendix A

Table 1

1974 - 1979 Whole Body Count Results - Rongelap Adult Males

ID #	Weight kg	1974** Potassium, g	¹³⁷ 1974** Cs, μCi	1977*** Potassium, g	¹³⁷ 1977*** Cs, μCi	1979 Potassium, g	¹³⁷ 1979 Cs, μCi
963	73	154	0.76	-	-	145	0.027*
4	64	125	0.47	-	-	-	-
915	57	104	0.36	105	0.34	-	-
878	75	123	0.54	-	-	-	-
16	58	114	0.26	119	0.33	-	-
5	46	121	0.40	130	0.28	-	-
11	46	96	0.28	-	-	-	-
881	88	158	0.44	167	0.28	166	0.20
1517	64	151	0.44	-	-	-	-
41	51	110	0.31	99	0.21	110	0.042*
814	67	158	0.97	148	0.68	155	0.22*
863	66	186	0.59	-	-	-	-
7	60	124	0.51	127	0.29	146	0.20
850	59	131	0.44	117	0.41	-	-
834	64	159	0.72	137	0.39	-	-
845	69	158	0.37	137	0.41	-	-

852	50	75	0.22	80	0.11		
48	48	88	0.46	-	-	110	0.14
67	81	109	0.27	99	0.22	-	-
66	76	83	0.28	-	-	103	0.13
835	65	73	0.19	-	-	86	0.15
78	75	77	0.43	-	-	96	0.012*
58	52	57	0.20	-	-	-	-
859	52	63	0.30	-	-	-	-
486	51	-	-	89	0.25	-	-
146	66	-	-	75	0.28	-	-
18	68	-	-	106	0.23	110	0.12
959	93	-	-	108	0.076	-	-
72	80	-	-	104	0.17	111	0.21
1520	61	-	-	93	0.20	-	-
960	50	-	-	93	0.17	-	-
901	59	-	-	96	0.20	-	-
21	57	-	-	90	0.25	124	0.093
911	61	-	-	109	0.19	121	0.14
956	59	-	-	89	0.26	103	0.17
7022	58	-	-	-	-	113	0.17

Appendix A

Table 2

1974 - 1979 Whole Body Count Results - Rongelap Adult Females

ID #	Weight kg	1974** Potassium, g	¹³⁷ 1974** Cs, μCi	1977*** Potassium, g	¹³⁷ 1977*** Cs, μCi	1979 Potassium, g	¹³⁷ 1979 Cs, μCi
812	52	101	0.52	-	-	-	-
816	65	81	0.25	95	0.15	106	0.14
821	47	95	0.20	-	-	100	0.081
825	70	109	0.19	111	0.13	112	0.16
1050	81	112	0.39	-	-	94	0.25
14	60	64	0.37	-	-	-	-
1541	66	106	0.89	-	-	-	-
1525	58	63	0.25	-	-	-	-
843	75	81	0.21	-	-	114	0.0029*
1001	67	100	0.35	-	-	110	0.003*
1	71	68	0.25	76	0.13	-	-
851	66	83	0.20	92	0.16	96	0.19
896	50	84	0.25	94	0.20	-	-
70	49	78	0.17	92	0.098	95	0.033*
64	66	81	0.31	91	0.20	-	-
932	54	84	0.15	96	0.25	-	-
822	56	72	0.22	80	0.11	-	-

Table 1 cont'd

1974 - 1979 Whole Body Count Results - Rongelap Adult Males

ID #	Weight kg	1974** Potassium, g	¹³⁷ 1974** Cs, μCi	1977*** Potassium, g	¹³⁷ 1977*** Cs, μCi	1979 Potassium, g	¹³⁷ 1979 Cs, μCi
1047	35	-	-	87	0.26	-	-
84	60	-	-	-	-	179	0.12
7028	74	-	-	-	-	145	0.14
\bar{X}	62	135	0.48	129	0.30	149	0.18
σ	12	26	0.19	20	0.11	18	0.088
Low	35	96	0.24	87	0.089	110	0.089
High	89	186	0.97	167	0.68	184	0.45
	N=43	N=22		N=30		N=19	

*Data obtained from individual who is currently living on Ebeye. Data not used to compute mean, standard deviation or range of Rongelap population ¹³⁷Cs body burden.

**C075

***C077

Table 2 Cont'd

1974 - 1979 Whole Body Count Results - Rongelap Adult Females

ID #	Weight kg	1974** Potassium, g	¹³⁷ 1974** Cs, μCi	1977*** Potassium, g	¹³⁷ 1977*** Cs, μCi	1979 Potassium, g	¹³⁷ 1979 Cs, μCi
\bar{X}	63	84	0.30	94	0.19	106	0.15
σ	11	16	0.16	10	0.057	10	0.044
Low	47	57	0.15	75	0.076	86	0.081
High	93	112	0.89	111	0.28	124	0.25
	N=36	N=24		N=21		N=18	

*Data obtained from individual who is currently living on Ebeye. Data not used to compute mean, standard deviation or range of Rongelap population ¹³⁷Cs body burden.

**C075

***C077

Appendix A

Table 31979 Whole Body Count Results - Rongelap Adolescent Males

ID#	Age,yr	Height,cm	Weight,kg	Potassium,g	¹³⁷ Cs μ Ci
7001	11	132	30	74	0.084
7004	11	135	34	78	0.076
7007	12	132	31	79	0.12
7011	11	135	33	89	0.12
7013	11	132	32	78	0.10
7014	12	126	25	72	0.10
7025	11	124	21	85	0.12
7035	13	137	31	81	0.11
\bar{X}	11.5	132	30	80	0.10
σ	0.76	4.5	4.4	5.5	0.017
Low	11	124	21	72	0.076
High	13	137	34	89	0.12

N=8

Appendix A

Table 41979 Whole Body Count Results - Rongelap Adolescent Females

ID#	Age, yr	Height, cm	Weight, kg	Potassium, g	¹³⁷ Cs, μ Ci
7006	12	137	27	86	0.16
7019	14	149	42	77	0.073
7023	12	149	49	87	0.16
7036	12	147	34	92	0.16
\bar{X}	12.5	146	38	86	0.14
σ	1.0	5.7	9.6	6.2	0.044
Low	12	137	27	77	0.073
High	14	149	49	92	0.16

N=4

Appendix A

Table 5

1979 Whole Body Count Results - Rongelap Male Children

ID#	Age, yr	Height, cm	Weight, kg	Potassium, g	¹³⁷ Cs, μ Ci
7002	10	122	29	78	0.12
7003	8	117	27	77	0.098
7009	10	127	29	74	0.10
7015	9	124	26	69	0.038
7016	10	137	36	87	0.11
7017	9	122	19	74	0.099
7018	9	124	25	70	0.065
7020	5	94	15	45	0.030
7026	10	119	22	76	0.14
7029	5	97	15	50	0.095
7031	6	109	19	52	0.040
7033	7	102	16	67	0.10
7034	6	107	19	50	0.068
7040	7	107	18	55	0.073
\bar{X}	7.9	115	23	66	0.084
σ	1.9	12	6.3	13	0.033
Low	5	94	15	45	0.030
High	10	137	36	87	0.14

N=14

Appendix A

Table 6

1979 Whole Body Count Results - Rongelap Female Children

ID#	Age, yr	Height, cm	Weight, kg	Potassium, g	¹³⁷ Cs, μ Ci
7005	10	131	27	73	0.13
7008	7	116	23	61	0.13
7010	7	104	16	50	0.053
7012	8	118	21	70	0.10
7021	7	110	17	56	0.052
7024	7	113	19	59	0.12
7027	6	118	20	48	0.058
7030	7	120	22	52	0.040
7032	7	114	18	58	0.073
7037	5	105	17	59	0.066
7038	5	103	17	45	0.063
7039	10	126	23	70	0.12
7041	10	127	28	64	0.022
\bar{X}	7.4	116	21	59	0.079
σ	1.7	8.9	3.9	8.8	0.037
Low	5	103	16	48	0.022
High	10	131	28	73	0.13

N=13

Appendix B

Table 1

1974 - 1979 Whole Body Count Results - Utirik Adult Males

ID #	Weight kg	1974* Potassium,g	¹³⁷ 1974* Cs,μCi	1977** Potassium,g	¹³⁷ 1977** Cs,μCi	1979 Potassium,g	¹³⁷ 1979 Cs,μCi
2125	77	144	0.18	135	0.092	160	0.060
2123	64	162	0.31	148	0.22	174	0.103
2137	78	160	0.53	154	0.11	172	0.051
2102	57	158	0.23	-	-	165	0.050
2167	93	156	0.23	-	-	-	-
2152	84	166	0.22	159	0.16	-	-
2166	49	144	0.23	117	0.13	139	0.079
2233	61	156	0.22	-	-	-	-
2185	57	156	0.21	-	-	164	0.046
2168	66	-	-	129	0.17	151	0.085
2150	84	-	-	141	0.86	-	-
2257	70	-	-	160	0.20	169	0.11
2145	66	-	-	133	0.051	-	-
2157	79	-	-	168	0.092	178	0.047
2242	64	-	-	172	0.072	-	-
2176	58	-	-	165	0.13	184	0.061
2174	92	-	-	145	0.16	160	0.064
2156	79	-	-	146	0.061	-	-
2232	57	-	-	172	0.12	164	0.047
2206	60	-	-	119	0.13	-	-
39	59	-	-	121	0.061	-	-
40	73	-	-	146	0.13	-	-
41	56	-	-	114	0.068	-	-
42	60	-	-	149	0.16	-	-
43	54	-	-	109	0.085	-	-
44	76	-	-	120	0.050	-	-
45	59	-	-	151	0.076	-	-
46	60	-	-	154	0.12	-	-
47	68	-	-	150	0.20	-	-
48	88	-	-	133	0.15	-	-
49	70	-	-	145	0.16	-	-
2136	102	-	-	-	-	169	0.090
2155	94	-	-	-	-	162	0.046
8022	79	-	-	-	-	144	0.057
8023	72	-	-	-	-	179	0.029
8024	69	-	-	-	-	174	0.036
8025	65	-	-	-	-	191	0.059
2207	77	-	-	-	-	171	0.049
\bar{X}	70	156	0.26	143	0.12	167	0.062
σ	13	7.3	0.10	18	0.048	13	0.022
Low	49	144	0.18	109	0.050	139	0.029
High	102	166	0.53	172	0.22	191	0.11
N	38	9		27		19	

*C075

**C077

2193	90	80	0.13	-	-	109	0.018
2212	64	89	0.089	81	0.066	117	0.041
2146	71	-	-	82	0.027	103	0.040
2270	64	-	-	92	0.077	128	0.062
2256	80	-	-	107	0.061	-	-
2227	44	-	-	84	0.035	-	-
2248	87	-	-	104	0.15	126	0.069
2140	51	-	-	73	0.059	-	-
2255	50	-	-	81	0.057	-	-
2158	84	-	-	88	0.10	106	0.061
2194	69	-	-	86	0.083	106	0.058
2104	55	-	-	93	0.12	-	-
2224	83	-	-	94	0.089	-	-
2128	72	-	-	95	0.071	-	-
2162	47	-	-	-	-	94	0.030
8029	56	-	-	-	-	117	0.039
8032	48	-	-	-	-	112	0.025
2350	60	-	-	-	-	109	0.042
8057	81	-	-	-	-	125	0.030
\bar{X}	67	91	0.13	90	0.078	114	0.043
σ	16	16	0.035	13	0.032	11	0.015
Low	35	66	0.074	71	0.027	94	0.018
High	90	129	0.21	112	0.15	136	0.069
N	30	13		21		17	

*C075
**C077

Appendix B

Table 3

1979 Whole Body Count Results - Utirik Adolescent Males

ID#	Age, yr	Height, cm	Weight, kg	Potassium, g	¹³⁷ Cs, μ Ci
8016	11	127	29	73	0.039
8017	11	130	26	69	0.047
8018	11	127	30	70	0.032
8037	15	168	60	124	0.054
8038	12	145	35	88	0.063
8039	12	140	35	75	0.036
8040	13	152	41	90	0.050
8041	11	135	28	84	0.066
8042	14	145	34	82	0.026
8043	13	150	37	78	0.054
8044	12	137	27	77	0.035
8052	15	159	49	113	0.038
8053	15	157	53	129	0.062
\bar{X}	13	144	37	89	0.046
σ	1.6	13	11	20	0.013
Low	11	127	26	69	0.026
High	15	168	60	129	0.066

N=13

Appendix B

Table 4

1979 Whole Body Count Results - Utirik Adolescent Females

ID#	Age, yr	Height, cm	Weight, kg	Potassium, g	¹³⁷ Cs, μ Ci
8010	13	137	29	76	0.041
8011	11	127	30	70	0.045
8014	13	142	38	82	0.042
8027	11	134	35	78	0.040
8028	11	130	31	62	0.024
8030	12	132	37	75	0.031
8031	11	122	25	57	0.023
2365	15	152	45	94	0.065
3532	15	150	64	85	0.038
8033	15	142	45	85	0.045
8046	12	137	34	70	0.031
8047	12	135	35	85	0.045
8058	15	147	53	89	0.057
\bar{X}	13	137	39	78	0.041
σ	1.7	9	11	11	0.012
Low	11	122	25	57	0.023
High	15	152	64	94	0.065

N=13

Appendix B

Table 5

1979 Whole Body Count Results - Utirik Male Children

ID#	Age, yr	Height, cm	Weight, kg	Potassium, g	¹³⁷ Cs, μ Ci
8003	10	127	25	70	0.041
8004	8	127	30	68	0.029
8005	9	128	26	72	0.056
8006	6	118	21	44	0.025
8007	10	122	22	47	0.065
8008	5	123	24	76	0.038
8009	5	112	22	54	0.019
8019	10	130	27	84	0.045
8020	10	127	40	75	0.019
8021	9	127	26	78	0.079
8049	10	127	25	76	0.047
8050	10	127	26	85	0.035
8051	10	122	23	70	0.026
\bar{X}	8.6	124	26	69	0.040
σ	2.0	4.9	4.9	13	0.018
Low	5	112	21	44	0.019
High	10	130	40	85	0.079

N=13

Appendix B

Table 6

1979 Whole Body Count Results - Utirik Female Children

ID#	Age, yr	Height, cm	Weight, kg	Potassium, g	¹³⁷ Cs, μ Ci
8001	9	114	27	45	0.019
8002	10	121	30	49	0.050
8012	8	114	22	58	0.050
8013	10	130	31	77	0.053
8015	8	114	25	61	0.044
8034	10	132	28	61	0.015
8035	7	109	19	43	0.031
8036	7	114	17	34	0.011
8045	10	119	23	76	0.018
8048	8	118	22	69	0.037
8054	7	117	20	54	0.030
8055	5	112	20	55	0.020
8056	8	119	20	60	0.045
\bar{X}	8.2	118	23	57	0.033
σ	1.5	6.7	4.4	13	0.015
Low	5	109	17	34	0.011
High	10	132	31	77	0.053

N=13

References

- CO 75 Conard, Robert A., et al., 1975, A Twenty year Review of Medical Findings in a Marshallese Population Accidentally Exposed to Radioactive Fallout, BNL 50424 (Brookhaven National Laboratory, Upton, N.Y.).
- CO 77 Personal Communications with S. Conly, Medical Department Brookhaven National Laboratory.

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