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RESIDUAL CONTAMINATION OF PLANTS, ANIMALS, SOIL, AND WATER OF THE MARSHALL ISLANDS ONE YEAR FOLLOWING OPERATION CASTLE FALL-OUT

Research and Development Report USNRDL-454
NS 081-001
NM 006-015.04

12 August 1955

by

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Effects of Atomic Weapons

Technical Objective
AW-7

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and plants was Cs . The island soil and lagoon water were contaminated principally by the rare earth elements, Ru^{106}-Rh^{106} and Zr^{95}-Nb^{95}. The amount of activity in the specimens analyzed was generally proportional to the external gamma reading in each of the areas.

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of soil, with movement indicated down to the lens water.

The major radionuclide found in the tissues of land animals and plants was Cs^{137}. The island soil and lagoon water were contaminated principally by the rare earth elements, Ru^{106}-Rh^{106} and Zr^{95}-Nb^{95}. The amount of activity in the specimens analyzed was generally proportional to the external gamma reading in each of the areas.

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ADMINISTRATIVE INFORMATION

This is the final report of the Atoll Resurvey Project. The resurvey was made by this Laboratory together with Applied Fisheries Laboratory of the University of Washington, under the joint sponsorship of the Bureau of Ships and the Atomic Energy Commission, Bureau of Ships Project Number NS 081-001 and Bureau of Medicine and Surgery Project Number NM 006-015.04, Technical Objective AW-7.

The work was done jointly by the Chemical Technology and the Biological and Medical Sciences Divisions of this Laboratory.

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islands. A gamma dose-rate survey was conducted to determine the external radiation hazard extant. Such data were necessary to determine the possibility of re-occupying the islands. The present report presents the data obtained from the resurvey of the contaminated islands.

1.1 OBJECTIVES

This work was named the Atoll Resurvey Project, entitled "Follow-up Determination of the Extent and Distribution of Fall-out Contamination on Rongelap and Other Atolls in the Marshall Group." Its specific objectives were:

a. To provide data upon which a decision can be based as to when the evacuated islands may be safely re-occupied by their former inhabitants.

b. To provide information about distribution of the residual contamination on a land area which had been heavily contaminated by fall-out.

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the bulk of the supernatant was removed by suction or decantation. The remaining slurry was transferred to lustroid tubes and centrifuged. The precipitate was washed once with water, transferred to an aluminum planchet, and dried at 110°C. Analysis of the supernatants from the more active samples showed that recovery of activity by precipitation ran from 80 to 90 per cent.

Soil and lagoon-bottom silt samples were dried and mounted in aluminum planchets for counting. Coral and algae samples were dried overnight at 110°C, ashed for 24 hr at 500°C, pulverized, and mounted in aluminum planchets.

After mounting, the samples were counted with a gas-flow proportional counter at 26 per cent geometry as determined with a U_3O_8 standard or with a 1.9 mg/sq cm, end-window, G-M tube and scaler at 14 per cent geometry as determined with a U_3O_8 standard. Absorption and scattering corrections were determined empirically by counting varying weights of individual samples and extrapolating the specific

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makes it merit study from a contamination standpoint.

*Native Marshallese were included in the survey teams.

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Summary

Plant Material	Likiep	Utir
Grass	20	400
Coconut leaf		1100
Coconut frond stem		
Coconut shell		
Coconut husk	1.7	1
Coconut sprout		
Sprouted coconut roots		
Scaevola leaf		
Scaevola Trunk Section		
Arrowroot stem		
Arrowroot leaf		
Pumpkin	2.0	
Limes	2.0	
Taro	1.1	
Banana	4.6	
Vines		

(a) Wet weight

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in Table 2.3. Table 2.4 presents data obtained from exposed soil profiles. The probability of cross-contamination in these samples was small.

TABLE 2.3

Summary of Beta Activity in Gross Samples of Soil

Island	Number of Samples	Beta Activity (β^-/min/g) Depth of Soil	
		0 to 1 in.	1 to 5 in.
Likiep	1	90	
Utirik	4	960	550
Rongelap	5	8,900	800
Eniaetok	2	48,000	640
Labaredj	3	85,000	1,300
Kabelle	6	96,000	3,100
Gejen	1	348,000	12,400
Bikar	1	8,400	90
Eniwetak	1	12,000	240

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TABLE 2.4

Beta Activity in Soil Samples Taken From Exposed Soil Profiles

Depth (in.)	Beta Activity (β^-/min/g) Island				
	Rongelap	Labaredj	Kabelle	Kabelle	Kabelle
0 to 1	12,400	130,000	72,000	93,000	97,000
3	1,500	380	6,800	2,900	440
6	110	950	1,700	400	130
9	140	770	130	2,300	240
12	NDA [a]	160	40	580	140
18	70	120	70	70	90
24		40	100	70	NDA
30				NDA	
36				60	
40				40	

(a) No detectable activity

Table 2.5 summarizes the data derived from the tube coring samples. Cores were analyzed in 1-in. increments and while some movement of activity along the walls of the tube was probable the results for the most part agreed rather well with those obtained by the other sampling procedures.

A comparison of Tables 2.3, 2.4, and 2.5 indicates that the coring technique falls down somewhat at high levels of activity although the apparent movement of activity may be real and may be a function of the soil particle size and not a mechanical cross-contamination.

The data in Table 2.5 show very definitely that the residual activity on the islands is contained primarily in the top several inches of soil and that movement is occurring. Data presented in Chapter 3 deal with the nature of the contamination in the environment and from them it can be deduced that fractionation takes place, with Ce^{144}-Pr^{144} and Ru^{106}-Rh^{106} making up much of the fixed contamination. The plant

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TABLE 2.5

Beta Activity in Core Samples of Soil

Island	No. of Cores	Beta Activity (β^-/min/g)								
		1-in. Increment of Soil Coring								
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th
Likiep	1	140	40	40	NDA[a]	NDA				
Utirik	3	1,250	480	240	130	100	160	60	25	
Rongelap	4	6,600	2,100	570	420	230	160	200	150	50
Busch	1	10,800	7,100	7,200	6,400	6,800				
Eniaetok	1	57,000	24,000	4,300	[illegible],000	26,000	12,000	11,000		
Labaredj	1	42,000	33,000	29,000	23,000	19,000				
Kabelle	3	43,000	30,000	10,000	3,600	2,000	2,300	180		
Lomuilal	3	53,000	48,000	26,000	20,000	14,000	1,000			
Gejen	1	37,000	37,000	8,000	4,000	4,400	3,400			
Lukuen	2	35,000	40,000	13,000	10,500	10,000	10,000	4,700		
Bikar	3	4,000	740	250	170	120	100	27		
Eniwetak	2	16,000	7,500	3,000	2,000	1,800	1,100	160	100	

(a) No detectable activity

uptake over a long period of time may be considerable since the root systems on the islands are uniformly distributed throughout the top 14 in. of the island profiles and are extremely dense. Very few roots were found below 14 in. and those that were noted appeared to be carrying large amounts of water from the fresh water lens to the mother plant. The large amounts of activity found in the plant systems negates any possibility that direct fall-out could be solely responsible for the contamination. The nature of the contamination in the plants shows that although Ce^{144}-Pr^{144} and Ru^{106}-Rh^{106} are firmly fixed in the soil they are readily taken up by the plant systems.

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2.2.4 Coral, Lagoon-Bottom Silt, and Algae

The extent of contamination in the atoll waters adjacent to the islands was evaluated from samples of coral, lagoon-bottom silt, and algae. Numerous edible marine species exist in this area and their food chain is dependent primarily on the algae and coral. The gross beta activities in coral and algae are given in Table 2.6.

TABLE 2.6

Gross Beta Activity in Coral and Algae

Island	Beta Activity (β^-/min/g)		
	Coral	Algae	
		Type[a]	Activity
Likiep	NDA[b]		
Utirik	NDA	G	120
Rongelap	290		
Eniaetok	790	H	400
	3,400	SC	34,000
Labaredj	860		
Kabelle	300		
	320	G	16,800
Gejen	1,300		
	1,140	H	4,160
	3,260		
Bikar	240		
	210	G	3,500

(a) G = green; H = Halimeda; SC = Sea Cucumber.
(b) No detectable activity.

Algae appear to concentrate activity to a much greater degree than coral. Much of the coral activity may even be due to algae which is lodged in small pores where it cannot be removed. The sea cucumber and green types of algae are much more efficient at concentrating activity than is the highly calcareous Halimeda type.

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from drinking the water.

Gross beta activities of the above samples are presented in Table 2.7. The scarcity of potable water is demonstrated by the few islands from which cistern water was obtainable.

TABLE 2.7

Summary of Gross Beta Activity in Water

	Beta Activity (β^-/min/liter)							
	Sources of Water							
	Ocean		Cistern					
Island	Lagoon Side	Ocean Side	Top	Bottom	Well	Barrel	Tree Bole	Exposed Soil Profile
Likiep	NDA[a]	NDA	12		NDA			
Utirik	50	NDA	290	1,350	28			
Rongelap	80	330	6,300	16,000	430	44,000		
Busch	36	NDA					14,000	
Eniaetok	460	260	23,000					
Labaredj	7,700	56					8,100	
Kabelle	2,300	60						15,000
Lomuilal	380	170						
Bikar	37	28						
Eniwetak	100	170						

(a) No detectable activity

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The ocean water data indicate that activity is being washed off the islands. It will be noted also that the levels of activity correlate with the gamma-dose rates of the islands. Such irregularities as do occur can be attributed to the ocean current movements around the islands. Lomuilal, for example, is in an exposed position and both the lagoon and ocean sides of the island are swept by strong currents. The generally higher levels of activity on the lagoon side of the islands can be explained by the same reasoning. Since the rainy season had ended at the time the sample was collected, the actual mechanism by which the active material was being moved was probably associated with the changing level of water line due to tides. The lower gamma-dose rates observed below the high tide mark would support this hypothesis.

The water from wells and exposed profiles represents the fresh water lens underlying the islands and Table 2.7 shows that they are contaminated. These data are of special interest since these lenses may be intermediate systems for transferring various nuclides from the soil to plants.

The cistern water and other potable water supplies of less importance show varying degrees of contamination depending on such factors as the cleanliness of the reservoir, the nature of the watershed areas, and the presence or absence of shielding trees. The higher levels of activity found in the bottoms of cisterns are to be expected and these data are included only for comparative purposes.

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Lagoon-bottom silt gives very nearly the same nuclide distribution as soil and it appears that solubility may be a better criteria for predicting nuclide mobility through soil than complex formation with matrix components.

The high uptake of Cs^{137} by the edible portions of plant foods is probably the result of potassium deficiency in the soil and the utilization of cesium to replace needed potassium. A comparison of the coconut frond and edible coconut fractions illustrates their selectivity for individual nuclides.

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Breadfruit	NDA (c)	6.3	50	19	NDA	24
Coconut Frond	1.2	5.0	80	4.2	6.7	1.6
Coconut Meat	NDA	NDA	1.2	NDA	NDA	95
Coconut Milk	NDA	NDA	0.9	NDA	NDA	96
Grass	1.3	4.6	74	6.4	4.8	8.4
Pandanus	0.5	2.4	1.2	0.2	0.6	95
Papaya	1.6	7.3	37	31	12	11
Coral	3.2	14	67	10	4.5	1.1
Soil	0.8	2.2	73	0.1	23.3	1.1
Lagoon Bottom	1.1	5.0	82	0.2	13	NDA
Cistern Water	2.9	8.6	41	24	20	13
Ground Water	0.8	2.5	49	20	16	9.2
Lagoon Water	0.9	4.0	76	9.7	7.0	0.8

(a) Values as of 15 July 1955 (16 mos after the nuclear detonation).
(b) Nb^{95} and Rh^{106} may be calculated from the reported parent values.
(c) No detectable activity.

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CHAPTER 4

INTERNAL CONTAMINATION OF FISH, MARINE SPECIMENS, AND BIRDS

Fish and birds were collected from the following islands of the Rongelap Atoll: Rongelap, Gejen, Kabelle, and Labaredj. In addition, other animals were collected from Bikar, Likiep and Utirik Atolls and Eniwetak Island of the Rongerik Atoll. The majority of the marine specimens were collected in the lagoons off the shores of the islands. The larger fish were caught in the middle of the lagoon.

Most of the fish were collected after they were poisoned by a Rotenone solution dispersed in the shallow water. The birds (terns) were shot with a rifle. Each specimen was placed in a plastic bag and frozen. The frozen samples were transported to this laboratory.

4.1 LABORATORY PROCEDURES

A number of the large fish were completely separated into skeleton, muscle, gills, liver, and viscera. The remaining fish and marine invertebrates were analyzed whole.

All samples were dried at 100°C for 48 hr and ashed for 48 hr at 550°C. The ash was dissolved in 2N HCl and made up to volume. The gamma activity was counted in a deep-well, sodium iodide crystal, gamma scintillation counter; the beta activity was counted under a thin end-window, beta counter. The beta activity in each case was corrected for counter efficiency and mass absorption. The gamma and beta activity is recorded in "$\mu c(Co^{60}$ equivalent)". This unit was derived from comparison with a Co^{60} standard counted under identical conditions as the samples.

Radiochemical analysis were performed to determine the concentration of several radionuclides in a number of the specimens. The radiochemical techniques employed will be described in a forthcoming report.

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TABLE 4.1

Summary of Beta and Gamma Activity Concentration in Fish and Marine Invertebrates

Location	Radioactivity Concentration (μc/kg)[a]											
	Large Fish[b]			Small Fish[c]			Crabs and Clams			Snails		
	No. of Specimens	Activity β	Activity γ	No. of Specimens	Activity β	Activity γ	No. of Specimens	Activity β	Activity γ	No. of Specimens	Activity β	Activity γ
Rongelap Atoll												
North Lagoon	3	0.22	1.2	22	.49	1.58	4	1.54	1.25	2	19.5	5.6
South Lagoon	3	.054	0.33	7	.14	0.94	3	0.49	1.76	- (d)	-	-
Rongerik Atoll												
Eniwetak	2	0.23	0.26	2	.23	.21						
Utirik Atoll												
Utirik				6	.14	.04						
Likiep Atoll												
Likiep	1	0.02	0.01	3	.05	.01	1	0.12	0.35			
Bikar Atoll												
Bikar							2	0.39	0.19			

(a) μc are in terms of Co^{60} equivalent.
(b) >150 g.
(c) <150 g.
(d) No data taken.

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times the amount of internally deposited fission products as that found in fish from the southern lagoon. This is consistent with the fact that the northern lagoon was exposed to higher concentrations of fall-out material.

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TABLE 4.2

Distribution of Gross Beta and Gamma Activity in Tissues of Large Fish[a]

Island	Fish	Wet Weight (g)	Radioactivity (μc x 10^3/Tissue)[b] Total β	Total γ	Skin β	Skin γ	Muscle β	Muscle γ	Bone β	Bone γ	Gills β	Gills γ	Viscera β	Viscera γ
Rongelap Atoll, North														
Gejen	Flat Fish with Orange Spots[c]	597	196	714	25	24	18	96	120	310	7	16	26	268
North Lagoon	2 Pelargic	503	84	500	6	69	9	78	29	271	3	16	37	66
	Snappers	391	53	550	4	68	9	94	35	313	3	17	8	60
Average		497	113	588	12	54	12	89	61	298	4	16	24	131
Percentage of Total Activity					10.6	9.2	10.6	15.1	54.0	50.7	3.5	2.7	21.0	22.3
Rongelap Atoll, South														
Southeast Lagoon	Grouper	1490	112	590	19	16	14	93	41	308	4	33	34	140
	Lutinius	2170	69	513	25	69	19	119	18	111	6	51	1	163
	Red Snapper	1980	106	339	12	36	14	104	59	122	8	27	13	50
Average		1880	96	481	19	40	16	105	39	180	6	37	16	118
Percentage of Total Activity					19.8	8.3	16.7	21.9	40.7	37.5	6.3	7.7	16.7	24.6
Rongerik Atoll														
Eniwetak	Parrot	1450	272	339	1	39	48	44	8	106	8	10	207	140
	Mullet	230	64	68	8	13	3	15	7	18	1	3	45	19
Average		840	168	204	5	26	26	30	8	62	5	7	126	80
Percentage of Total Activity					3.0	12.7	15.5	14.7	5.2	30.4	3.2	3.4	82.0	39.2

(a) >150 g.
(b) μc are in terms of Co^{60} equivalent.
(c) Name unknown.

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TABLE 4.4

Summary of the Gross Beta and Gamma Activity in Birds and Fowl

Island and Specimen	No. of Specimens	Wet Weight (g)	Activity(μc x 10^4/Tissue)[a] β	γ
Rongelap Atoll				
Gejen - Terns	2	163		
Gut			46	115
Tibia			10	10
Carcass			197	290
			253	415
Kabelle - Terns	2	184		
Gut			13	9
Tibia			23	NDA[b]
Muscle			22	6
Carcass			242	133
			300	148
Larbaredj - Terns	2	146		
Gut			114	37
Tibia			29	4
			143	41
Rongelap - Rooster	1	1140		
Skeleton		268	6800	8270
Muscle		434	260	120
Viscera		64	166	51
Liver		144	29	6
Heart		15	8	2
Skin		157	16	18
Lung			2	2
			7281	8479
Rongerik Atoll				
Eniwetak - Terns	2	-[c]		
Gut			10	9
Tibia			6	NDA
Muscle			33	14
Carcass			126	294
			175	317
Bikar Atoll				
Bikar - Terns	2	126		
Gut			9	3
Tibia			6	1
Muscle			40	14
Carcass			14	14
			69	32

(a) μc are in terms of Co^{60} equivalent.
(b) No detectable activity.
(c) No data taken.

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In the fish analyzed at 4 months post-detonation averaged 2.5 μc beta activity (Co^{60} equivalent) and the beta-to-gamma ratio was 1:2. In the current analyses, fish of comparable size had a beta activity of approximately 0.1 μc and a beta-to-gamma ratio of 1:4. The largest fraction of the gross beta activity in fish collected at one month was contributed by material in the viscera and liver. Smaller but equal amounts of activity were found in the muscle and skeleton in these fish. In the fish collected at one year post-detonation, in contrast to the group collected earlier, about 50 per cent of the activity was incorporated into the skeleton with only about 10 per cent found in muscle.

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TABLE 4.5

Radiochemical Analysis of Fish and Chicken

Island	Fish	Weight (g)	Tissue	Total Beta Activity (d/m x 10^{-3})	Percentage of Total Beta Activity					
					Sr^{89}	Sr^{90}	Rare Earths	Cs^{137}	Ru^{106}-Rh^{106}	Zr^{95}
Rongelap Atoll										
Rongelap Lagoon	Pelargic Snapper	503	Viscera	82	1.2	1.0	3.2	0.07		
			Gill	3	0.4	0.3	3.2			
			Muscle	20	0.2	0.2	-(a)			
Gejen	Flat Fish	597	Muscle	40	0.6	0.5	5.6			
			Viscera	585	0.1	0.1	18		14.2	61
	Coconut Crab	1008	Muscle	175	0.2	0.2	1.3			
			Viscera	225	0.7	0.6	1.9	2.1		
	Spider Snail	26	Total Body	1204	0.1	0.1	7.8			
	Spider Snail	11	Total Body	432	0.1	NDA(b)	1.9		5.3	65
	Red Eye Crab	30	Total Body	29	1.1	0.8	1.6	1.0		
Labaredj	Killer Clam	230	Total Body	60	0.2	0.2	2.5			
Rongelap	ROOSTER	1140	Muscle	11	-	-	2	40		
			Viscera	23	0.6	0.5	14			
			Liver	7	2.0	1.6	4			
			Skin	12	1.3	1.0	51			
			Tibia	101	0.2	0.2	1.4	1.0		
Utirik Atoll										
Utirik	Eel	24	Total Body	1	1.1	0.9	11			
	Butterfly Fish	185	Total Body	7	-	-	-			
Rongerik Atoll										
Eniwetak	Mullet	230	Muscle	7	0.8		8.2			
			Viscera	100	0.2	0.2	39	0.04		

(a) No data taken.
(b) No detectable activity.

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CHAPTER 5

GAMMA-DOSE RATES

Gamma-dose rates at 3 ft above ground were determined with AN/PDR 27 C survey meters.

Specific locations which had been monitored on earlier surveys were resurveyed whenever they could be located. General surveys were run on all islands. A linearity calibration was carried out on the instruments with a 93.53-mg Ra source.* Low intensity Cs^{137} standards were carried in the field in order to maintain a continual check on the behavior of the instruments.

5.1 RESULTS AND DISCUSSION

5.1.1. General Surveys

Table 5.1 contains the gamma-dose rates found on the islands surveyed. These data are reported as of 11 months post-detonation.

TABLE 5.1

Average Gamma-dose Rates on Islands

Atoll	Island	Gamma-dose Rate (mr/hr at 3 ft)
Likiep	Likiep	0.04
Utirik	Utirik	0.14
Bikar	Bikar	0.27
Rongerik	Eniwetak	0.7
Rongelap	Rongelap	0.7
Rongelap	Busch	0.8
Rongelap	Eniaetok	2.4
Rongelap	Labaredj	3.0
Rongelap	Kabelle	4.2
Rongelap	Lukuen	4.8
Rongelap	Gejen	5.4
Rongelap	Lomuilal	5.8

* Made available by the Radiological Safety Section, Atomic Energy Commission, at the Pacific Proving Grounds.

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Photodosimetry data* on Rongelap and Kabelle islands are in good agreement with the values reported herein. In general, it was found that gamma-dose rates were uniform over any individual island. Such variations as occurred appeared to be associated with distinct features of the islands such as Marshallese living areas with little organic covering, wide roads, shifting sand dunes, and tidal washes.

5.1.2 Surveys at Specific Locations

Table 5.2 presents readings taken at various specific locations on the islands. In general, most of the specific locations had been set up in the living areas by earlier survey teams and the levels are lower than those encountered over the major portion of the islands.

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* Furnished by Mr. R.L. Taylor, Atomic Energy Commission Radiological Safety Representative.

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TABLE 5.2

Gamma-dose Rates at Specific Locations on Islands

Island	Specific Location	Gamma-dose Rate (mr/hr at 3 ft)
Utirik	Stake 100 ft westward from southwest corner of church (in grove)	0.2
Rongelap	Wood enclosure 30 yd inland from cemetery	0.6
	West side of flagpole, center of northern village	0.5
	Central cistern, 200 yd W of flagpole	0.5
	Roof, southern cistern, 350 yd W of flagpole	0.5
	Northern cistern, opposite flagpole	0.4
	Cistern 150 yd E of flagpole	0.7
	Southernmost cistern of northern village	0.5
	Road Marker XV at Cistern 100 yd S of burned church	0.4
Busch	Stake 50 yd from beach, center of path in coconut grove	0.8
Eniaetok	Two stakes at 100 yd from beach just north of west peninsula	1.8
Kabelle	Stake painted yellow, at high-tide line, west shore	3.1
Lukuen	Stake painted yellow, at high-tide line, southwest corner of island	4.8
Gejen	Stake painted yellow, at high-tide line, near west coconut trees	3.6
Lomuilal	Stake painted yellow, at high-tide line, south end of island	5.8
Eniwetak	Living area, mess hall interior	0.25
	Living area, hospital interior	0.3
	Living area, walk from hospital to mess	0.5
	Living area, store room (behind mess)	0.3
	Living area, exterior store room tent	0.3
	Living area, general area exterior	0.4
	Weather station, exterior areas, local	0.5
	Weather station, interior all tents	0.4
	Weather station, interior all buildings	0.4
	Army site, general area	0.4
	Army site, interior tents	0.4
	Army site, adjacent to trailer position	0.4

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rare earth group elements, Ru^{106}-Rh^{106}, and Zr^{95}-Nb^{95}.

Radioactivity was found in all food plants on the contaminated islands. Supporting plant systems also contained a large reservoir of activity available for future incorporation into the plants.

The amount of activity in the specimens analyzed was generally proportional to the external gamma reading in each of the areas.

6.2 COMMENTS ON FUTURE WORK

In the event that future work is carried out along the lines initiated during this project the following suggestion may be helpful.

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Sampling of coconut tree sap, pandanus, and breadfruit would be greatly expedited by scheduling the major survey during the end of the rainy season, preferably in November. This would also allow a better study of the effect of rainfall on the leaching of activity from the soil into the lens water and from there into the lagoon or ocean.

Studies on the movement of activity into the supporting plant systems might be broadened to forecast the transfer of more hazardous nuclides into reproductive fractions of the plants.

Approved by:

Paul C Tompkins

P. C. TOMPKINS
Scientific Director

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[redacted]

Operation CASTLE Project 4.1 Addendum Report No. WT-936, (Confidential) 1955.

3. Hunter, H. F., and Ballou, N. E. Fission Product Decay Rates, Nucleonics, Vol. 9, No. 5, pp c-2 to c-7, November 1951.

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Technical Information Center
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The enclosed material is in response to your telephone request to

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