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DATA ON SOIL SAMPLES COLLECTED ON THE ISLANDS OF THE PACIFIC FOLLOS-ING THE FIRST DETONATION AND ALSO THE DOSE PATE READINGS AT THE SAKE LOCALITIES.

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Attached (Annex I) are data on soil samples collected on the islands of the Pacific following the first detonation and also the dose rate readings at the same localities. One method of evaluating such data is to try to establish relationships between different units if possible. One useful relationship would be the conversion of disintegrations per minute per gram of soil to millimentgens per hour of gamma radiation at a three-foot height or vice versa.

Larson's work with soils around NTG during the spring 1953 tests

E indicated the following relationship: 10 mc/sq.ft. teta counts of

soil (after absorption and geometry corrections) — 1 mr/hr garma

En at 3 feet. He found that essentially all of the activity was in the

first one inch of top soil.

In collecting soil on the Facific Islands good care was taken to collect one square foot of surface (in fact, templets were made for this purpose). It was impossible, however, to scoop up the soil to a uniform depth so the rule followed was to collect to one inch or greater. If the fallout activity in the Facific Islands also was contained in the first one inch, the additional soil below this contributed mass but little activity to the sample. By taking the disintegrations per minute per gram (after a thorough mixing) and multiplying by the total number of grams for each sample one should arrive at the activity per square foot.

The plot of bota disintegrations per minute per gram of soil versus mr/hr of gamma at 3 feet is shown on the attached graph. The correlation is not too good. For references, several curves are arbitrarily drawn on the graph. The data strongly suggest that less than 10 pc/sq. ft. is equivalent to 1 mr/hr. For lower levels of activity the data are more of the order of 2 pc/sq. ft. I mr/hr and for higher levels of activity less than 1 pc/sq.ft. I mr/hr. If one is flistified in trying to fit a curve to such widely scattered data, then 1t pc/sq.ft. I mr/hr is a very rough approximation. Another possibility but not probability is a more complex curve shown by the solid black line.

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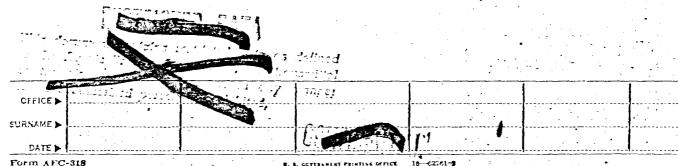
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Pased on calculations made in Annex II it would appear that about 10 µc/ft2 >1 mr/hr gamma at 3 feet. If one accepts the figure of 2 beta emissions for each garma photon (Effects of Atomic Weapons) then 20 yc/ft2 (bota) -> 1 mr/hr gamma at 3 feet.

Knowing the difficulties of collecting, handling, packaging, shipping and counting the samples, it is probable that some of the data are not entirely valid. The information shown in this neme suggests that further carefully controlled studies must be made before a more firm conclusion may be reached.

Attachments 3 Annex I Annex II Graph (w/cy lA only)

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ANNEX I Comparison of Soil Activity to Pose-rate Readings

Location	Collection	No. Grans	d/m/gm (same date)	Total Act. (pc/ft²)	er/hr (survey (neters
Likiep	6 Karch	2,1:00	23,000	2.5 × 10 <sup>1</sup>	~3
Jeno	0	1,060	13,000	6,2	~3
Ailuk	# '	2,160	23,000	2.2 x 10 <sup>1</sup>	3 - 15
Kejuit	7 Earch	1,360	30,000	1.8 × 10 <sup>1</sup>	3 ~ 10
Ormed	5 Harch	1,325	15,000	9.0	3 <b>.5</b>
Erikub	5 Earch	1,720	4,300	3 <b>.3</b>	1.5
Kaven	6 March	1,335	5,500	3 <b>.3</b>	1.8
Totho	6 Parch	1,490	2,400	1.6	~0.8
Falap	7 Harch	965	950	0.4	0.5
Rongelap (Northern)	8 Varch	703	290,000	9.2 x 10 <sup>2</sup>	hho.o
(Central)	4	815	1,600,000	5.9 × 10 <sup>2</sup>	280.0
(1 mile M.Village)	<b>.</b>	1,630	100,000	7.6 x 10 <sup>1</sup>	340.0
(Couth Cistern)	a .	1,040	11:0,000	6.6 x 10 <sup>1</sup>	220.0
Friirippu	A	810	9,000,000	3.2 x 10 <sup>3</sup>	2,200.0
Iniwetok	It	2,010	780,000	$7.1 \times 10^2$	900.0
Kabelle	n	1,470	4,500,00 <b>0</b>	3.0 x 10 <sup>3</sup>	2,000.0
ütirik	9 Earch	1,140	1,100,000	6.9 x 10 <sup>2</sup>	40.0
Bikar	<b>13</b>	1,030	8 <b>5,000</b>	4.1 x 10 <sup>1</sup>	ilio.o
Iniwetak	10 Earch	1,050	135,000	8.8 x 10 <sup>1</sup>	230,0
Sifo	in pair	1,060	11:,000	6.7	100.0

## II XEKEL

## Calculations of Tose Rate at Three Feet Above A Flane Surface

For point source (0.3 - 3.0 Kev range)

Fose rate (r/hr) = 
$$\frac{6CE}{d^2}$$

where: C = activity (curies)
E = energy in Nov
d = distance in feet

Dose rate = 
$$\frac{61A \ 2\pi y dx}{h^2 + x^2}$$

where: A = activity/unit area
h = height above surface (feet)
x = distance in feet

Fose rate = 67A 
$$2\pi$$
 $R_2$ 
 $R_1$ 
 $R_2$ 
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The rean free path for 0.7 MeV in air is about 360 feet so that essentially all of the dose will be contributed from a surface 1,000 feet in radius.

Let  $\Lambda = 10 \times 10^5$  cories/ft<sup>2</sup> E = 0.7 Yev

Tose rate =  $G_{\pi}(0.7)(10 \times 10^{-6}) \ln \left[ \frac{9 + 10^6}{9} \right]$ 

Since this formula assumes no absorption and also a uniform plane surface, an estimate is that

