17 May 1973

ENVIRONMENT [illegible] ATOLL CLEANUP

3.f. The U. S. [illegible] of the [illegible] Nuclear Testing

The testing [illegible] testing grounds that, among other factors [illegible] remote from [illegible] areas. Previously, two tests had been con[ducted] [illegible] Bikini [illegible] and July 1946 under Operation [illegible] and near [illegible] Alamogordo, New Mexico on 16 July 1945 a[illegible] Trinit[y] [illegible] for a continuing program of testing [illegible] suffered [illegible] in that the land areas [illegible] oriented to the prevailing winds to permit construction of a [illegible].[1] This led to the selection of Eniwetok [illegible] for testing [illegible] detonations, a selection administratively approved [by] [President] Truman on 2 December 1947.

BEST AVAILABLE [illegible]

The selection of Eniwetok Atoll [illegible] on a study of possible ocean sites made [illegible] S. R[illegible] Deputy Director of the Division of Military A[pplications] [illegible] K. Froman of the Los Alamos Scientific [Labora]tory. [illegible] possible fallout, Eniwetok Atoll was [illegible] ted [illegible] of miles of open sea lying from the Atoll [illegible] westward [illegible] of the prevailing winds.

1. N. O. Hines, [illegible] Press, Seattle, 1962) p 81.

The [illegible] nuclear [illegible] tests on [illegible] [illegible] on 1[illegible] October 194[illegible]. Called [illegible] composed of personnel [illegible] having significant ground fac[illegible] Seven operated from their many s[illegible] were made in this Operation Sands[illegible] May in 1948.[3] The detonations [illegible]; the first off Engebi, the second off [illegible] The largest yield was the second with [illegible] kiloton terminology means that the [illegible] detonation equals 49 thousand tons [illegible] and following tests, table at the end of [illegible] gives [illegible], date, time, location, height of burst [illegible] ground surface, or underwater) of nuclear expl[illegible].

In prepar[illegible] for the next [illegible] nuclear tests, the Atomic Energy Commissi[illegible] 194[illegible] [illegible] further testing by improving groun[illegible] structure [illegible] more adequate technical facilities at [illegible] based on a survey submitted by Holmes and [illegible] The Commission approved the recommendat[illegible] 1949, and the contract was signed in June.

BEST [illegible]

2. Reference [illegible]
3. Reference [illegible]
4. Samuel Glas[illegible] Effects [illegible], Department of the Army Pam[illegible] A. Edwards, "Tabulation of Data on [illegible] Nations through 1965," Report UC[illegible] from clearing house for Federal [illegible])
5. Reference [illegible]
6. Reference [illegible]

On 31 Januar [illegible] the decision to develop a thermo[illegible] f course, was to have great impact on [illegible] such large increases in yield and fal[illegible] continental United States, but are [illegible] of the Pacific Proving Ground. [illegible] test [illegible] that at first were limited to the 20 [illegible] weapon, the Nevada Proving G[illegible] was additionally established in the autumn of [illegible] a 1951 series starting on 27 Ja[illegible]

The Eniweto[illegible] for 1951 was designated as Operation Gree[illegible] and [illegible] tests, activities related to thermo[illegible] involving a full thermonuclear explosion. Betwe[illegible] and 24 Ma[illegible] tests from towers were conducted at Eni[illegible] Easy announced as 47 kiloton yield.[4,7]

A full thermonuclear explosion [illegible] the following year in the 1952 test series [illegible] Iv[illegible],[4,8] This involved only two tests, but th[illegible] had [illegible] and consequence. The first was Te[illegible] the first the[illegible] detonation and a ground level explosion [illegible] to [illegible] of 10 4 million tons of high explosiv[illegible] island, Elugelab (Eluklapin in Marshallese, [illegible], at the north end of the Atoll. Being a [illegible] large yield, Test Mike actually remove[illegible] crater. A large reinforced conc[illegible] large island of Engebi to test effects [illegible] The second test of

7. Reference [illegible]
8. Reference [illegible]

Operat[illegible] from an air drop north of the [illegible]

Associat[illegible] was dozens of times greater than [illegible] corresponding increase in the fallout radiation [illegible] the [illegible] and contrary to expectations, the winds [illegible] southeast,[9] and so most of the radio[illegible] as to the north and northwest. Nevertheless, [illegible] northern islands of the Atoll. Since these i[illegible] harm resulted to humans from this local f[illegible]

U.S. tests [illegible] Proving Grounds in 1953, thereupon starting [illegible] at the Nevada Proving Grounds or the Pacific [illegible] years. The next series of tests in the Pa[illegible] 954 [illegible] Operation Castle.. It involved a task force, which [illegible] the number [illegible] Seven of the 1947 force. Five out of the s[illegible] Bikini Atoll, which had not been used for nuc[illegible] these had consequences affecting all test[illegible] megaton thermonuclear tests Bravo in this seri[illegible] conducted on the [illegible] in Bikini Atoll on 28 February 1954[4,10]

The radioacti[illegible] Bravo [illegible] particularly troublesome by unexpectedly being [illegible] to the east [illegible] than to the north as had been foreseen. Harmful [illegible] of radioa[illegible] out on the inhabited atolls of Rongelap, Ailingina[illegible] Rongerik [illegible] Japanese fishing ship (Lucky Dragon). These ev[illegible] resulted in [illegible] renewed interest in radiological consequences, with [illegible] focus on [illegible] series of tests. The Atomic Bomb Casua[illegible] which [illegible] established after the atomic bombing of Ja[illegible] [illegible] Maru of the Japanese

9. Melvin P[illegible] Lawrence Livermore [illegible]

10. [illegible]

Fisheries [illegible] for survey purposes; [illegible] the [illegible] Guard Cutter Roger B. T[illegible]

Operation [illegible] Atoll, but with an enlarged [illegible] fallout. The only detonation [illegible] the Nectar shot, detonated [illegible] the Mike crater.

By 1956 [illegible] code name) had become a barren [illegible] palms and other trees had long since [illegible] had been subjected to World War II [illegible] series of nuclear weapons tests. The nuclear [illegible] irradiated the island by initial radiation [illegible] residual radiation of fallout. Nevertheless, [illegible] on this isolated island in 1955[12] even [illegible] test.

The 1956 series [illegible] Proving Ground was called Operation Redwing. These [illegible] Eniwetok Atolls, with eleven at Eniwetok Atoll. [illegible] Bokou [illegible] the U.S. code name) was removed on 6 June [illegible] was positioned on the land surface. This Se[illegible] of the remainder of Bokou Island. The other [illegible] was Test Lacrosse, which formed a crater [illegible] is the U.S. code name) in the tide [illegible] the [illegible] island.

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11. John H. [illegible] -4656 (1956).
12. Reference [illegible].

Early [illegible] testing of nuclear explosions was under [illegible] international awareness about the world-wide [illegible] tests by the several nuclear nations. [illegible] series of tests called Operation [illegible] took place in 1958 both at En[illegible] Proving Grounds as Phase II, [illegible] testing years at the sites.

Between [illegible] tests were conducted at Eniwetok under Operation [illegible] period of testing thereby const[illegible] conducted at the Atoll over the ent[illegible] Operation Hardtack, the U.S. morator[illegible] 1958 and was followed in a few days by a [illegible] nuclear tests at [illegible] years until the present time have allowed some nat[illegible] affected islands and have provided the time [illegible] the residual radioactivity resulting from th[illegible]

Two islands [illegible] Hardtack, Phase I. The test Koa was [illegible] Island Dridrilbwij (Gene by the U.S. code name) [illegible] from the Atoll. The other was Test Cactus [illegible] Island (Yvonne by the U.S. code name). Thi[illegible] Southwest of the La Crosse crater

Further tests [illegible] in the vicinity of Johnston Is. and [illegible] east that there was no effect upon [illegible] the 1 September 1961 announcement [illegible] testing. The USSR tests [illegible] month later the United States [illegible] Operation Dominic, but, as just [illegible] series was completed by the end of [illegible] Treaty, which was signed in Septe[illegible] those tests that did not result in [illegible] boundaries, and so effectively limited [illegible] Although underground tests have been conducted [illegible] States and at Amchitka in Alaska, none have [illegible] Atoll.

In these test [illegible] total of [illegible] detonations or attempts at nuclear detonat[illegible] made [illegible] Atoll. The number of tests either on individual islands or [illegible] these islands is as follows for the total of 4[illegible] Enewetak [illegible]

Number of Tests	Board Geo. [illegible]	Island Name: [illegible]	[illegible]	Island Name: US Code Name
18	Runit	[illegible]		Yvonne
10	Enjeb[illegible]	[illegible]		Janet
4		[illegible]ap	[illegible]	Flora*
3	Aomon	[illegible]	[illegible]	Sally
2	Eberir[illegible]	[illegible]		Ruby
1**	Bogal[illegible]	[illegible]		Alice
1		[illegible]		Gene***
1	Bogeir[illegible]	[illegible]		Helen
1	Rujiy[illegible]	[illegible]		Pearl
1	Bugan[illegible]	[illegible]		Henry
1	Bogan	[illegible]		Irwin

*This island n[illegible] by test Mike on 1 Nov 52.
**Actually loca[illegible] southwest of this island.
***This is and [illegible] test Koa on 23 May 58.
The underwater [illegible] other

Th? p[illegible] [illegible]osives before detonation fo[illegible]

[illegible] of tests

What happened to the tests?

Of course, land sur[illegible] [illegible]ctive to the physical condition of the islands by [illegible] -exi[illegible] or [illegible] removing an island entirely. All ha[illegible] [illegible] side usually off the islands of Runit (Yvonne) and [illegible] (Janet) [illegible] generally west of these islands, the tests produced [illegible] that [illegible] winds from the northeast generally carried [illegible] the island [illegible] the lagoon.

In either the [illegible] successf[illegible] [illegible] detonation or the case of an unsuccessful nuclear detonation a spread [illegible] radioactivity results in addition to physical damage [illegible] vegetation [illegible] animals. In the case of a successful de[illegible] the fol[illegible] [illegible] radioactive results are:

1 [illegible] products re[illegible] [illegible] the fission of the uranium or plutonium [illegible] nuclear explosive, with [illegible] fission [illegible] cesium-137 and strontiom-90. ([illegible] 20-year [illegible] respectively, roughly [illegible] human [illegible] do not decay appreciably [illegible] nor do they decay sufficiently [illegible] of radioactivity.

... used for towers,
... waiting times

... capture of

... the nuclear
... nuclear
... int" safety tests),
... for assembling these
... m.
... from thermonuclear
... (However ... the water in the ocean

Misfires ... one-point" safety tests of nuclear explosi... activity, as mentioned in Item 4. ... uranium or plutonium is deposited ... of the spread from a nuclear explo... spread in the former case, but worldwide ... A particular concern in these cases ... lower radiological hazard of ... radiological concern when used ... concern is complicated by its long ... which is far too long to enable ... hazard.

Just such [illegible] ...tion have occurred around Runit [illegible] in Operation Hardtack [illegible] was planned only to [illegible] explosion. Local [illegible], narrow island.

NUCLEAR DETONATIONS AT ENIWETOK ATOLL

Zebra	[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]		Barge	[illegible]	[illegible]	
Zuni	27/5/56	1756		Surface	11°37'24"	162°19'13"	
Erie	30/5/56	1815	300	Tower	11°32'40"	162°21'52"	
Seminole	6/6/56	0055		Land Surface	11°40'35"	162°13'[illegible]2"	12 kT
Blackfoot	11/6/56	1826	200	Tower	11°33'04"	162°21'31"	
Kickapoo	13/6/56	2326			11°37'41"	162°[illegible]'32"	
Osage	17/6/56	[illegible]114	680	Air Drop	11°32'48"	162°21'3[illegible]"	
Inca	21/6/56	2156			[illegible]	[illegible]	
Mohawk	2/7/56	1806			11°37'39"	[illegible]	
Apache	8/7/56	1806		Barge	11°40'17"	162°12'01"	
Huron	21/7/56	1816		Barge	11°40'19"	162°12'09"	
HARDTACK, PHASE I							
Cactus	5/5/58	1815		Land Surface	11°33'23"	162°21'15"	18 kT
Butternut	11/5/58	1815		Barge	11°32'23"	162°21'02"	
Koa	12/5/58	1830		Land Surface	11°40'30"	162°12'20"	1.37 MT
Wahoo	16/5/58	0130	-500	Underwater	11°20'41"	162°10'44"	
Holly	20/5/58	1830		Barge	11°32'38"	162°21'22"	

NAME	DATE (GCT)	TIME (GCT)	HEIGHT OF BURST (FEET)	TYPE OF BURST	GEOGRAPHICAL COORDINATES NORTH LAT	EAST LONG	YIELD	[illegible]
[illegible]								
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		

17 May 1973

ENVIRONMENT ... ATOLL CLEANUP

3g Present ... Radiological Survey

Introduction

The ra[illegible] ... or entirely from the nuclear exp[illegible] ... 1958. Some radio- activity resul[illegible] ... tests conducted else- where in the at[illegible] ... significant compared to radioactivity [illegible] ... The minimum radio- activity observ[illegible] ... 1973 was more than an order ... world-wide fallout and of local [illegible] ... (Beir, 197[illegible]) ... the scene of only two underwater ... from most other southern islands ... the southern islands of Eniwetok At[illegible] ... entirely from local fallout from t[illegible] ...

Only afte[illegible] ... only after centuries, will the local ... undergo natural nuclear decay ... radioactivity is as low as the rad[illegible] ... principally cosmic rays at this locat[illegible] ... residual, actually many, many ... required. Of course, our purpose [illegible] that [illegible] and in further [illegible] many to [illegible] radiological [illegible] the islands [illegible] world [illegible]

Radioactiv[illegible]

The [illegible] Atoll are present[illegible]:

- Cesium-[illegible] fission product. When pres[illegible] gamma rays externa[illegible] inhabitant[illegible]. Of less import[illegible] the top surface of soil [illegible] exposures. Being chemica[illegible] deposits in the muscle of the [illegible] via the food chain; the conseq[illegible] the risk of inducing [illegible]
- Strontium[illegible] is a fission product. Not[illegible] normally provides only a beta ray [illegible] deposits on the top surface [illegible] similar to calcium, it deposits [illegible] human body via the food chain, [illegible] the principally the risk of [illegible]

• Plut[illegible] 24,000 [illegible] is [illegible]r
[illegible] of the
nucl[illegible]
uran[illegible] (follow[illegible]
complet[illegible] the [illegible]tent
of the [illegible]
partic[illegible] 24,000 [illegible] is
of very [illegible]. The concern
is [illegible] to the
time [illegible] the subsequent
hazar[illegible] of plutonium-239
via the [illegible]

Other [illegible] result of the
various tes[illegible] are insigni-
ficant compared [illegible]nium-239 and
furthermore [illegible] the several existing
guidelines [illegible] general public.
These los[illegible] processes
during the test[illegible]

• Other [illegible] explosions.
• Isoto[illegible] other materials
nearb[illegible] explosion, for
examp[illegible], barres, and
cente[illegible] free neutron
capt[illegible]

[illegible] in [illegible]

Fall[illegible]

[illegible] radio-

activ[illegible] th[illegible]

the [illegible] under

water [illegible] nuclear

explosion[illegible] materials.

Due [illegible] and

cloud. [illegible] and [illegible] condense

onto [illegible] and

conden[illegible] vaporiza-

tion temperat[illegible] fission products

that are [illegible] parent

element [illegible] daughter element)

adhere [illegible] during these

processes.

[illegible] In general, [illegible] to

fallout [illegible] frac-

tionation is [illegible] land surface

burst the [illegible] at early times

and are [illegible] different

from the smaller [illegible] cloud [illegible] tim ... ant

per ...

str ... predi t

activ ...

the ...

frac ...

dep ... to

other ...

nuclear ...

An examp ... of the

particles in ... 1970 ... La

Crosse was ... Island.

The ... at

2.6 hours ... radioactive

disentegration ... particle

was found to ... the following

factors when ... as compared

with a ... lation was

found ... sizes ranging

between 0.5 and ...

Radionuc...	... for 0 microns / ... for 50 microns
stront...	[illegible]
promet...	[illegible]
urani...	... 47

[illegible] (one [illegible] [illegible] higher

te[illegible] [illegible]

pro[illegible] [illegible]

ur[illegible] [illegible]

of [illegible]

[illegible], however,

pri[illegible] [illegible] d

above. [illegible]

semi[illegible] [illegible] takes

this [illegible] [illegible] world-

wide and [illegible] is con-

sidered to [illegible] diameter, the

interm[illegible] [illegible] and the world-

wid[illegible] [illegible] percentage

of the total [illegible] that deposits

in local [illegible] [illegible] to be

[illegible]	Percentage in Local Fallout
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	
[illegible]	6[illegible]

differs North & South?

On the [illegible] large explosions [illegible] the combined [illegible] is la[illegible]tion, and [illegible] radi[illegible] ition of the radi[illegible] explosions [illegible] at Eniwetok At[illegible] just off islands tended not to [illegible] products in the fallout on the [illegible] cesium-137 and strontium-90 [illegible] these [illegible] fall-outs from [illegible] at the [illegible] surface.

An example [illegible] barge tests is provided [illegible] the Tewa test at Bikini Atoll [illegible] analyzed was taken at 16,000 [illegible] (Nathans, 1970).

Radionuclide [illegible]	S[illegible]	[illegible] 8.2 microns [illegible] microns
strontium-9[illegible]		
prometh[illegible]		
uranium		

Leaving aside [illegible] particle size, an analysis [illegible] particle sizes (Freiling, 196[illegible] little strontium-90 and cesium-137 [illegible] argument above.

In [illegible] diffe[illegible] ratios. Ele[illegible] retenti[illegible] fraction [illegible] with [illegible] varying fraction [illegible] the prope[illegible] are refract[illegible] of the [illegible] gases, alka[illegible] particle sizes [illegible] including [illegible] However, [illegible] interest rather [illegible] local and remote fallout.

The per[illegible] explosion residues fr[illegible] early fall-out is [illegible] radioactivity [illegible] water surface explosions, [illegible]. However, for land sur[illegible] higher, with estimat[illegible] environ-mental and [illegible] variations in these fractions [illegible] 436).

We now [illegible] from surface explosions o[illegible] is largely CaO and Ca(OH)$_2$ [illegible] particles from the surface [illegible] properties depending on wh[illegible] fireball from the nuclear explos[illegible] 1960, p. [illegible]).

[illegible] not

to [illegible]

[illegible]

[illegible]

th[illegible]

the [illegible]

hott[illegible]

On the [illegible] are

forme[illegible] fire-

ball. [illegible] particles,

with the [illegible]

proceeds at [illegible] Logi-

cally [illegible]

material and [illegible] have

been in con[illegible]

BEST AVA[illegible] COPY

Particle Size

Fallout [illegible] smaller than fine

sand, i.e., [illegible] distant

portions of the [illegible] i.e.,

roughly 1 [illegible] Glasstone,

1964, p. 41[illegible] size

of the fallout [illegible] distribution

law with th[illegible] with

mass median [illegible] standard

deviat[illegible] With

the [illegible] fine deposited [illegible] particles

[illegible] cloud [illegible] of

explo[illegible] partic[illegible]

size [illegible] particle

[illegible] particle

were [illegible] which w[illegible]

diameter [illegible] around

2.9 [illegible]

[illegible] fallout whose

size and [illegible]

15-megaton [illegible] fishing

vessel [illegible]

300-micron [illegible] and

400 microns.

As [illegible] of

local fall[illegible] particle sizes of

the cloud. [illegible] for which

the cloud [illegible] after the

nuclear exp[illegible] were

observed, [illegible] of [illegible] early cloud

centered [illegible] fallout

partic[illegible] p. [illegible]

For [illegible] contain

[illegible] all [illegible] of [illegible] oxide [illegible] from [illegible] a [illegible] us [illegible] (...et al., 1966) [illegible] nuclides [illegible] particles, while [illegible] volatile [illegible] smaller particles. The [illegible] is similar [illegible] (Tamplin and Fisher, ... ft, 1970, [illegible]).

Weathering

The [illegible] of the [illegible] islands will decrease [illegible] but also from weathering [illegible] of fallout from one location [illegible] years of the action at Eniwetok Atoll [illegible] activity or reposi- tioning [illegible] result from wind effects.

Furthermore [illegible] loosely adhering radionuclides [illegible] depth the soil above would prov[illegible] for persons being exposed [illegible], called leaching, depend[illegible] properties of the fallout [illegible] (Strecker, et al., 1965 [illegible]) the radioactivity over a period [illegible] Eniwetok Atoll, the future [illegible] difficult to estimate even [illegible] of the [illegible] nuclear

explo[illegible] period [illegible]

weathe[illegible]

leachi[illegible]

as cor[illegible] [illegible]

in fir[illegible]

halve[illegible] [illegible]C

it is [illegible] 1960). [illegible] ng

at Enie[illegible]

been removed, [illegible] probab[illegible]

much higher [illegible] experi-

ments. [illegible] significantly

hasten the [illegible]

Howeve[illegible] to depend

upon many va[illegible] 1965).

<u>Distri[illegible]</u>

The [illegible] the sea after

having been [illegible] in horizontal

distances by [illegible] distri-

bution is alt[illegible] of organisms

in and out [illegible]

The hor[illegible] determined

primarily [illegible] horizontal

dispersion [illegible] density gradients.

[illegible] distribution of fallout [illegible] greatly upon the

therm[illegible] the layer of [illegible]

zone [illegible] water [illegible]

of [illegible] tempera-

ture [illegible]

layer [illegible]

fairl[illegible] the upper [illegible]

require[illegible]. In

contrast, [illegible] layer [illegible] turbu-

lent [illegible] a layer [illegible] high

stabi[illegible].

BEST [illegible] COPY

In st[illegible] Atoll, analyses

were [illegible] and

colloidal-[illegible] considered in

these studies [illegible] colloidal-soluble

fract[illegible] after the nuclear

explosion, [illegible] concentrated

at the 100-m [illegible] Radically,

the particulate [illegible]

This was [illegible] which

showed that [illegible]

magnitude [illegible] fraction.

At the [illegible] fraction

increased [illegible]

appro[illegible] of the [illegible]

this [illegible]

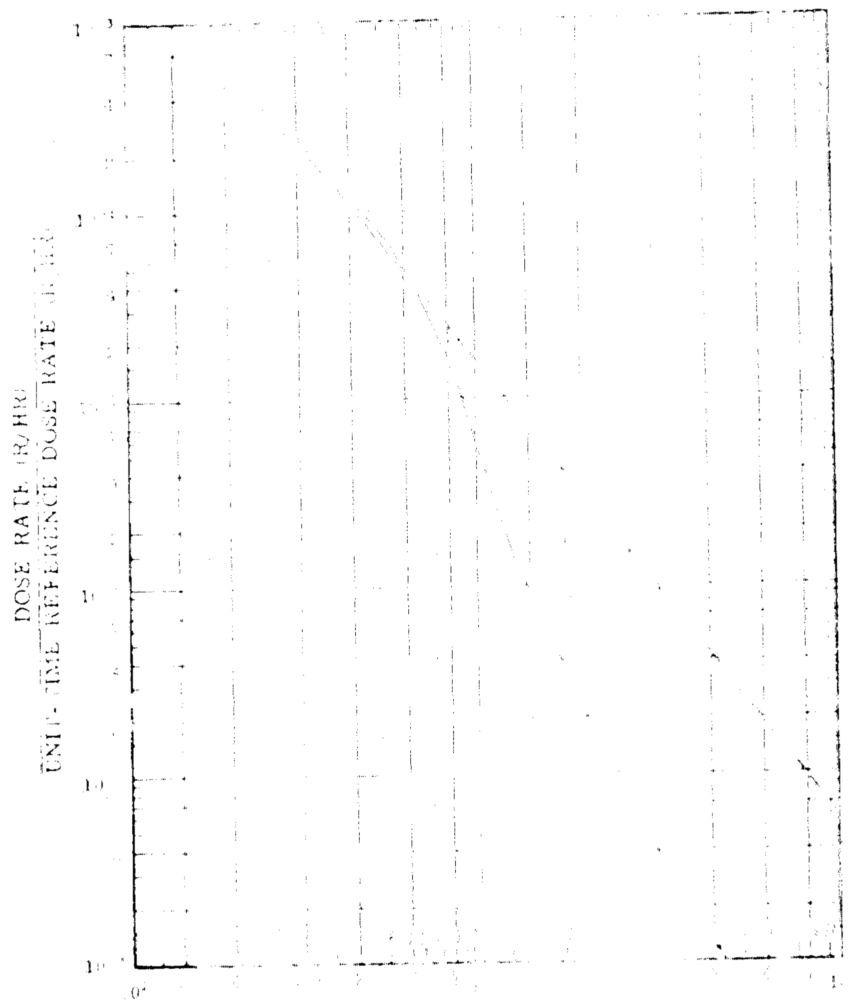
[illegible] tions about the [illegible] are not expected to apply [illegible] Enewetak Atoll [illegible] 60 miles [illegible] depth of th[illegible] than the [illegible] depth of the [illegible] line. The r[illegible] indicate that [illegible] the particular [illegible] ter from the [illegible] would have settled to the [illegible] of the lagoon within weeks after [illegible] explosion, [illegible] would have settled to the bottom [illegible] the [illegible] fallout [illegible] expected [illegible] in the open ocean.

Early [illegible]

The [illegible] are now only [illegible] have long since [illegible] is included here for [illegible]

The [illegible] within a second [illegible] called the initial radiation. [illegible] these prompt neu[illegible] in the radiological condition [illegible].

Following [illegible] radiation. However, some time [illegible] its maximum, a maximum [illegible] with time as seen in Figure [illegible] nuclear [illegible] (Glasstone [illegible] until fallout [illegible]. The mean arrival time [illegible] the test series has been [illegible] in the megaton [illegible] and results from



Figure

9.17

of this referen
possible to est
at any time at
24 hours afte
senting 24 ho
onto the plot
quired dose r
rate i.e., 0.2

9.18 If the
the value at
is to compare
two given tim
suppose the d
roentgens pe
respective ra
0.033, with
dose rate at
roentgens per

9.19 The
alternative f
somewhat l
taken as 1.0
rate in the s
quantity of
actual dose r
known, the
obtained by

RELATIVE T
VARI

the [illegible] / of the [illegible]

stabil[illegible] of the [illegible] which is about [illegible]

feet in [illegible]

[illegible] range of [illegible]

rea[illegible] to [illegible] the point [illegible] fallout [illegible] concent[illegible] the same order [illegible] (Glasstone, 1964, p. [illegible]).

The [illegible] amounts of rad[illegible] the radiation from this [illegible] (an [illegible] copy) shows the [illegible] after the explosion [illegible] R/hr (Roentgens [illegible] and down-wind posit[illegible] essentially zero at [illegible] (p. 4[illegible]).

Alth[illegible] measurement[illegible] the nuclear explosion [illegible], namely those in [illegible]

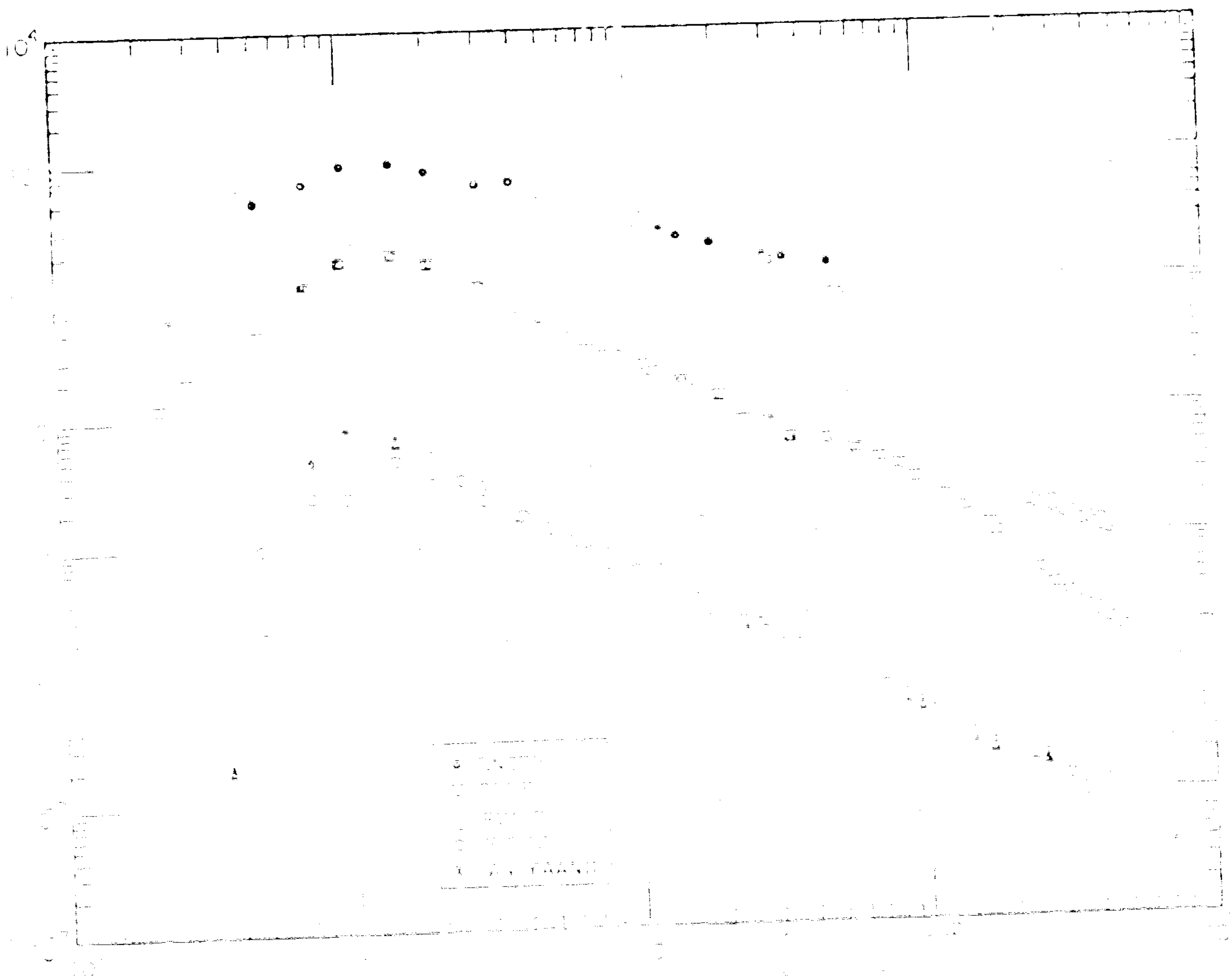


Fig. 6 - Mike fall-out intensity versus time.

F[illegible] of the [illegible] for [illegible] of [illegible] with the [illegible]:

Test	Location	Radioactivity
Cac[illegible]	[illegible]	[illegible]
Butt[illegible]	[illegible]	[illegible]; L[illegible] 0.04
Koa	[illegible]	[illegible]; Leroy [illegible]
Holl[illegible]	[illegible]	[illegible]
Yell[illegible]	[illegible]	[illegible]; Mary 0.02
Magn[illegible]	[illegible]	[illegible]; Leroy [illegible]
Tob[illegible]	[illegible]	[illegible] Helen [illegible] Janet 38; [illegible]
Rose	[illegible]	[illegible]; Leroy [illegible]
[illegible]	[illegible]	[illegible] Janet [illegible].8 Mary 0.04
Lind[illegible]	[illegible]	[illegible] 0.2; Janet 0.02
Elder	[illegible]	[illegible]; Janet 0.4; Leroy 0.04
Oak	[illegible]	[illegible] 0.3; Helen 0.05
Sequoia	[illegible]	[illegible]; Leroy [illegible]
Dogwood	[illegible]	[illegible]; Janet [illegible]; Leroy 0.02
Pisonia	[illegible]	[illegible]; Leroy [illegible]2
Olive	[illegible]	[illegible]; Janet [illegible]; Wilma 0[illegible]
Pine	[illegible]	[illegible]; Janet [illegible]; Leroy 0.02

The decay hist[illegible] radioactivities might have [illegible] at four hours aft[illegible].

Among [illegible] Afterwards [illegible] vicinity of the northern [illegible] in the [illegible] of the [illegible] islands [illegible] along with [illegible] generally [illegible] of [illegible] tests. The earliest [illegible] can [illegible] eastern [illegible] direction. The other [illegible] direction, is largely [illegible] to the [illegible] to the south. The table shows [illegible] one or the other of these [illegible].

Sea-Based Surveys

Much of [illegible] in the oceanic areas around [illegible] lagoon, has been obtained from [illegible] Laboratory of the University of [illegible] (Hines, [illegible]).

In June [illegible] first [illegible] almost two thousand fish [illegible] normal Bikini fish [illegible] and after these tests similar [illegible] study radioactivity [illegible] fish caught at nearby [illegible] radioactivity (Hines [illegible]).

Resurvey [illegible] in [illegible] scientific representation broaden [illegible] repr[illegible] non-fading plate of [illegible] (Bikini [illegible]

Bikini [illegible] 1947 collections [illegible] Atoll [illegible] on the

[illegible] Atolls

thou[illegible] collected [illegible] 65). A [illegible] survey

by [illegible] Laboratory [illegible]

Atol[illegible] 1949, p. 94) [illegible]

the April [illegible] algae,

inverte[illegible] the [illegible] results

of 194[illegible] generally as

expected [illegible] survey of

1949 [illegible] the [illegible] Atoll [illegible] Likiep.

The Eniwet[illegible] plant[illegible] shore.

Prior [illegible] Atoll [illegible] October

1952, the Ap[illegible] collections at

Eniwet[illegible] 1952), [illegible] Between

3 and 8 Nove[illegible] southern

islands [illegible] at Rojoa

Island [illegible] was 2 to

2.5 R/hr. [illegible] of vegetation

remained. [illegible] per

minute [illegible] minute

at th[illegible] of [illegible] increase

in act[illegible] with 340,0[illegible]

[illegible] tests of [illegible] Atoll in 195[illegible]

[illegible] Bikini [illegible] sharply

inc[illegible] in

195[illegible] the Japanese [illegible]

[illegible]

[illegible] of radioactivity [illegible] marine

life [illegible]

prec[illegible] potassium-40

and [illegible] and [illegible] of the

ruth[illegible] activity found in sea

water [illegible] per liter on

21 June [illegible] integrations

per [illegible] kilometers [illegible] of

Bikini. [illegible] be in solution, since

it passed [illegible] with depth showed

the activity [illegible] several hundred meters

depth.

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[illegible] survey ship, the

U.S. [illegible] activity samples

(Harley, [illegible] from 7 March 1955

until [illegible] cesium were

not [illegible] niobium, and

pr[illegible] activity [illegible] zero to

570 [illegible] less than observed

by [illegible] activity [illegible] to

14[illegible] 3.5 [illegible] for

ash [illegible] of the [illegible] level [illegible] that [illegible] the activity [illegible] chemical [illegible] the [illegible] portion of fish [illegible] two percent [illegible] level [illegible]

[illegible] survey [illegible] in [illegible] by [illegible] cells, [illegible] was [illegible] Sea, an area then [illegible] contamination.

The next [illegible] and [illegible]ember 1956 during the [illegible] Atoll and Eniwetok [illegible] 1962, [illegible] and Lowman, 19[illegible]8). [illegible] penetrate [illegible] surface layer. [illegible] Atoll, radioactivity was high. At [illegible] for plankton was 1.2 million [illegible] of [illegible] d/min·g was almost [illegible] Operation Troll in 195[illegible]. Another [illegible] the [illegible] to the Shunk[illegible] attempting to follow [illegible]. At these later times after [illegible] distance [illegible] the radioactivity [illegible] was [illegible] d/min·g eight[illegible] miles [illegible].

For [illegible] both was [illegible] for radioactivity [illegible] (H[illegible]). Plankton radioactivity was [illegible] d/[illegible] explosion on [illegible], and squ[illegible] the day [illegible]

of r[illegible]ivity [illegible] following the

Uabr[illegible] in the [illegible] about [illegible]

[illegible]

a [illegible]

p. [illegible] radioactivity [illegible] /min [illegible]

110 [illegible] 7 [illegible]

Land-[illegible]

A[illegible] or both

of th[illegible] 1954,

1955, [illegible] detonations.

However, th[illegible] thus relatively

less [illegible] the [illegible]

radioactivit[illegible] these

expedition[illegible] test

operation[illegible] instantaneous

radio[illegible] for the

month[illegible]

[illegible] 1954 following the

13 March 19[illegible] large [illegible]

locat[illegible] of the island.

The [illegible] May 1954

two day[illegible] year after

the t[illegible] could be attributed

to h[illegible] radiation

effec[illegible]

Coral [illegible] [illegible] approxi-

mately [illegible] ... [illegible]

[illegible] day and [illegible]

[illegible]

[illegible]

and [illegible]

a [illegible] activity

three [illegible] d/min/g in the

gut, but [illegible] about 10 thousand

d/min/g [illegible].

[illegible] radioactivity was

in 196[illegible] by [illegible] of [illegible] University of

Washington [illegible]

This was [illegible] of the world, and

so allowed [illegible] observations

(Welander [illegible] broad range of

organisms [illegible] evaluation at the

University [illegible]

[illegible] meters at

three feet [illegible] observations:

		[illegible] in mR/hr
Island	Average	Maximum
[illegible]	0.[illegible]	1.0 (near craters at north)
[illegible]	0.0[illegible]	
[illegible]	0.10	0.23
[illegible]	0.[illegible]	0.70

37

In th[illegible] the radioactivity was found [illegible] on [illegible] Atoll [illegible] the [illegible] nuclear tests [illegible] from [illegible] (Gessaman [illegible] 1971).

[illegible] Force Weapons [illegible] the following islands were surveyed [illegible], Aomon [illegible]. In gen[illegible] mR/hr, the la[illegible] readings of beta- and gamma-[illegible] along four equally spaced traverses [illegible] On Aomon the highest reading was [illegible].

In early [illegible] and Environmental [illegible] radiological survey of Run[illegible] survey, the AEC repr[illegible] of the Atoll, that this island [illegible] radiological survey could be made [illegible] the "waist" of th[illegible] position of radi[illegible] test.

Following [illegible] 1972, about [illegible] the AEC and the [illegible] conducted [illegible] Island [illegible] beta-gamma survey meters [illegible] (for plutonium [illegible] by means of americium-241 [illegible]) were used, the [illegible] detect [illegible] for plutonium [illegible] were made on 10-foot [illegible] analyzed in laboratory [illegible] samples [illegible] plutonium in the [illegible] detectable activity, but did record [illegible] activity and 28.4 d/min [illegible] of full-time workers [illegible] larger than a very small [illegible] of these findings [illegible] for the island.

S. G.

E.

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E. C. F.

R. E. H.

E. C. F.

R. W.

(40)

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F. G

G. R C

U.C [illegible]

Anil [illegible]

R.F [illegible]

[illegible]

[illegible]

[illegible]

Thom[illegible] 1971 [illegible]

p450

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[illegible]