U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY
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14 JAN 1957

AIR MAIL

Dr. W. F. Libby
U.S. Atomic Energy Commission
Washington 25, D.C.

Dear Dr. Libby:

In accordance with your request of 26 December 1956, Dr. H.V. Weiss has assayed samples of Marshall Island soil for exchangeable calcium and Sr^{90} and has computed the sunshine units on this basis.

Seven soils from different islands in the northern Marshall group were assayed. The samples were 6" x 6" surface soils and ranged in character from calcareous particulate to rich loam.

Exchangeable calcium was determined by the method of Smith and Blume (Soil Sci. 77 9, (1954). Samples of soil varying in weight from 1-2 pounds were extracted with 500 ml of the equilibration solution.

In estimating Ca^{45}, extracts of the exposed soils were scavenged with ferric hydroxide prior to oxalate precipitation to eliminate interfering nuclides. Sr^{90}, which would be expected to follow Ca^{45}, was insufficient in concentration to interfere with accurate counting measurements, as evidenced by the identical aluminum absorption curves obtained with the extracts and an authentic sample of Ca^{45}.

The data are shown in the accompanying table. Previous analyses on these soil types showed that the calcium content ranged from 23-35 per cent. Clearly, exchangeable calcium represents only a small fraction of the total.

It was interesting to note that the sunshine units expressed on the basis of exchangeable calcium are without exception considerably greater than that of plants recovered from the respective islands (cf. USNRDL Report 455 (1956)).

This observation implies that a sizeable fraction of Sr^{90} is in an unavailable form or that the distribution of this radioelement in the soil is inhomogeneous and only a small part is translocated to the area of the root system.

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In the latter regard, you may be interested to know we intend to study the downward movement of specific nuclides on profile soil samples which were collected from the Marshalls about one year ago.

If we can be of any further assistance we shall be happy to do so.

Very truly yours,

EUGENE P. COOPER
Associate Scientific Director

SUNSHINE UNITS OF MARSHALL ISLAND SOILS

Island	Soil Type	Sr^{90} d/m/g soil	Exchangeable Calcium mg/g soil	Sunshine Units
Utirik	Small sand-like particles	3 ± 1.5	1.9	660 ± 330
Gejen	Large coral particles	1886 ± 20	1.4	$6.2 \times 10^5 \pm 6.3 \times 10^3$
Likiep	Loamy	11 ± 2	11.3	430 ± 60
Eniwetok	Small sand-like particles and loam	62 ± 2	4.6	$6.1 \times 10^3 \pm 180$
Rongelap	Loamy	234 ± 4	12.7	$8.4 \times 10^3 \pm 150$
Sifo	Small sand-like particles	25 ± 3	0.8	$1.3 \times 10^4 \pm 1.7 \times 10^3$
Ennaetok	Small sand-like particles	400 ± 11	0.9	$1.9 \times 10^5 \pm 5.4 \times 10^3$