



## **Radiological Picture in the Marshall Islands Today**

Ivana Nikolić-Hughes  
Columbia University

March 1<sup>st</sup> Bikini Day Rally

# K=1 Project in the Marshall Islands



2/22/16

Nuclear Weapons -- Hughes

2

# Marshall Islands





# K=1 Project in the Marshall Islands

Paper 1:

## Background gamma radiation and soil activity measurements in the northern Marshall Islands

Maveric K. I. L. Abella<sup>a</sup>, Monica Rouco Molina<sup>a</sup>, Ivana Nikolić-Hughes<sup>a,b</sup>, Emlyn W. Hughes<sup>a,c,1</sup>,  
and Malvin A. Ruderman<sup>c,1</sup>

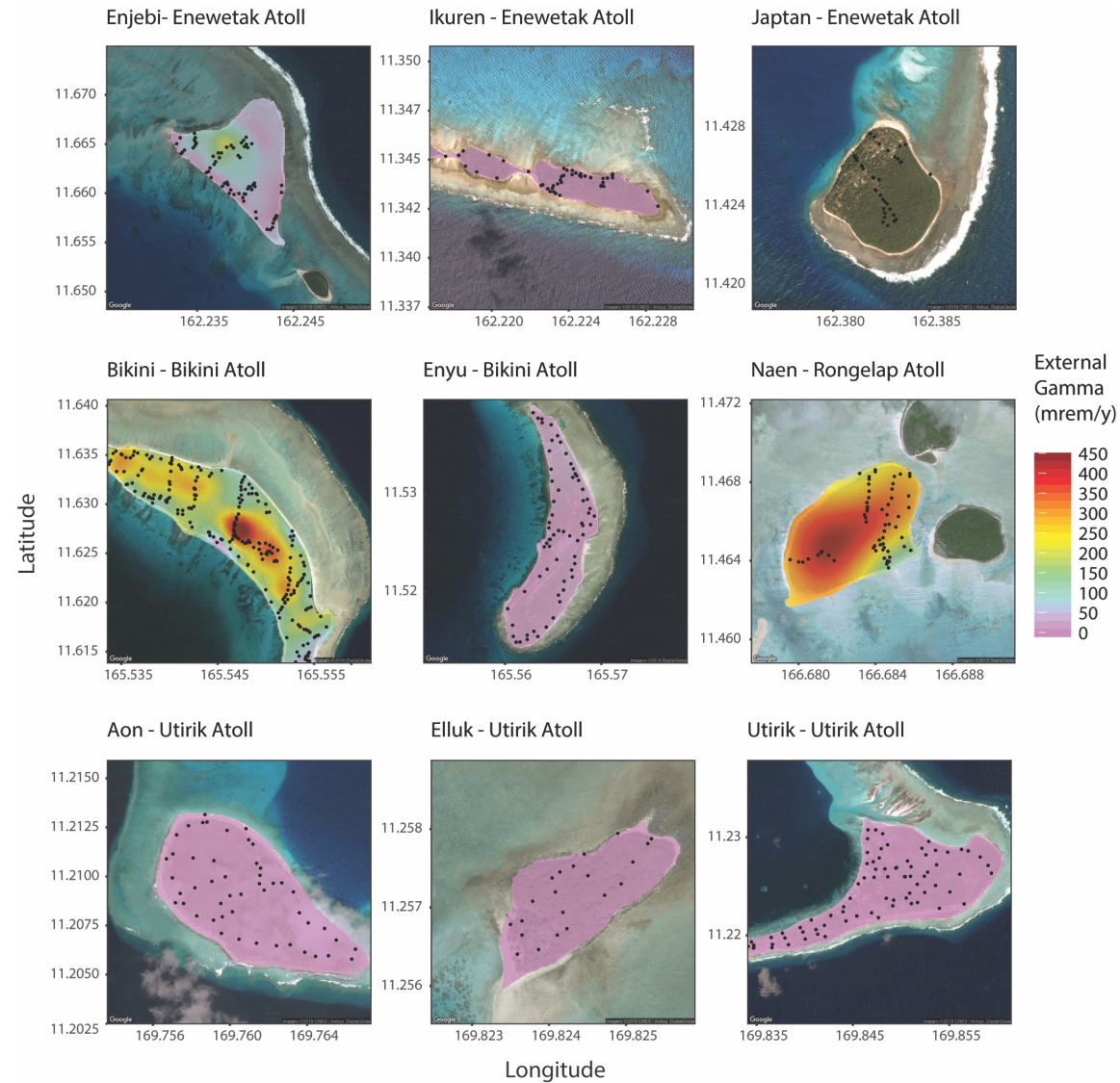
<sup>a</sup>K=1 Project, Center for Nuclear Studies, Columbia University, New York, NY 10027; <sup>b</sup>Department of Chemistry, Columbia University, New York, NY 10027; and <sup>c</sup>Department of Physics, Columbia University, New York, NY 10027







# Maps of 9 islands in the 4 atolls in the northern Marshall Islands, including 8 interpolated maps.



Maveric K. I. L. Abella et al. PNAS 2019;116:31:15425-15434

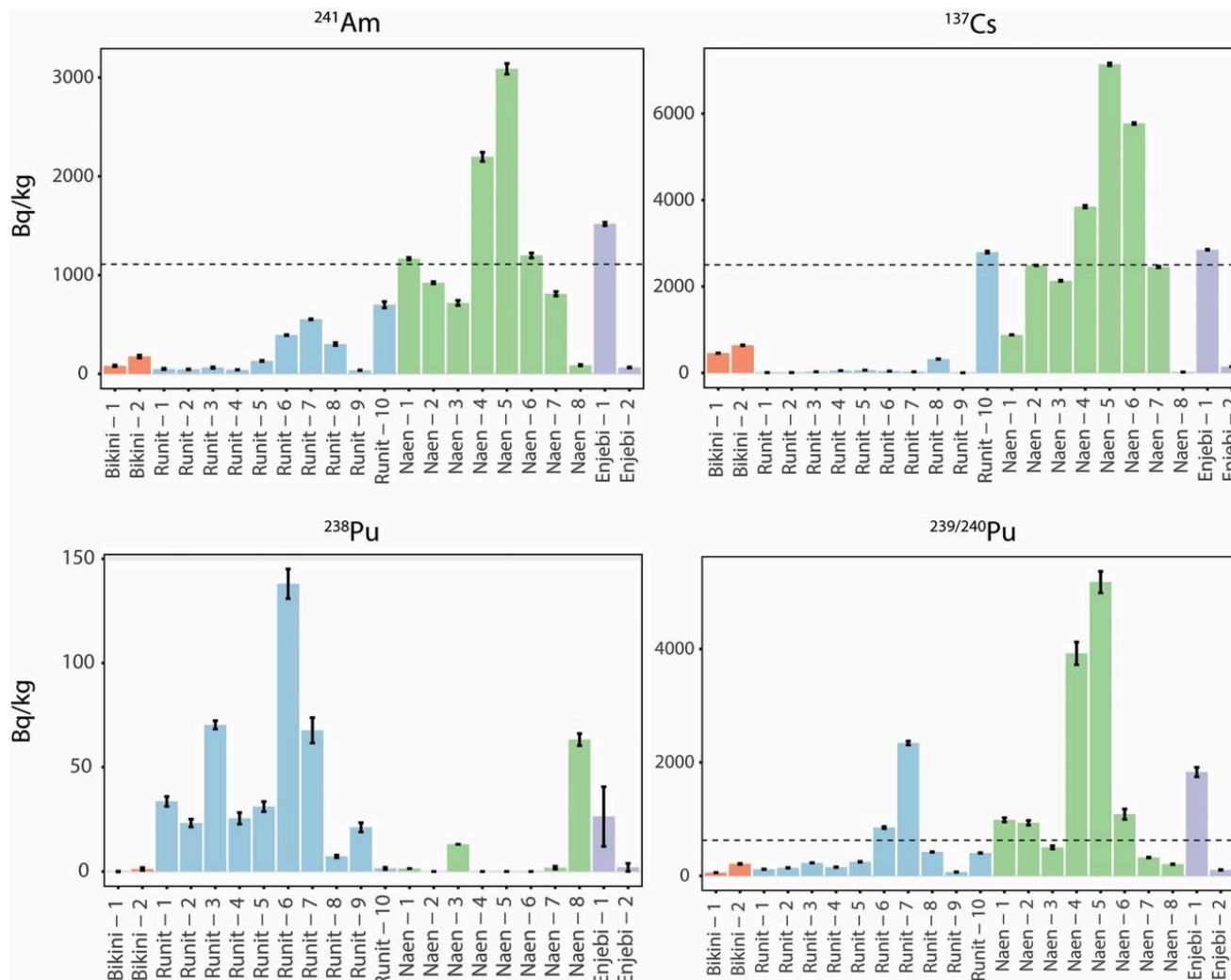
PNAS







**Mean radioisotope activity concentrations (Bq/kg) in the soil for 20 samples with the highest concentrations from different atolls (Enjebi and Runit islands on Enewetak Atoll, Bikini Island on Bikini Atoll, and Naen Island on Rongelap Atoll).**



Maveric K. I. L. Abella et al. PNAS 2019;116:31:15425-15434

PNAS

# Runit Dome



# K=1 Project in the Marshall Islands

Paper 2:

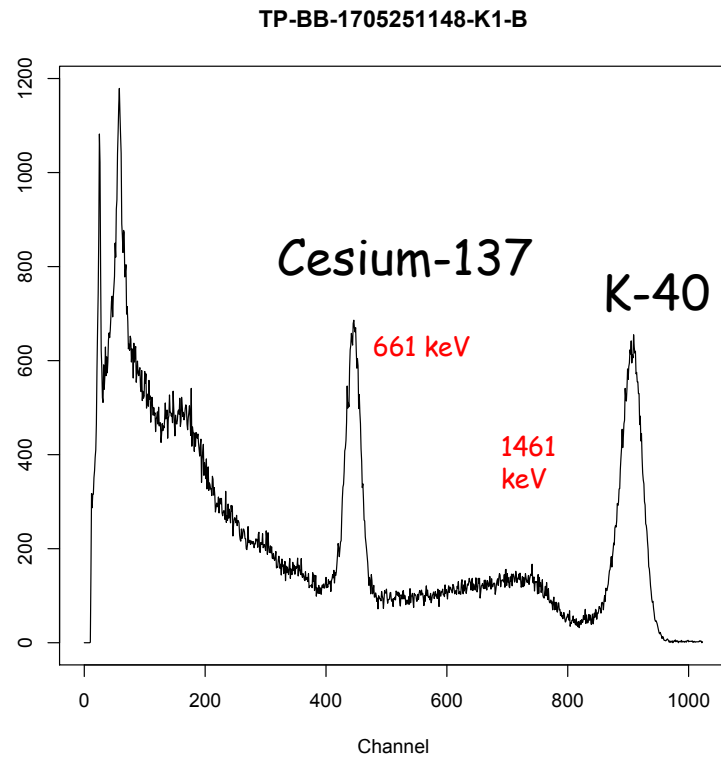
## In situ measurement of cesium-137 contamination in fruits from the northern Marshall Islands

Carlisle E. W. Topping<sup>a</sup>, Maveric K. I. L. Abella<sup>a</sup>, Michael E. Berkowitz<sup>b</sup>, Monica Rouco Molina<sup>a</sup>, Ivana Nikolić-Hughes<sup>a,c</sup>, Emlyn W. Hughes<sup>a,b,1</sup>, and Malvin A. Ruderman<sup>b,1</sup>

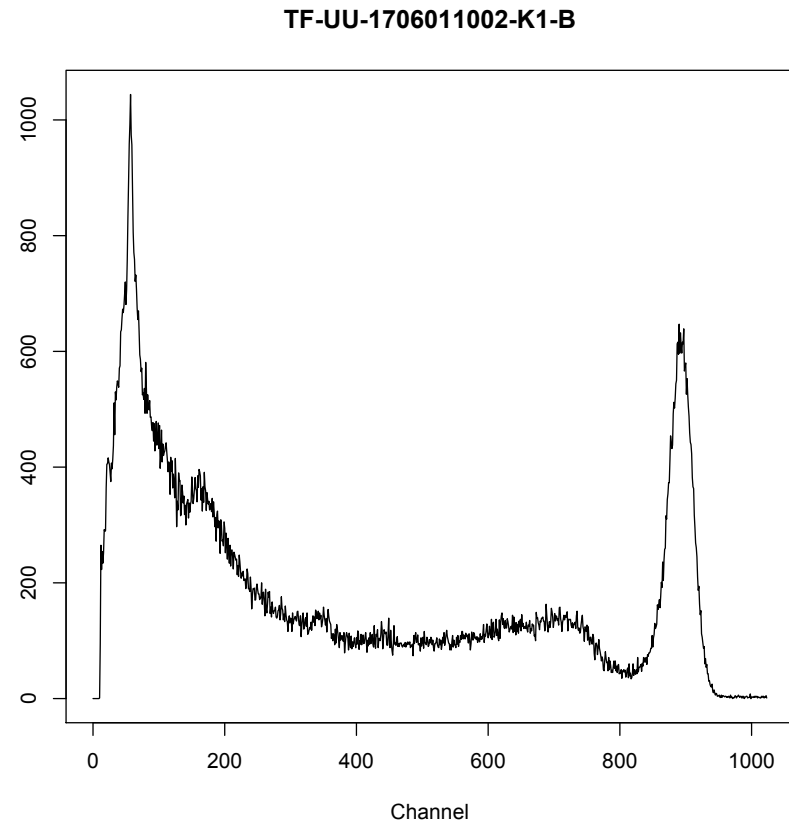
<sup>a</sup>K=1 Project, Center for Nuclear Studies, Columbia University, New York, NY 10027; <sup>b</sup>Department of Physics, Columbia University, New York, NY 10027; and <sup>c</sup>Department of Chemistry, Columbia University, New York, NY 10027



# Spectra from single fruits



Bikini



Utirik

# Standards for $^{137}\text{Cs}$ in food

**Table 1.**

International standards by country and organization, including specified food types, for  $^{137}\text{Cs}$  contamination levels in units of becquerels per kilogram

Food	IPPNW, 1996	Belarus, current	Russia, current	Ukraine, current	Japan, current	European Union	1994 Codex	IAEA	FDA
Infant food	8	37	40–60	40	50	370	1,000	1,000	1,200
Noninfant food	16	NS	NS	NS	100	600	1,000	1,000	1,200
Milk	16	100	100	100	50	370	1,000	1,000	1,200
Fruit	16	40–100	40–120	40–70	100	600	1,000	1,000	1,200
Berries	16	185–370	160–500	500	100	600	1,000	1,000	1,200
Mushroom	16	2,500	2500	2500	100	600	1,000	1,000	1,200
Bread, cereal	16	40	40–60	20–50	100	600	1,000	1,000	1,200

# Standards for $^{137}\text{Cs}$ in food

$^{137}\text{Cs}$  (Bq/Kg)

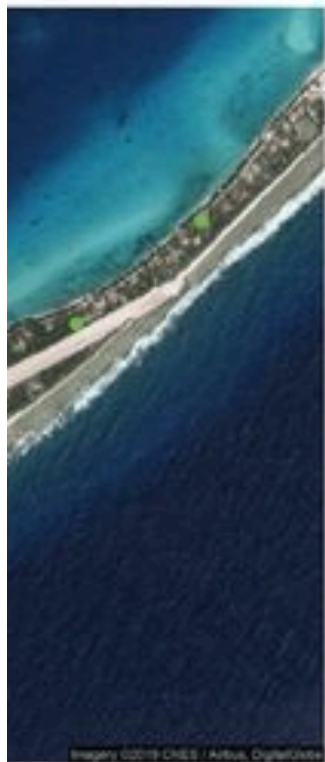
- 0-40
- 40-100
- 100-600
- 600-1200
- >1200

\*Homeland security colors



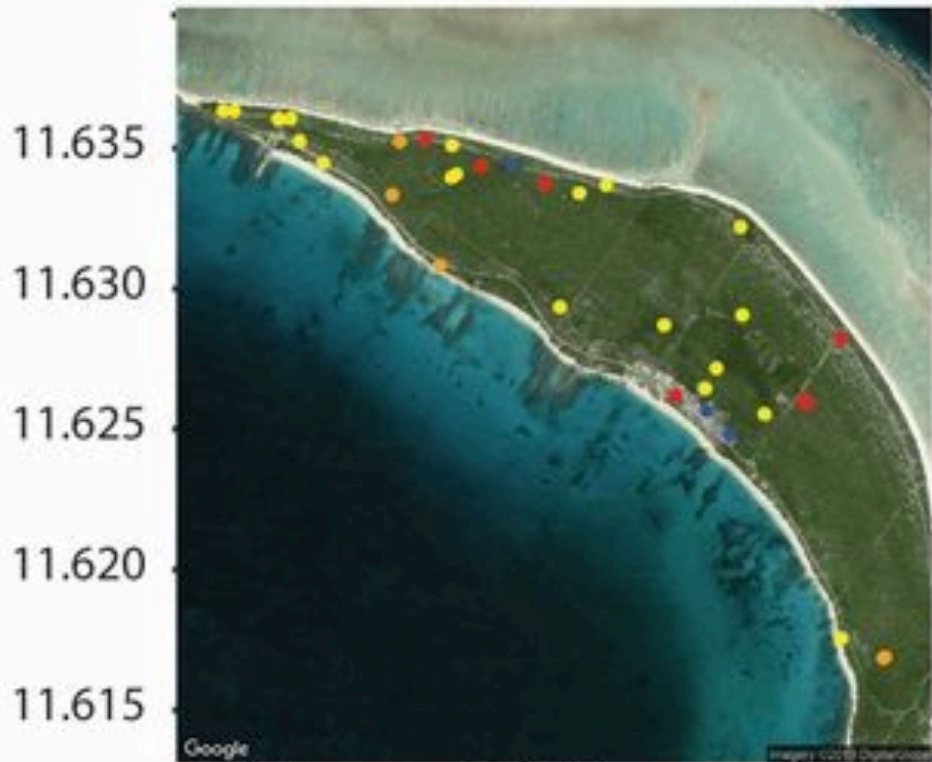
Location of measured fruits on 4 atolls in the northern Marshall Islands.

etak Atoll



162.34

Bikini - Bikini Atoll



11.635  
11.630  
11.625  
11.620  
11.615

165.5 165.54 165.55

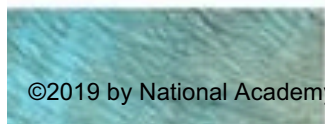
Aon - Utirik Ato



11.2150  
11.2125  
11.2100  
11.2075  
11.2050

169.7575

c Atoll



Enyu - Bikini Atoll

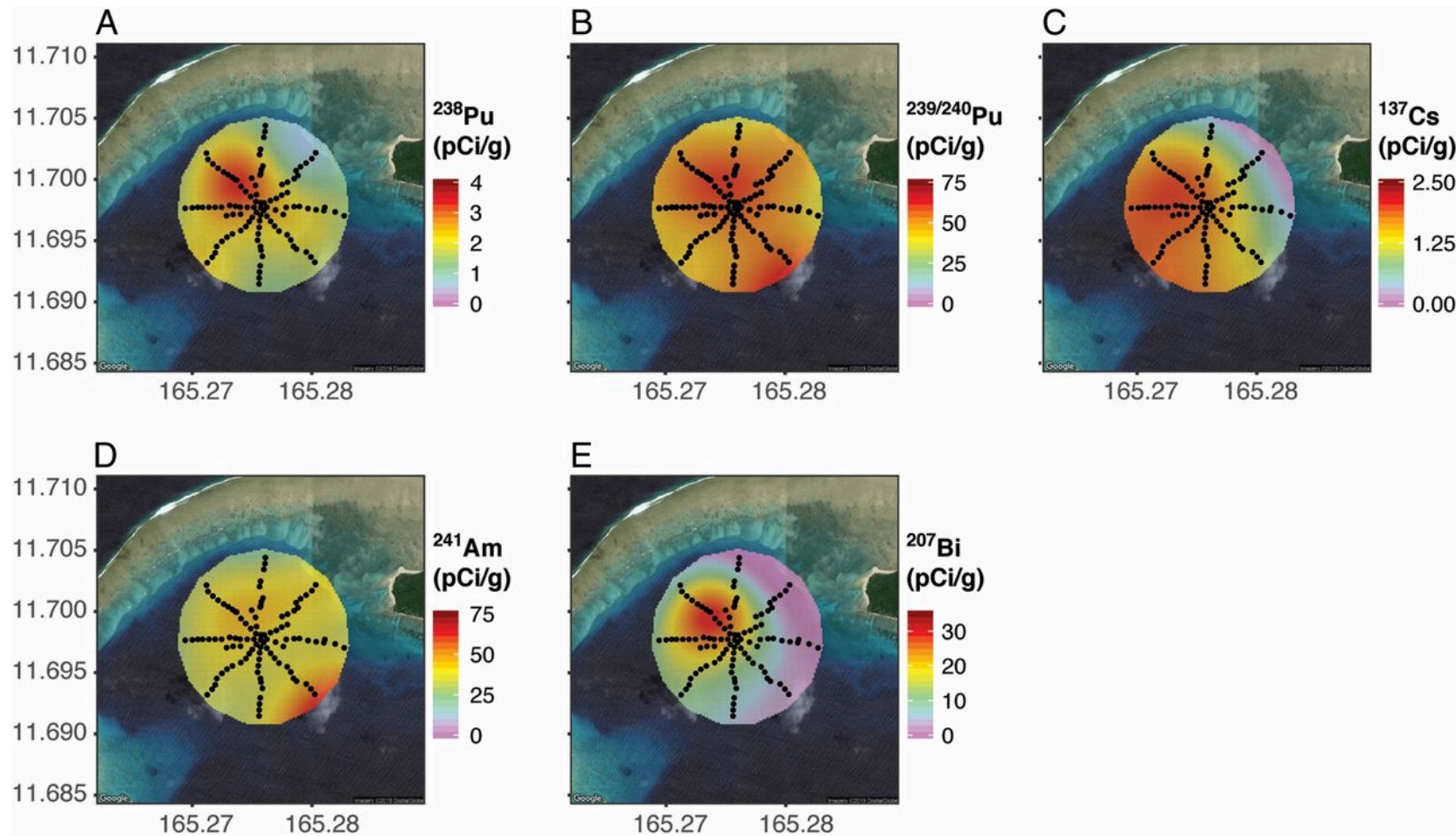


Elluk - Utirik Ato



11.258

## Radiation levels of 5 different radionuclides in the top 25 cm of surface sediment of the Bravo crater.



Emlyn W. Hughes et al. PNAS 2019;116:31:15420-15424

PNAS







76513

HEADQUARTERS  
TASK GROUP 7.4, PROVISIONAL  
APO 187, c/o Postmaster  
San Francisco, California

CLASSIFICATION CANCELLED  
WITH DELETIONS  
BY AUTHORITY OF DOE/OC\*

REVIEWED BY *Carroll Wagoner* 5/28/86  
DATE  
J. Deag 8/20/86

TGOP

JUST 5 DAYS  
BEFORE BRAVO

23 February 1954

MEMORANDUM FOR: Chief of Staff, Task Group 7.4, Provisional

RG 347  
~~SECRET~~  
~~CONFIDENTIAL~~

SUBJECT: Report of Conference Location Technical Library B-2

Collection AFWL

Folder OP. Plan, Operation Castle  
Task Group 132.4 - 7-3-54, 12-7-53, 2-23-54

1. PURPOSE: On 20 February 1954, General Estes, Doctor Schwartz and Lt Colonel Crosby attended a positioning meeting for the purpose of determining the final positions of all aircraft participating in Shot BRAVO.

2. PERSONNEL ATTENDING THE CONFERENCE: Representatives of Joint Task Force SEVEN, Task Group 7.1, Task Group 7.3 and Task Group 7.4.

3. DISCUSSION:

a. It was decided that aircraft would be positioned on the basis of a twenty-megaton yield with the exception of the two (2) effects aircraft which will be positioned on the basis of a twelve-megaton yield.

b. The latest information from Los Alamos Scientific Laboratory indicates that BRAVO will have a maximum possible yield of ~~15~~ megatons with a probable expected yield of ~~10~~ megatons.

c. The final positioning for the B-36D aircraft is 50,000 feet horizontal range and for the B-47, 48,000 feet horizontal range.

d. The second IBDA aircraft is in a critical position at shock arrival, and therefore he will accomplish radar scope photography until H + 1 minute, at which time he will turn tail aspect to Ground Zero. HARDTIME THREE, the furthest out of the IBDA aircraft will take over the scope photography up to H + 15 minutes, unless he is forced to abort the last portion of this mission because of cloud growth.

4. ACTION REQUIRED: Incorporate the above decisions in Operations Order 2-54.

JAMES E. CROSBY, JR.  
Lt Colonel, USAF  
Chief, Technical Projects

70054 153

AFWL/HQ

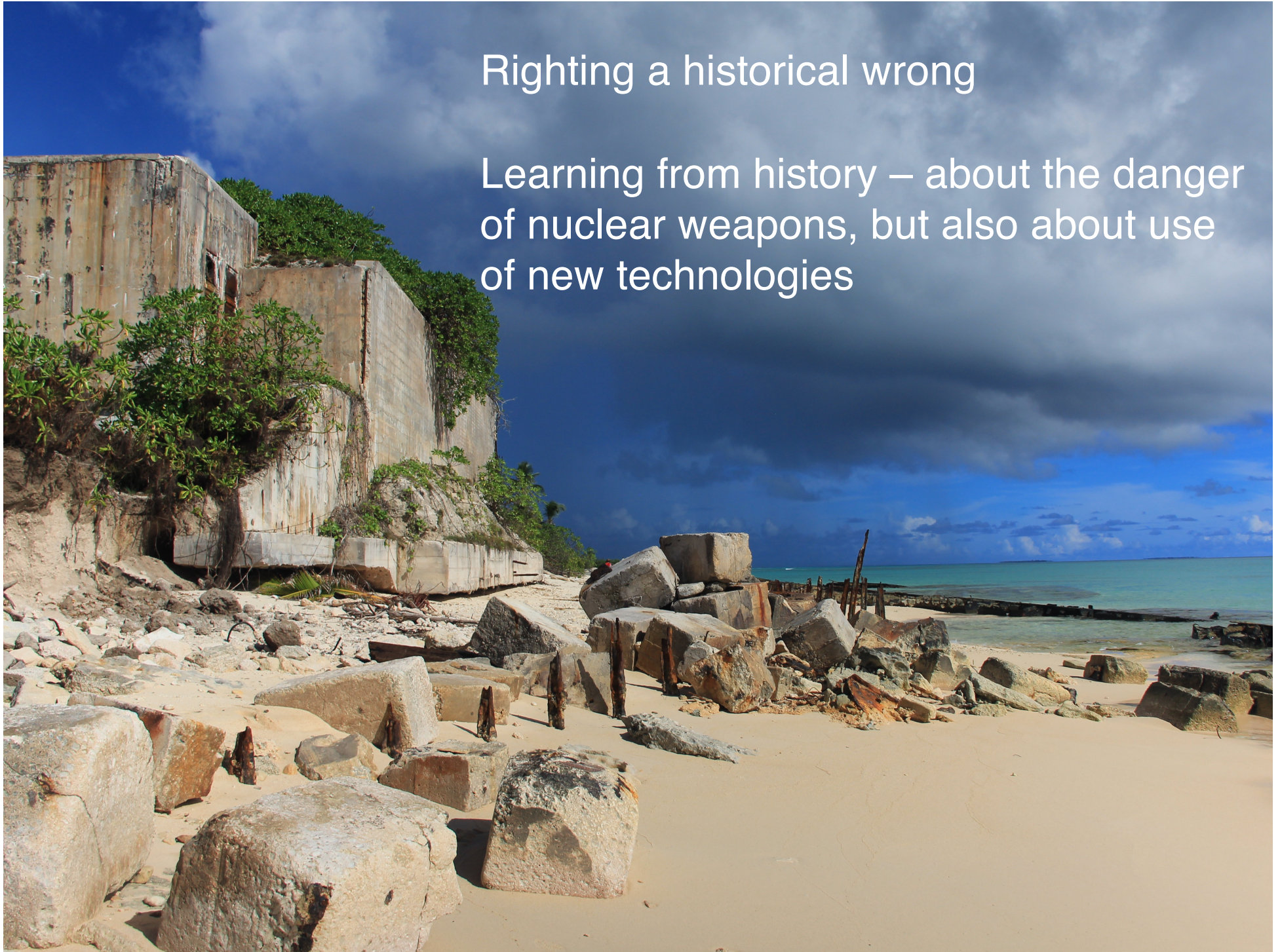
3-2628-RL

courtesy of Bill Graham and Giff Johnson



Righting a historical wrong

Learning from history – about the danger of nuclear weapons, but also about use of new technologies





# The US Should Apologize to the Marshall Islands for Nuclear Tests

The United States tested 67 nuclear weapons from 1946 to 1958 in what is now the Republic of the Marshall Islands.

By **Ivana Nikolić-Hughes**, **Glenn Alcalay**, and **Hart Rapaport**

April 30, 2021



With the Able nuclear test on July 1, 1946, the United States fired the opening salvo in one of the worst, and least-known, tragedies in our nation's history. Seventy-five years later, it's time for the Biden administration to break with the past and issue a presidential apology to victims of nuclear testing in the Marshall Islands. This action promises to address past injustices, help restore America's moral leadership on the world stage, and foreclose the chance for similar calamities.

The United States tested 67 nuclear weapons from 1946 to 1958 in what is now the Republic of the Marshall Islands (RMI), a nation of 29 atolls located nearly halfway between Hawaii and



Credit: [Public Domain](#)